TRADE CREDIT IN CHINA:

EVIDENCE FROM UNLISTED COMPANIES

by

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Abstract

This thesis analyses the use of trade credit in China, relying on balance sheet information for a large sample of unlisted companies over the period 2004-2007. We first investigate which factors drive the extension and the obtainment of trade credit. Private companies extend less trade credit the higher the amount of inventories they hold and the lower the share of capital owned by foreign agents. Consistent with the Triangle Debt Dilemma, state-owned enterprises and collective enterprises are more likely to obtain trade credit if they have previously extended it. We then examine the effect of net trade credit, measured as accounts payable minus accounts receivable, on the capital structure. We show that net trade credit is positively associated with total and short-term debt. This relationship holds in those provinces with high levels of marketization and it is valid for private and foreign firms only if located in the most developed provinces. Finally, we analyze how accounts payable and accounts receivable affect the extensive margin of exports. Accounts payable influence the probability of exporting through an inverted U-shaped relationship for all ownership types. However, the nonlinearity holds also for accounts receivable only for private companies.

Dedication

To my parents.

May happiness be with you.

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"It is what you do in the dark that puts you in the light." (Droga5, New York)

It is now time to go back to where it all begun.

Marco Giansoldati

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“There’s a feeling I get when I look to the West,

And my spirit is crying for leaving.

In my thoughts I have seen rings of smoke through the trees,

And the voices of those who stand looking.

Ooh, it makes me wonder.

Ooh, it really makes me wonder.

And it’s whispered that soon, if we all call the tune,

Then the piper will lead us to reason.

And a new day will dawn for those who stand long,

And the forests will echo with laughter.”

Jimmy Page, Robert Plant

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List of abbreviations

2SLS	Two-Stage Least Squares
3SLS	Three-Stage Least Squares
AR	Autoregressive
BEEPS	Business Environment and Enterprise Performance Survey
CCER	China Centre for Economic Research
CEOs	Chief Executive Officers
COEs	Collective Owned Enterprises
CSMAR	China Stock Market and Accounting Research
ECB	European Central Bank
EPFs	entrepreneurial private firms
FAME	Financial Analysis Made Easy
FTSE	Financial Stock Exchange
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
GNP	Gross National Product
HS-6	Harmonized System at 6-digits
IMF	International Monetary Fund
LGTR	local government tax rebate
NBS	National Bureau of Statistics of China
NERI	National Economic Research Institute of China

OLS	Ordinary Least Squares
POT	Pecking Order Theory
R&D	Research and Development
SAFE	Survey of Access to Finance
SMEs	small and medium enterprises
SOEs	state-owned enterprises
SYS-GMM	System Generalized Method of Moments
TOT	Trade-Off Theory
UK	United Kingdom of Great Britain and Northern Ireland
US	United States of America
WEO	World Economic Outlook
TWO	World Trade Organization

CHAPTER ONE

INTRODUCTION

This chapter introduces the background and research topics of the thesis. Section 1.1 discusses the general background of the research. Our three research questions are discussed in Section 1.2 and an outline of the thesis is then presented in Section 1.3. Finally, the contributions of the research are provided in Section 1.4.

1.1. Background

China has achieved a significant transformation in the last 35 years from a centrally planned to a market based economy recording GDP growth rates (at constant prices) of about 10% a year on average. In 2010 it surpassed Japan as the second largest economy in the world in terms of nominal GDP. Total investment as a percentage of GDP grew from 34% in 2000 to 43% in 2015.[1]

[1] All this set of information are computed or extracted from the data supplied by the International Monetary Fund (IMF) in the World Economic Outlook released in April 2016.

A significant contribution to the growth of the country is attributable to its engagement in international trade. In fact the share of China's trade over its GDP increased from 12.5% in 1980 to 64.8% in 2006, suffered a decline in the years of the global financial crisis, but then rose again and reached 41.2% at the end of 2015.[2,3] Looking at the volume of exports and imports of goods and services, they both grew at a remarkable average yearly rate of about 14% over the period 1998-2015, whereas the current account balance (as a percentage of GDP at current prices) averaged almost 3.9% over the same time span.[4] In addition, the World Trade Organization (WTO) (2015, p. 43) reports that at the end of 2014, China's merchandise trade represented 12.33% and 10.26% of total world exports and imports, respectively.[5] Looking at the contribution of firms owned by different agents to China's success in exports, Lardy (2014) indicates that the foreign firms' share of total exports reached a peak in 2005. Afterwards the country has become increasingly reliant on private domestic firms to sustain its role as a leading exporting economy in the world. Private firms' share of exports grew so significantly that, since 2009, the expansion of the value of private firms' exports has surpassed that of foreign companies (Lardy, 2014).

Yet, these remarkable achievements hinder the presence of large weaknesses in the architecture of the Chinese economy. First and foremost, China is a counterexample to the literature on finance and growth, which advocates a positive association between financial

[2] More precisely, the share of China's exports (of goods and services) over its GDP increased from 5.96% in 1980, peaked to 35.7% in 2006, and suffered a decline to 22.4% at the end of 2015. Conversely, the share of China's imports (of goods and services) over its GDP increased from 6.56% in 1980, peaked to 29.2% in 2005, and showed a decrease to 18.8% at the end of 2015.

[3] These ratios are retrieved from the World Bank data website and are based on World Bank national accounts data, and OECD National Accounts data files. To have a complete picture of the evolution of the data provided in the text please see the following links:
http://data.worldbank.org/indicator/NE.TRD.GNFS.ZS?end=2015&locations=CN&start=1980;
http://data.worldbank.org/indicator/NE.EXP.GNFS.ZS?end=2015&locations=CN&start=1980;
http://data.worldbank.org/indicator/NE.IMP.GNFS.ZS?end=2015&locations=CN&start=1980.

[4] Also these ratios are obtained from the April 2016 World Economic Outlook, published by the International Monetary Fund (IMF).

[5] These digits can be compared to the 8.53% and 12.64%, recorded for the United States, which confirm the relevance of Chinese engagement in global trade (WTO, 2015, p. 193).

development and economic growth (Demirgüç-Kunt and Maksimovic, 1998; Levine, 2005). In fact, the country has attained significant growth despite the presence of a relatively underdeveloped formal financial system (Allen *et al*., 2005; Poncet *et al*., 2010; Guariglia *et al*., 2011, Ding *et al*., 2013).

The banking system represents the cornerstone and the first component of the Chinese formal financial architecture. According to Allen *et al*. (2012 p. 9), the size of China's banking system, in terms of total bank credit directed to non-state sectors, was 116% of its GDP over the period 2001-2007. The figure is significantly larger than the average of other major emerging economies (65%). It is dominated by four large state owned banks, i.e. the Industrial and Commercial Bank of China, the Agricultural Bank of China, the Bank of China and the China Construction Bank. Historically these banks have favored state-owned enterprises (SOEs) in the allocation of funds, and neglected private firms which have been facing significant credit constraints. Private firms have partially overcome these constraints thanks to four strategic factors: the capability to generate large amounts of internal finance, the ability to manage working capital efficiently, the capacity to establish political connections and to build joint ventures with foreign partners (Guariglia *et al*., 2011; Ding *et al*., 2013; Du *et al*., 2015; Guariglia and Poncet, 2008).

The equity market is a second component of the formal financial system, but it is still underdeveloped. Allen *et al*. (2012, p. 8) document a non-negligible market capitalization to GDP ratio of 64% over the period 2001-2007, which is slightly larger than the 58% average of the other major emerging economies. Yet, the two domestic stock exchanges did not succeed in allocating resources in an effective manner. This can be explained as follows. First, prices and investors' behavior are not always driven by fundamental values of listed firms due to a poor rule of law and to limited regulation. Second, SOEs captured circa 57% of

the equity volume during the 2000s (Didier and Schmuckler, 2013, p. 121), leaving limited resources to private firms, despite these being the major drivers of China's growth.

The corporate bond market is the third component that makes up the formal finance architecture. Compared to government-issued bonds, the size of the Chinese corporate bond market is small. In terms of the amount of outstanding bonds at the end of 2008, the corporate bond market is less than one-fourth of the size of the government bond market. This is similar to what is recorded in other emerging economies, possibly due to the lack of rigorous accounting and auditing systems, and of high-quality bond rating agencies (Allen *et al*., 2012).

The faults of the formal financial system are to some extent compensated by the development of a robust informal financial structure. This involves borrowing from delegated monitors, as well as from family members and friends. It also includes "shadow banking" which is accompanied, amongst others, by trust or wealth management products, and accounted for 43% of China's GDP at the end of 2013 (Elliott *et al*., 2015, p. 8).

Trade credit plays a role as an "informal financial institution in developing and transitional economies" (Lin and Chou, 2015, p. 18). Trade credit has a dual nature. It is provided when there is a delay between the delivery of goods or the provision of services by a supplier, and their payment. For the seller, it is an investment in accounts receivable. It represents a large proportion of firms' assets in China, averaging 18.7% over the period 2000-2007 for unlisted companies (Guariglia and Mateut, 2016), and 10.7% over the period 2006-2012 for listed firms (Lin and Chou, 2015). For the buyer, it is a source of finance and is recorded as debt. The relevance of accounts payable to total liabilities for Chinese listed firms increased over time, growing from 15% in 2006 to 20% in 2012, whilst the average of accounts payable to total assets stood at 9.45% along the same time span (Lin and Chou,

2015). Earlier studies confirm the relevance of accounts payable on the asset structure of Chinese firm. Among these, Wu *et al*. (2012) show that accounts payable over total assets average 10.9% over the period 1999-2009 for listed firms, whereas Yano and Shiraishi (2012) record a mean value of 14.1% over the period 2001-2006 for unlisted companies.

Trade credit is by definition an inter-firm financial tool employed in the short-run for transaction motives, despite some evidence showing that it is also used in the long-run for financial purposes (Ge and Qiu, 2007). This is relevant as the largest part of leverage that Chinese firms accumulate (more than 50%) is short-term in nature (e.g. Li *et al*. 2009; Du *et al*., 2015). The infant stage of the bond and insurance markets development limits access to long-term debt (Chen, 2004; Huang and Song, 2006; Bhabra *et al*., 2008) and justifies the prevalence of short-term over long-term debt. This is why trade credit plays a non-negligible role in the capital structure of Chinese firms.

A link has been recorded between trade credit and the export engagement for Chinese firms. Lu (2013) analyses the relationship between trade credit growth, measured as the ratio between the yearly growth of accounts payable and total liabilities and the intensive margin of exports for Chinese unlisted companies over the period 2000-2006. He finds a positive and largely significant association between the two.

Given the abovementioned set of facts, it is important to define which are the factors affecting the size and evolution of trade credit, if and how it shapes the capital composition of Chinese firms and in what way it affects their export engagement. These research questions are of interest not only to the academic community of economists, but also to practitioners, managers and policy makers.

1.2. Research questions

This thesis deals with trade credit for Chinese unlisted firms over the period 2004-2007. Three empirical studies are carried out in order to address the following research questions.

First, the literature that looked at trade credit in China has so far concentrated on the analysis of the specific effect of a selected factor only on either accounts payable or accounts receivable or both. Guariglia and Mateut (2016), for instance, focus on the effect of political affiliation on accounts receivable, whilst Wu *et al.* (2014) concentrate on the effect of social trust on both accounts payable and receivable. To the best of our knowledge, no study has aimed at identifying a comprehensive set of determinants for the extension and the obtainment of trade credit in China. In contrast such an analysis was undertaken for developed countries, such as the UK (García-Teruel and Martínez-Solano, 2010a) or Spain (García-Teruel and Martínez-Solano, 2010b). It is thus our aim to test if the variables identified to have explanatory power in the developed world, can be fruitfully employed to describe the extension of accounts receivable and the obtainment of accounts payable for Chinese unlisted companies. We aim to do this by explicitly taking into account location and ownership heterogeneity across firms.

Second, there is extensive research on the capital structure of listed and unlisted firms for both developed (e.g. Bradley *et al.*, 1984; Titman and Wessels, 1988; Rajan and Zingales, 1995; Wald, 1999) and developing countries (e.g. Wiwattanakantang, 1999; Delcoure, 2007; Köksal and Orman, 2015 and Booth *et al.*, 2001). Several papers have focused on Chinese listed companies (e.g. Chen and Strange, 2005; Wu and Yue, 2009; Zhang *et al.*, 2015), but only two papers have concentrated on the capital structure of Chinese unlisted companies, limiting their focus to SMEs (Newman *et al.*, 2012; Du *et al.*, 2015). In addition, only two

papers (Michaelas *et al*., 1999; Degryse *et al*., 2012) looked at the effect of trade credit on leverage composition, focusing on the experience of unlisted SMEs in two different developed countries, i.e. the UK and Belgium, respectively. It is thus our aim to study the extent to which trade credit plays a role in the capital structure of unlisted Chinese firms, and identify any complementarity/substitution between net trade credit (accounts payable minus accounts receivable) and other forms of finance. We will undertake this study by addressing differences amongst firms in terms of ownership and degree of marketization of the provinces where they are located.

Finally, extensive research has looked at how financial constraints affect firms' internationalization in both developed (e.g. Greenaway *et al.*, 2007; Bellone *et al.*, 2010; Minetti and Zhu, 2011) and developing countries (e.g. Berman and Héricourt, 2010; Fauceglia, 2015), including China (e.g. Jerreau and Poncet, 2014; Manova and Yu, 2016). Yet, there are only two papers that have looked at the effect of trade credit on both the extensive and intensive margins of both exports and imports for a developed country, namely Germany (Eck *et al*., 2013; 2015). When concentrating on the effect of trade credit in the internationalization of Chinese firms, we identified only two contributions (Lu, 2013; van Biesebroeck, 2014). Lu (2013) focuses on the effect of trade credit (accounts payable and accounts receivable) on the intensive margin of exports for unlisted firms, whilst van Biesebroeck (2014), analyses the effect of accounts receivable on sales growth when firms, mostly SMEs, enter export markets. Thus, our third research question aims at testing how both accounts payable and accounts receivable influence the extensive margin of exports for Chinese unlisted firms, allowing the relationship to be nonlinear. We wish to take explicitly into account the presence of sunk costs in a dynamic setting and understand if the nonlinearity affects firms owned by different agents in a heterogeneous way. This is of particular relevance in the Chinese case as the

majority of firms in our sample are private companies, which face large constraints in the access to formal credit and might be highly leveraged. This is useful to unveil possible hazardous managerial practices and to help maximize the benefits that trade credit may provide to access international markets.

1.3. Outline of the thesis

In Chapter two we provide evidence on the determinants of accounts payable and accounts receivable for a large panel of unlisted firms over the period 2004-2007. We first identify a set of factors highlighted in the literature as potential determinants of the extension and the obtainment of trade credit. We then test their power in explaining accounts payable and receivable. By making use of a system generalized method of moments (SYS-GMM) estimation to deal with the potential endogeneity embedded in the regressors, we document that accounts payable and receivable move dynamically towards a target level. We also show that the extension of trade credit decreases when cash flow and external finance increase, especially for private firms. Private firms extend more trade credit the higher the share of capital owned by a foreign agent, but the lower the amount of inventories. We also show that consistently with the Triangle Debt Dilemma it is the extension of trade credit that leads to its receipt, especially for SOEs and collective firms.

In Chapter three we describe the role of trade credit in shaping the capital structure of Chinese unlisted companies located in provinces with different levels of marketization and owned by different agents. We explicitly emphasize the signalling power of creditworthiness associated with net trade credit. By making use, once again, of a system generalized method of moments (SYS-GMM) we document that net trade credit is positively associated with total

and short-term debt, but not with long-term debt. We also show that this relationship is economically stronger for firms located in the provinces with the highest levels of marketization. Finally, we document that net trade credit plays a positive role on the financial decisions of private and foreign firms located in those provinces with highest levels of marketization.

In Chapter four, we study how accounts payable and accounts receivable influence the probability to export. We emphasize the presence of the dynamic nature of the exporting process and the need to deal with the sunk costs required to start exporting. We thus take into account the initial condition issue when the lag of export status is included and when there is possible correlation between the unobserved heterogeneity and other explanatory variables. Also making use of a pooled probit technique, we show that there is evidence of an inverted U-shaped relationship between both measures of trade credit and the probability of exporting. When the estimation is undertaken for firms owned by different agents we show that accounts payable and exporting are linked by a U-shaped relationship for all types of firms. Yet, if accounts receivable and accounts payable are both considered at the same time, then the U-shaped relationship for the extension of trade credit is observed for private firms only.

Finally, Chapter five concludes with a summary of the results for our empirical studies, identifies implications and limitations and supplies suggestions for future research.

1.4. Contributions of the research

Access to finance represents a key driver for firms' growth, both in developed and in developing countries. In fact, a large literature concentrates on the finance-growth nexus. Several papers also consider the effect of financial constraints on firms' development and

international expansion. These include works on developed and developing nations. In the case of China, the presence of a largely immature banking system, coupled with the large relevance of informal finance, underlines the importance of our research on trade credit. We provide advancement in the literature along the following directions.

In Chapter two, we show that firms grant and receive trade credit with the aim to reach a target level. Despite counterintuitive, we find that having access to either internal or external sources of funds reduces the provision of accounts receivable. We prove that private firms extend less trade credit the larger the involvement of a foreign investor in the capital of the firm and the lower the stock of inventories they hold. We also show that that the supply of accounts receivable is positively associated with the obtainment of accounts payable, especially for state-controlled enterprises. To the best of our knowledge, no previous study has comprehensively investigated the determinants of both trade credit extended and received for unlisted Chinese firms in a dynamic fashion, taking into account ownership and geographical heterogeneity. Our paper contributes to the trade credit literature in at least two ways. First, we investigate, for the first time, how factors related to the financing advantage theories, the transaction costs hypothesis, price discrimination and implicit product quality guarantee influence the obtainment of account payables and the extension of account receivables in a sample of unlisted companies of a large transition economy. Second, we enhance our understanding on how the determinants of accounts payable and accounts receivable change when firms are owned by different agents and are located in areas with different levels of marketization.

In Chapter three we show that trade credit is a means to transmit information of trustworthiness to business peers and to both formal and informal providers of capital, taking into account ownership as well as economic and institutional development. We thus

contribute to the corporate finance literature by explicitly addressing the role played by trade credit in the capital structure of unlisted companies in a large transition country. We also contribute to the entrepreneurial finance literature by examining the signalling effect of ownership attributes on debt financing, highlighting the relevant heterogeneity associated with an uneven institutional development.

In Chapter four, we demonstrate that accounts payable and accounts receivable affect the probability to export through an inverted U-shaped effect. Focusing on different ownership groups, we show that accounts payable and exporting are linked by a U-shaped relationship for all types of firms. If accounts receivable and accounts payable are both considered at the same time, then the U-shaped relationship for the extension of trade credit is recorded only for private firms. With this set of results we contribute to the trade literature by including trade credit as a brand new element of firm heterogeneity, with the aim of better explaining the determinants of the extensive margin of trade. We also enrich the corporate finance literature, which has looked at the effects of different forms of financing on both domestic operations and opening up of international trade.

CHAPTER TWO

WHAT DRIVES ACCOUNTS PAYABLE AND RECEIVABLE FOR CHINESE UNLISTED FIRMS?

2.1. Introduction

Despite the absence of a well-developed financial and institutional system, China has one of the fastest growing economies in the world. Allen *et al*. (2005) argue that alternative financial channels, rather than formal external finance, have played a role in supporting the fast-paced expansion of domestic firms, especially the private ones. Yet, later studies do not unanimously confirm this perspective and point to other different sources of funds such as internal finance (Cull *et al*., 2009; Ayyagari *et al*. 2010; Guariglia *et al*., 2011).

Two statistics are worth mentioning here. First, informal finance (loans from informal financial institutions and friends) represents 9.87% of the total financing of working capital

(Allen *et al*., 2013).[6] Second, trade credit is almost identical to the amount (97%) of informal finance (Degryse *et al*., forthcoming).[7]

Trade credit has thus a twofold nature. It is provided when there is a delay between the delivery of goods or the provision of services by a supplier and their payment. For the seller, it represents an investment in accounts receivable. It accounts for a large proportion of firms' assets in China, averaging 18.7% over the period 2000-2007 for unlisted companies (Guariglia and Mateut, 2016), 14.5% over the period 1999-2009 for 1,729 listed enterprises (Wu *et al*., 2012) and 10.7% over the period 2006-2012 for 1,213 listed firms (Lin and Chou, 2015).[8] For the buyer it is a source of finance and, as such, it is recorded under the liabilities. The relevance of accounts payable to total liabilities for Chinese listed firms increased over time, rising from 15% in 2006 to 20% in 2012, whilst the average of accounts payable to total assets stand at 9.45% along the same time span (Lin and Chou, 2015). Further data on the relevance of accounts payable on the asset structure of Chinese firms is confirmed also by previous studies. Wu *et al*. (2012) indicate that accounts payable over total assets average

[6] Data refer to the year 2002 and derive from a survey conducted in the early 2003 on 2,400 small enterprises from 18 cities that are representative of a wide range of regions in China.

[7] We thank Liping Lu, one of the authors, for providing us with the data to compute this ratio. The original data refers to a survey undertaken in the year 2006 on 4,300 firms, which, at that time, represented 1% of private firms (mostly unlisted). Degryse *et al*. (forthcoming) make use of this data in their investigation on the co-funding of Chinese firms.

[8] Guariglia and Mateut (2016) argue that their figure is similar to those recorded by Bartholdy and Mateus (2008) across Southern European countries that show ratios between 7% and 19%. Conversely, when looking at the ratio between accounts receivable and total sales, Guariglia and Mateut (2016) register a 17.2%, which is close to the 17.1% recorded by Bougheas *et al*. (2009) for the UK.
Wu *et al*. (2012) also indicate that the ratio between accounts receivable and total sales for Chinese listed firms is equal to 34%, pointing to a larger extension of trade credit by listed firms. In a more recent contribution on Chinese non-state listed companies between 2003 and 2008, Wu *et al*. (2014) show that the ratio between accounts receivable and total assets is equal to 12.61%.
Older figures are provided by Cull *et al*. (2009) and Ge and Qiu (2007). Cull *et al*. (2009) concentrate on the ratio between accounts receivable and total sales for firms located in China and owned by different agents. They show that over the period 1998-2003, the ratio ranges from 17.9% for domestic private firms to 36.5% for state-owned enterprises (henceforth SOEs). In their analysis of Chinese largely unlisted non-financial firms for the year 2000, Ge and Qiu (2007) report that the ratio between accounts receivable and total assets, and between accounts receivable and total sales, is equal to 13% and 27%, respectively.

10.9% over the period 1999-2009 for almost 1,800 listed firms, whereas Yano and Shiraishi (2012) record a mean value of 14.1% over the period 2001-2006 for 509 unlisted companies.[9]

The relevant role played by trade credit in both assets and liabilities composition thus justifies a thorough study on the determinants of both accounts payable and accounts receivable for Chinese unlisted firms, owned by different agents and located in provinces with different degrees of marketization.

There are many theoretical explanations for trade credit. Trade credit might provide access to capital for firms unable to raise money through formal finance (Schwartz, 1974). Suppliers might also have better access to customers' financial and economic information and hence be able to evaluate and control the credit risk of their customers better than banks (e.g. Smith, 1987, Mian and Smith, 1992; Fabbri and Menichini, 2006). Trade credit may also represent a tool of indirect price discrimination through credit when direct price discrimination is forbidden (e.g. Brennan *et al*., 1988; Petersen and Rajan, 1994). It may also be used as an instrument to reduce the level of transaction costs and provide customers with the time needed to check the quality of the supplier's products (e.g. Ferris, 1981; Emery, 1987). Finally, trade credit can be used to provide an implicit product quality guarantee (e.g. Lee and Stowe, 1993) and reduce the possible negative effect of changing macroeconomic conditions (e.g. Kashyap *et al*., 1993).

Different works have looked at the determinants of trade credit, both for developed (e.g. Giannetti *et al*., 2011; Petersen and Rajan, 1997) and developing countries (e.g.

[9] The figures provided by Yano and Shiraishi (2012) are based on a panel of 509 rural firms. Yano and Shiraishi (2016) also show that the ratio of notes and accounts payable over total capital is equal to 25% for a panel of domestic non-SOEs over the period 1998-2007. The value is equal to 26% in coastal provinces and it declines to 19% in interior provinces.
Wu *et al*. (2012) indicate that the ratio of accounts payable over total sales is 20%. Additional but, but once again older statistics, are provided by Ge and Qiu (2007), who show that the ratio between accounts payable and total assets, and between accounts payable and total sales is equal to 14% and 23%, respectively.

Demirgüç-Kunt and Maksimovic, 2001; McMillan and Woodruff, 2002; Delannay and Weill, 2004). Only a couple of articles concentrate on the dynamic nature of trade credit, showing that there is a speed of adjustment for accounts payable for UK SMEs (García-Teruel and Martínez-Solano, 2010a) and for accounts receivable for Spanish SMEs (García-Teruel and Martínez-Solano, 2010b). More recently, some literature has focused on Chinese listed firms, but it almost exclusively concentrated on the complementarity/substitution between trade credit and bank credit (Huang *et al*., 2011; Du *et al*., 2012; Lin and Chou, 2015). A very recent exception is provided by Oh and Kim (forthcoming), who look at the effect of sales growth on both accounts payable and accounts receivable for a panel of listed firms between 2000 and 2013.

This Chapter aims to fill at least four gaps in the literature on trade credit.

First, the overwhelming majority of studies trying to provide an explanation of accounts payable or accounts receivable, or both, concentrate on developed countries. This is the case, for example, of García-Teruel and Martínez-Solano (2010c) who analyze the factors driving both sides of trade credit in a sample of European countries; García-Teruel and Martínez-Solano (2010b) who study the determinants of accounts receivable for Spanish SMEs; and García-Teruel and Martínez-Solano (2010a) who examine the determinants of accounts payable for UK SMEs. This Chapter is the first to provide a thorough study of the determinants of both accounts payable and accounts receivable for a large transition economy.

Second, to the best of our knowledge, the literature on trade credit in China analysed the impact of one factor only on one or either both aspects of trade credit. This is the case of at least five studies. Guariglia and Mateut (2016) investigate how only political affiliation affects only the extension of trade credit by unlisted companies. Wu *et al*. (2014) focus on the effects of only social trust on both accounts payable and receivable, and only for listed firms.

Yano and Shiraishi (2012) investigate how only performance affects the amount of accounts payable for a small sample of rural enterprises. Oh and Kim (forthcoming) look only at the relationship between growth prospects and both accounts payable and receivable only for listed firms. Cull *et al*. (2009) investigate which ownership types are more likely to extend accounts receivable only, placing particular emphasis on firms' profitability. To the best of our knowledge, no previous literature provided a thorough and comprehensive examination of a broad set of factors that may affect both trade credit extended and received for unlisted Chinese companies. This is the second gap in the literature we fill.

Third, we supply an investigation on the determinants of both accounts payable and accounts receivable for different ownership types, namely private firms, foreign companies, and State-Owned plus collective enterprises. We take stock of the financial frictions that affect private and foreign firms, and the soft budget constraints of SOEs and collective firms (Allen *et al*., 2005; Poncet *et al*., 2010; Guariglia *et al.*, 2011). In this manner we are able to complement the work by Ge and Qiu (2007) who look at the determinants of accounts payable and net trade credit for SOEs and non-SOEs, but they do not disentangle the ownership types that compose the latter group.

Fourth, we examine how the determinants of trade credit vary across firms located in areas with different degrees of marketization (Fan *et al*., 2010). This is relevant because the large heterogeneity across Chinese provinces has been proved to affect firms' profitability (Choi *et al*., 2015). To the best of our knowledge, no previous contribution took into account how marketization shapes the determinants of both accounts payable and receivable. This is thus the fourth gap we intend to fill.

Starting from these premises and making use of a large firm-level dataset for the years 2004-2007, our results first show that the decision to grant and receive trade credit follows a

model of partial adjustment. Second, we document that the extension of trade credit decreases when cash flow and external finance increase. These counterintuitive results derive from the features of the Chinese financial markets. Firms that are able to internally generate funds or to access any form of external finance are reluctant to extend trade credit given the high value embedded in the resources they hold. Third, looking at firms owned by different agents we observe that private companies are financially constrained and seem to be involved in the production of low-quality goods, given the low lead time required to perform the manufacturing process. The level of accounts receivable for private firms raises if they have a share of capital owned by a foreign investor. This could be not only related to mere financial motives, such as the easy access to finance through their internal capital flows. It may also depend on the larger efficiency and perceived reliability that the foreign presence brings along and the larger likelihood of such firms to have their debt repaid, compared to their non-participated peers. This may foster domestic participated firms to increase the extension of trade credit. We also demonstrate that there is a tradeoff between holding inventories and offering trade credit, as sellers subsidize the shift of inventories to buyers. Finally, we show that the extension of accounts receivable is positively associated with the obtainment of accounts payable. This relationship is stronger the lower the level of marketization and it holds for firms owned by different agents, despite being stronger for SOEs and collective firms. All these aspects may point to a revival of the Triangle Debt Dilemma, which developed in the early ‘90s when, especially SOEs, forced their suppliers to offer them credit due to inadequate cash flow or an excessive tax burden.

The remainder of the paper is structured as follows. In Section 2.2, we describe the theories that have been so far presented by the literature to explain the use of trade credit. Section 2.3 summarizes the contributions of our work. Section 2.4 provides the hypotheses we

wish to test. Section 2.5 presents the baseline specifications and the estimation methodology. Section 2.6 describes the data used and shows summary statistics, whilst Section 2.7 provides our empirical results. Section 2.8 concludes, and provides policy recommendations and paths for future research.

2.2. Literature review

The analysis of the literature on trade credit is developed along three different avenues.

First, we provide a brief explanation of the theories of trade credit. We recall not only the seminal contributions that helped to developed them, but also some sketchy connections with more recent articles.

Second, we concentrate on the empirical contributions. Given the large amount of articles that investigate the motives of trade credit in countries different than China, we only analyse those that explicitly deal with the determinants of both accounts payable and receivable and treat the two sides of trade credit as dependent variables. A special space is reserved for those few works that analyse trade credit in a dynamic fashion.

Third, we describe the contributions on the determinants of accounts payable and/or accounts receivable for the Chinese case. Yet, we avoid the papers whose main focus is the complementarity/substitution between trade credit and bank credit. We wish, in fact, to isolate the articles that explain trade credit primarily on the basis of a non-financial motive, although controlling for it.

We identify a gap in the literature by observing the second and the third avenue. No contribution has so far provided a thorough examination of the determinants of both payables

and receivables for Chinese unlisted companies, especially in a dynamic fashion. Our paper fills this gap.

2.2.1. Theories of trade credit

We are aware that a large number of theories have been proposed to describe the motives for the existence and the use of trade credit. Yet, here we provide a brief analysis on those theories that are likely to help us to shed light on the empirical studies of Chinese unlisted companies. Below, we thus describe the financing advantage theory, the price discrimination theory and the transaction cost theory. Motives related to implicit product guarantee and to changing macroeconomics conditions are also included. For the first three theories we heavily rely on Petersen and Rajan (1997).

2.2.1.1. Financing advantage theories

The supplier may present an advantage over banks and other financial institutions in assessing the solvency of her clients, but also a better capability to control and impose repayment of the credit. This will lead to possible costs advantages that the supplier may have over financial institutions when offering trade credit (Schwartz, 1974). This type of cost advantages stem from different sources, at least three.

The first one is related to the supplier's ability to have much closer contact to the buyer's offices than a financial institution would usually have. The seller is also able to observe the buyer's behavior in terms of the frequency and size of orders, and its capability to take advantage of early payment discounts. The vendor is thus able to identify signs of

economic and/or financial distress of the purchaser. Many authors stress that the informational advantage of trade creditors derives from the strong transactional relationship between trade creditors and debtors. This reduces the inefficiency arising from asymmetric information and allows suppliers to provide funds to liquidity constrained companies (e.g. Smith, 1987, Mian and Smith, 1992; Biais and Gollier, 1997; Jain, 2001, Fabbri and Menichini, 2006).

The second type of financial cost advantage is concerned with the type of goods sold by the supplier and the role these play in the activity of the buyer. They might be easily substituted with goods from another supplier, or their specific features may imply an idiosyncratic relationship with the manufacturer (e.g. Dass *et al.*, forthcoming). If this is the case, then the vendor can threaten to cut future supplies if the buyer is not able to fulfil her obligations, especially if the latter is not a key partner in the business relationship. Conversely, financial institutions may have more limited powers, especially for past finance and for the little effect in the short-run that a threat to reduce the supply of funds may have (e.g. Cuñat, 2007).

The third source of financial advantage emerges when the buyer experiences a default. In this case the vendor is able to repossess the goods supplied and resell them through an established channel of business relationships which the banks normally do not have. If the goods are mostly durable items then the credit that the supplier can extend is higher, but, at the same time, the possibility to place them on the market is more complicated. Moreover, the less the goods are transformed by the buyer, the higher is the supplier's advantage over banks and other financial institutions. Yet, this difference depends on the selected industry and, therefore, on goods' characteristics (e.g. Frank and Maksimovic, 2005; Longhofer and Santos, 2003). More recent works also point to the fact that trade creditors are less exposed to debtors'

diversion than financial institutions are because it is harder to divert goods that vendors sold than to divert cash lent by banks (e.g. Burkart and Ellingsen, 2004; Giannetti *et al*., 2011)

2.2.1.2. Price discrimination

Trade credit may be used to carry out price discrimination when this is otherwise legally prohibited (Meltzer, 1960; Schwartz and Whitcomb, 1979; Mian and Smith, 1992). Since credit terms are defined regardless to the credit quality of the purchaser but are set according to the industry practice, trade credit lowers the real price for credit paid by low-quality borrowers (Smith, 1980; Petersen and Rajan, 1994). This is especially the case when the demand in the selected segment of the market is more price elastic, which usually occurs if there is credit rationing (Petersen and Rajan, 1997). Firms with high market power have a solid motivation to increase their sales without reducing the price offered to old customers. Solvent and financially healthier buyers will promptly repay for the goods purchased even if they perceive the terms of the transaction too expensive. Conversely, buyers facing credit bank constraints will accept the borrowing, either because it is the only source they have access to, or because it is cheaper (e.g. Brennan *et al*., 1988; Petersen and Rajan, 1994).

A complementary version of this theory advocates that the supplier might be interested in keeping the relationship with the customer alive in the long-term, which is more likely to occur if the supplier has no real alternatives for the purchaser. The supplier does not only take into account the profit from the current transaction but it also wishes to protect the present value of all revenues stemming from future operation (Petersen and Rajan, 1995).

2.2.1.3. Transaction costs theories

One version of the transaction cost theory is related to paying bills. A firm may prefer not to pay the bills every time the goods are supplied, but at pre-determined deadlines, such as every month, every two months or every three months. This allows the company to save on administrative procedures, but also to organize the cash flow in advance, avoiding undesired payment oscillations. The company thus needs to hold smaller cash balances and saves money accordingly (Ferris, 1981). Another version of the theory implies the use of trade credit to smooth the seasonal effect that may impact the manufacturing process and the building up of inventories. If the firm is able to selectively offer trade credit across different buyers and different times, it may manage its inventories in a more efficient fashion. This may in fact translate into a reduction of the stock of inventories to be continuously kept, and, therefore, the associated costs of financing them (Emery, 1987). Yet, only more recently, Daripa and Nilsen (2005, 2011) have theoretically investigated how the trade–off between trade credit and inventories affect the terms of trade agreements. In their framework the vendor offers trade credit to incentivize purchasers to hold more inventories. Their motivation for the use of trade credit is very similar to the one driving Bougheas *et al*. (2009) who identify the response of accounts payable and accounts receivable to changes in the cost of inventories. These authors claim that the seller, who faces uncertainty in the demand for its products, extends accounts receivable to financially constrained purchasers in order to obtain credit-financed sales and thus avoid to keep large inventories.

2.2.1.4. Implicit product quality guarantee

Trade credit can be used also to provide an implicit guarantee to the seller's products. In other words, it supplies the buyer with the time needed to evaluate the quality of the product before proceeding with the payment (Lee and Stowe, 1993). This is of particular importance especially for small and medium size enterprises that employ trade credit as a form of guarantee (Frank and Maksimovic, 2005).

2.2.1.5. Changing macroeconomic conditions

Trade credit may reduce the efficacy of monetary control but also mitigates the biased effects that arise from contractionary monetary policy (Schwartz, 1974). In fact, when the supply of loans is restricted, larger companies with easier and consolidated access to formal finance from banking and non-banking institution, can extend accounts receivable to constrained firms (Kashyap *et al*., 1993). Within this framework, smaller companies might be inclined to extend the terms of trade credit as the increasing interest rates requested by financial institutions make trade credit a cheaper source of short-term financing.

2.2.2. The empirics of trade credit

2.2.2.1. Countries other than China

2.2.2.1.1. A dynamic approach to the study of trade credit

To the best of our knowledge only two papers investigated the determinants of trade credit in a dynamic fashion. These are García-Teruel and Martínez-Solano (2010a, 2010b).[10]

García-Teruel and Martínez-Solano (2010a) focus on defining the determinants of accounts payable and check if trade credit received follows a model of partial adjustment. The authors isolate five different features to be used as determinants. First, they state that the quality of the firm's credit must be evaluated, as companies with higher creditworthiness, measured by size and age are more likely to receive credit from their peers.[11] Second, they look at how the liquidity position is able to affect the demand for trade credit. Firms with higher ability to generate internal funds are also less likely to ask for trade credit to their suppliers. Third, firms that resort to accounts payable may do so because they face tough access to formal finance, especially through the banking channel. Therefore the authors expect a relationship of substitution between the sources of finance provided by credit institutions, and those provided by suppliers. They also take into account the cost of external finance which should deter the use of formal sources of credit. Fourth, growth opportunities are considered and should positively affect the demand for formal and informal finance. Fifth, the authors wish to check the maturity matching principle, i.e. whether firms tend to match the maturity of their liabilities and the liquidity of their assets. The authors expect that firms that

[10] Huyghebaert (2006) provides a study on the dynamics of trade credit, but she does not analyse the speed of adjustment of accounts payable. By relying on information on 328 Belgian business start-ups between 1992 and 2002 for a total of 2,682 firm-year observations, she aims at explaining accounts payable through a set of variables. These include proxies for the financial discrimination theory and the financing advantage theory of trade credit, the entrepreneurial attitude towards control and the perceived firms' product quality. She augments the regression by including age, size, assets growth, assets tangibility and GNP growth as control variable. The regression is estimated through an ordinary and a pooled OLS. Results show that start-ups that are more financially constrained, on the basis of internal cash production and price of their bank debt, employ more trade credit. Suppliers may enjoy from an advantage in financing high-risk customers if start-ups 1) employ a large amount of trade credit when raw materials are often replaced, 2) have a high collateral value and 3) the industry has a low concentration value. In addition, all measures testing the transaction cost theory of trade credit are supported.

[11] However, bigger and older firms might not need to ask for suppliers' credit as they may have access to other formal channels of credit. This is confirmed by recalling the financial growth cycle model of Berger and Udell (1998) who state that trade credit is more important for smaller and younger firms which typically present a less transparent financial sheet.

invest more in current assets will also make more use of short-term debt, and trade credit in particular. In order to be precise on the source of current financing, the authors divide currents assets into three components, namely cash, inventories and accounts receivable, all scaled by total assets.

Data are obtained from a panel of 3,589 small and medium UK firms for the period 1996-2001. The regression implies to explain accounts payable through the abovementioned set of explanatory variables whilst controlling for macroeconomics conditions. The econometric specification is estimated via a dynamic panel data model through a two-stage Generalized Method of Moments (GMM). Results show that the lagged dependent variable carries a positive and significant sign. As far as the other explanatory variables are concerned, there is a negative relationship between size and accounts payable, implying that larger firms can easily resort to formal channels of credit. However, the other measures of firm's creditworthiness, age and age squared are not significant. At the same time, companies with higher levels of both short- and long-term debt and with lower financing costs use lower accounts payable, supporting the idea of a substitution between supplier-provided finance and alternative sources of finance. There is a negative relationship between cash flow and accounts payable, as firms reduce the need of trade credit from their suppliers when they are able to generate funds internally. Firms with a positive growth in sales are going to ask for more trade credit from their suppliers in order to finance their expansion. However, there is no significant effect of current assets on accounts payable, which is absent also when the item is split into its three components.

In a complementary fashion, García-Teruel and Martínez-Solano (2010b) analyse the determinants of accounts receivable for Spanish SMEs, placing particular emphasis on the

adjustment process.[12,13] First, the authors argue that firms suffering from low demand may use trade credit to incentivize their customers to acquire goods. Second, they state that firms' creditworthiness (size and age) affects their level of trade credit extended. Third, they claim that firms' capability to generate internal finance should encourage the extension of trade credit. Fourth, firms that wish to provide a proof of their products' quality to their buyers allow for a delayed payment, as it takes longer to produce higher-quality than low-quality goods. Fifth, firms with greater profitability are more inclined to extend their sales.

The authors rely on a panel of 2,922 Spanish SMEs over the period 1997-2001. They employ a one stage GMM technique to estimate a regression where the dependent variable is accounts receivable, whereas a set of explanatory variables able to capture the abovementioned characteristics is employed. Results show primarily that there is high speed of adjustment. Outcomes also show that firms extend more trade credit when their sales growth is smaller, which may indicate that companies may use accounts receivable to support their sales. Yet, at the same time, smaller firms, which have limited reputation, use more trade credit to guarantee their product. Companies with larger current liabilities and able to generate more cash flow also extend more trade credit.

2.2.2.1.2. Trade credit disentangled: accounts payable and accounts receivable

[12] Given the high levels of accounts receivable shown by the firms under scrutiny, it is of particular relevance for SMEs to establish a target level and thus avoid the negative effects on both profitability and liquidity due to uncollectible sales

[13] In a later work, Martínez-Sola *et al*. (2013) analyse the impact of account receivable in shaping the market value for a sample of Spanish firms between 2001 and 2007. Given the non-linear relationship between trade credit granted and market value, a test is performed to understand the effects of the deviations of accounts receivable from their target level. It is thus estimated a model that tries to explain accounts receivable with annual growth rate of sales, size, short-term financing, the cost of external financing, the firm's capability to generate internal funds, product quality and profit margin. The residuals obtained from this regression are then employed to identify the effect on the Tobin's *q* and on the market-to-book ratio. Results show that as firms move away from the target accounts receivable level, this decreases their value.

An interesting contribution looking at the determinants of both accounts payable and receivable is provided by Niskanen and Niskanen (2006) who concentrate on the Finnish experience and rely on a sample of 840 companies between 1994 and 1996 for a total of 2,714 annual observations.

The authors first look at the determinants of accounts receivable and isolate a set of independent variables. These include size, the capacity to generate internal finance, firm's growth, and price discrimination. Additional explanatory variables look at the bank-borrower relationship, at interbank competition, control if a firm is located in a rural or urban area, and take into account macroeconomic conditions. The authors then look at the determinants of accounts payable and identify a set of explanatory variables. These include a measure of the supply of trade credit, asset maturity, demand for formal alternative capital and for the presence of constrained access to bank credit. Some explanatory variables previously employed to explain accounts receivable are also used to describe accounts payable.[14]

Results on the extension of trade credit show that creditworthiness, access to capital markets and sales growth do have a positive effect. It is confirmed the importance of the availability of external funds and the larger extension of trade credit by firms located in urban areas. There is instead no support for the price discrimination theory. Results on accounts payable indicate that purchases play a key positive role and that older and larger firms receive a lower amount of trade credit. Internal financing and asset maturity are also positively associated with accounts payable. Firms that asked for a renegotiation of their loans and are located in the urban areas tend to need more accounts payable.

A recent work which aims at testing both components of trade credit is supplied by García-Teruel and Martínez-Solano (2010c) who look at the determinants of accounts payable

[14] These include firm size and age, sales growth, internal financing, measures of banking relationship and bank competition, the urban/rural dummy, macroeconomic factors and the market interest rate.

and accounts receivable across different European countries over the period 1996-2002. The authors make use of firm-level data on SMEs from seven European countries, i.e. Belgium, Finland, France, Greece, Spain, Sweden and the UK from 1996 till 2002, relying on a panel of 47,197 SMEs.

From an empirical standpoint, the authors look at the determinants of two dependant variables, accounts receivables and payables. There are common explanatory variables for trade credit given and received and some others specifically attributable to either one or the other. Common explanatory variables include age, size, cash flow, financing costs and change in sales. There are some explanatory variables that the authors select as determinants of accounts receivable only. These include short-term finance, turnover, and gross profit. There are also some explanatory variables selected by the authors as determinants of accounts payable only. These include short- and long-term financial debt and current assets.

The results obtained through a GMM estimation technique show that the determinants of trade credit are substantially similar across the selected countries. Trade credit seems to support the price discrimination theory as firms with greater margins are more inclined to extend accounts receivable. Firms with lower sales turnover and of smaller size extend less trade credit. If looking at accounts payable, firms tend to use less trade credit when the firm is able to generate funds internally. Bigger firms with greater growth opportunities receive more trade credit from their suppliers. Accounts payable also increase when currents assets grow, even if its three components of cash, inventories and accounts receivable are considered separately in the specified regression.

2.2.2.2. Evidence from transition and developing countries

Few papers analyse explicitly the determinants of trade credit in developing countries. To the best of our knowledge, one of the first and most authoritative contributions looking at the experience of a developing country is provided by McMillan and Woodruff (1999) who analyse how relational contracting affects trade credit in Vietnam. The authors wish to test a threefold set of hypotheses. According to the first one, customers with few alternative suppliers are likely to have more accounts payable. According to the second one, a supplier will extend more trade credit when it inspects the customer directly and in the presence of a long-standing relationship. According to the third one, a supplier pertaining to a network will extend more accounts receivable.

The authors rely on information from surveys of 259 non-state firms in Hanoi in 1995-1996 and in Ho Chi Minh City in 1997 and try to understand the determinants of companies' willingness to extend trade credit. The dependent variable is the share of the payment made after the delivery of the goods. There are three sets of explanatory variables. The first group of independent variables proxies the ease with which a buyer is able to find an alternative supplier. The second set of independent variables identifies the information the producer is able to obtain about its customers through a direct contact. The third set of independent variables captures the membership in business or social networks.

The authors treat the level of trade credit as a censored variable and observe that firms offer more trade credit when there are few similar firms nearby and when the length of the business relationship rises. Business networks and visits to the customer's factory exert a positive effect on trade credit granted. McMillan and Woodruff (1999) also look at the determinants of accounts payables. Results show that the buyer's difficulty of identifying alternative sources of supply affects credit, and accounts payable rises with the duration of the business relationship. Moreover, the amount of trade credit received grows in the presence of

communication amongst the sellers, pointing to the relevance of sanctions arising from the network.

A more comprehensive attempt to provide a thorough analysis on the determinants of trade credit for transition countries is provided by Delannay and Weill (2004) who investigate the forces driving accounts payable and accounts receivable in a cross section of transition countries in Central and Eastern Europe. The authors rely on balance sheet information on 9,273 companies from nine Central and Eastern European countries for the years 1999 and 2000. Trade credit received is explained by a set of independent variables that include size, profitability, the growth rate of turnover, and leverage. Trade credit extended is instead assumed to be influenced by the supplier's access to own funds, but also by additional regressors, some of them identical to those used to explain accounts payable. These include firm's size, profitability, and sales growth.

The regressions are estimated by country with an OLS technique. The analysis on the determinants of accounts payable points to a negative effect of profitability in most of the countries, possibly indicating the presence of soft budget constraints for inefficient firms. There is also a negative relationship with size in almost all countries, as smaller firms may have greater need of trade finance than their larger peers. A positive variation in sales is detected in the majority of countries, showing that suppliers invest in a commercial relationship with growing firms. Conversely, a negative variation in sales is recorded in only four countries, which may suggest that firms in these nations wish to limit the risk stemming from lending to purchasers with a troublesome balance sheet. Leverage is significantly negative in five countries, supporting the idea of a possible substitution between accounts payable and bank loans. When looking at the determinants of accounts receivable results highlight the significant negative effect only for the negative variation of sales for four

countries. This indicates that firms with declining sales try to limit such decrease by offering more favourable terms of payment. A strong positive association between size and accounts receivable is instead detected for almost all countries supporting the validity of financial motives.

A recent and methodologically very interesting contribution on the determinants of trade credit in a developing country is provided by Hermes *et al*. (2015) who concentrate on the Tanzanian experience. They rely on data collected through an interview conducted on 141 wholesalers and 276 retailers from January to August 2008 and look at the determinants of the ex post observed amount of trade credit (defined as delaying payments) provided by suppliers to retailers. Explanatory variables are distinguished in those relevant for the supply-side and those important from the demand-side. Supply-side variables include the length of the trade relationship between a couple of buyer and seller, the frequency of purchase between the two, and if they belong to the same ethnic group or religion. Demand-side variables are mostly related to the firms' capability to have access to finance. They take into account if the purchaser had received a loan from a bank, the gender of the entrepreneur and the availability of internal finance. Through the estimation of a structural model of simultaneous equations they show that the demand of trade credit is higher for female retailers who own smaller firms and have limited liquidity. Conversely, the extension of trade credit is mostly determined by the wholesalers' willingness to attract clients, especially if there is a real threat of switching. It is larger in the presence of longer trade relations, higher frequency of purchase, and if the business peers share the same ethnic background.

2.2.2.3. The Chinese experience: the determinants of trade credit

The literature on the determinants of trade credit for Chinese firms mainly concentrates on the relationship between informal and formal finance (e.g. Huang *et al*., 2011; Du *et al*., 2012; Lin and Chou, 2015). Yet, only a handful of contributions try to explain trade credit, measured through different proxies, placing no major emphasis on its complementarity/substitution with bank credit. Therefore, in what follows, we will try to summarise these selected works, pointing to their main findings, with limited space for the bank credit/trade credit relationship.

2.2.2.3.1. The stepping stones

To the best of our knowledge, the first contribution to look at the determinants of trade credit in China is provided by Ge and Qiu (2007) who concentrate primarily on the effects of ownership. The authors make use of a survey conducted in the year 2000, and rely on a sample of 570 companies of whom 332 are SOEs, whereas 238 are non-SOEs. A battery of four trade credit measures is employed: accounts payable scaled by total asset or by total sales and (accounts payable – accounts receivable) scaled by total assets or total sales. The first two capture the total trade credit, while the other two proxy for net trade credit.

Ge and Qiu (2007) try to explain trade credit for SOEs and non-SOEs by the means of a regression where the dependent variable is each of the four above-mentioned proxies. The key independent regressor is a dummy variable capturing firm's ownership, which is equal to 1 if the firm is state-owned, and 0 otherwise. The baseline model is estimated using random effects technique and the results show that non-SOEs use more trade credit than SOEs. Yet, the authors' objective is also to test if ownership is an important determinant in shaping the employment of trade credit for transactional and financial motives. To this aim they examine

the use of overdue trade credit (i.e. trade credit that has expired but has not been repaid) between SOEs and non-SOEs.[15] Ge and Qiu (2007) show that SOEs are more likely to have overdue debt. This is possibly due the fact that state firms have good banking relationships that allow them to extend debt payment easily. Yet, they also show that trade credit is more likely to be the dominant source of debt outstanding for non-SOEs.

The authors also perform a test on the determinants of a firm's use of long-term trade credit (i.e., credit more than 30 days after the delivery of the goods). Results show that SOEs are less likely to use long-term trade credit. Conversely, non-SOEs are more likely to use long-term credit and have a greater share of long-term trade credit, which suggests that they employ trade credit for financing motives.

The abovementioned results on the different use of trade credit by SOE and non-SOEs can be complemented by the findings of Yano and Shiraishi (2010) who concentrate on the factors affecting accounts payable and accounts receivable for SOEs in the early 1990s. On the one hand, the authors look at the determinants of accounts receivable and employ a large set of explanatory variables. First, they argue that extending trade credit might be a marketing tool. Second, they claim that firms with higher internal cash flow are more likely to extend trade credit. Third, they assume that an easier access to external finance allows firms to grant more credit to its customers.

The authors look at the determinants of accounts payable, controlling for a large set of explanatory variables. These include political factors, firm's credit quality, and firm's reputation in debt markets. Yet, they also take into account the possible presence of the

[15] They observe that state-owned bank loans comprise 86% of overdue debt for SOEs, compared with only 51% for non-SOEs. Conversely, trade credit only represents 7% of overdue debt for SOEs, compared to 30% for non-SOEs.

Triangle Debt dilemma, which implies a link between granting trade credit to customers and receiving trade credit from suppliers.

The authors make use of information on 305 SOEs of the Guanxi province between 1992 and 1994 and estimate Probit and Tobit regressions. Their results show three main facts. First, in 1992, accounts receivable are a determinant of accounts payable, whereas in 1994 the relationship is reversed. Second, political factors and insufficient internal finance are both positively associated with trade credit at the beginning of the time span. Third, in 1992, suppliers were forced to offer trade credit by their customers, often large SOEs, who exploit their higher bargaining power. Only afterwards they were able to take control of their own credit conditions, thanks to a shift towards an intensified market competitiveness and a reduced power of SOEs.

2.2.2.3.2. Trade credit, firm performance, and market competition

The role of ownership structure and profitability in shaping the extension of trade credit is also on the main research path followed by Cull *et al*. (2009), who check if a possible re-distributional effect is in place across firms owned by different agents. The authors provide an in-depth picture of the behaviour of accounts receivable across private domestic enterprises, foreign firms, legal-persons, SOEs and collective firms. Cull *et al*. (2009) make use of information on balance sheets for manufacturing firms with annual sales greater than 5 million Yuan between 1998 and 2003, thus relying approximatively on data for 100,000 companies for each year. The authors elaborate a regression where the dependent variable is trade credit extended. The independent regressors include a vector of dummy variables for the abovementioned ownership types, profitability, the interaction between the ownership dummy

and the lagged value of formal finance, and the triple interaction between the ownership dummy, lagged profitability and the lagged value of formal finance.

Results of the regressions show that SOEs extend more trade credit than other types of firms although this is likely to happen for less profitable firms with low incentives to collect receivables. Private profitable firms make partially use of formal finance to support their trading partners. Thus, trade credit might have been a substitute for formal finance in periods featured by the presence of credit constraints. Yet, the magnitude of trade credit appears to be comparably limited with that of the formal finance sector.[16]

The role of a firm's performance in determining the amount of accounts payable is investigated by Yano and Shiraishi (2012). If a measure of performance for a firm is positively associated with the amount of trade credit received, this means that more trade credit is obtained by companies that actually had a better performance before receiving trade credit. The authors rely on information from 509 rural firms for the years between 2001 and 2006 for the provinces of Shandong, Anhui, Jiangsu, and Zhejiang, reaching 3,054 observations.

Yano and Shiraishi (2012) employ two different measures of trade credit. The first one entails accounts payable only. The second one includes accounts payable plus deposits received, and other payables.[17] The two key independent variables are two measures of lagged

[16] In order to get a clearer picture on how the determinants of access to a bank loan are heterogeneous across different ownership types an additional regression is estimated. The dependent variable is, in this case, the proxy of formal finance. The explanatory variables include the ownership dummies applied in the specification looking at trade credit, plus lagged profitability, the interaction between ownership and lagged profitability plus the same set of control variables applied in the specification to explain trade credit extension. Moreover, in order to rule out the possibility of reverse causality between formal finance and trade credit, an amended version of the previous regression is employed, where the interaction between ownership and lagged profitability is replaced with the interaction between ownership and the lagged value of trade credit. In all regressions firm-fixed effects are included.

[17] Deposits represent the money that customer provide to sellers ahead of the delivery of the products, i.e. suppliers borrow from customer firms in cash. Other payables, which are not classified as accounts payable in

performance, i.e. return on assets and total factor productivity. In order to compare the efficiency of trade credit with that of bank finance, the authors build three models. In the first two the dependent variables are the two abovementioned measures of trade credit, whereas in the third one the regressand is the difference in the amount of funds borrowed from banks at the end of time *t* minus the amount of funds borrowed from banks at the end of time $t - 1$.

The equations are estimated through a two-step system GMM. First, results show that the two measures of performance are significantly and positively associated with trade credit but not with bank credit. Second, the performance of small firms has a greater influence on the amount of trade credit received compared to what occurs for large firms. Third, private firms are discriminated in the access to financing through trade credit, which is, however, more efficient than bank credit.

The role of profitability in shaping the levels of both accounts payable and accounts receivable for Chinese firms is tackled in an indirect way by Fabbri and Klapper (2008) who analyse the effect of market power in both the input and the output market. The authors rely on firm-level data coming from a survey conducted in 2003 on circa 2,500 Chinese firms with indication on whether the companies offered trade credit to their customers, and if customers accepted the offer. Additional information includes control features of the firms, measures of market power, financial characteristics, collateral value of the goods and customer creditworthiness.

The main explanatory variable is a dummy that takes a value of one if the firm offers trade credit, and zero otherwise. Yet, three additional variables on the extension of trade credit are employed, i.e. the percentage of goods sold on credit, the percentage of firms that offer a discount on prepayment and the number of days of trade credit extension. A similar set of

China, consist mostly of account items to be paid by customers to suppliers for services such as products and material transportation or packing services.

variables are applied when the authors study companies' use of trade credit from their own suppliers. The main variable of interest is, in this case, a dummy that takes a value of one if the firm received trade credit, and zero otherwise.

The authors place particular emphasis on the relational nature embedded in trade credit contracts and wish to test a set of hypotheses. First, they expect that the decision to extend trade credit to customers derives from the market structure where the company operates. Second, they argue that firms will extend less trade credit not only if they have limited access to other forms of informal or to formal finance, but also to satisfy the maturity matching principle. Third, they test whether credit constrained firms are more reliant on matching the terms of their accounts receivable and payable. Fourth, they test if firms working in a more competitive market are more prone to use accounts payable to finance their account receivable.

The authors employ a large set of econometric tools that include logit, OLS and tobit and show a consistent set of results. They demonstrate that firms make use of trade credit as a competitive tool. Companies are very likely to rely on accounts payable to extend accounts receivable and try to adhere to the maturity matching hypothesis as much as possible. This is especially true for firms that enjoy a strong market power in purchasing inputs but that face a tough competition when selling their outputs. Moreover, for more than one fifth of the firms in the sample trade credit is cheaper than bank finance, providing a justification for its widespread use.

A very important and recent contribution on how firms' performance affects trade credit is provided by Oh and Kim (forthcoming). To the best of our knowledge, this is the only paper which takes into account in the same contribution the determinants of both accounts payable and accounts receivable for the Chinese companies. The authors look at how firms' growth opportunities affect their trade credit policy. More precisely, the authors wish

to test five different hypotheses, two on accounts receivable and two on accounts payable. First, they expect Chinese firms with more growth opportunities to have lower accounts receivable. Second, they argue that such negative relationship should be stronger in private firms than in SOEs. Third, they expect firms with more growth opportunities to have lower accounts payable. Fourth, they expect the negative relationship between growth and accounts payable to be stronger for private firms than for SOE. Fifth, they wish to take into account the effect of the 2007 new receivable pledge policy that allowed firms to use receivables as collateral.

In order to check these hypotheses, Oh and Kim (forthcoming) rely on panel data on 586 Chinese non-financial listed firms between 2003 and 2013 thus being able to examine 6,446 firm-year observations. They then employ two different regressions where the dependent variables are the ratio of accounts receivable over total sales and the ratio of accounts payable over total sales, respectively. The explanatory variables are the same in both regressions. They include sales growth, growth opportunities (in assets), leverage, profitability, inventories and size.

The two models are estimated through a fixed-effect panel regression for the full sample, for the sole SOEs, and the sole private firms. Results for trade credit extended show that growth opportunities are negatively associated with accounts receivable, a linkage that is stronger for private firms than for SOEs. In addition, sales growth is negatively related to accounts receivable, whereas the proxies of leverage, inventories, profitability and size show a positive association with the regressand. Results for trade credit received show that growth opportunities are negatively associated with accounts payable. When the regression is run for firms owned by different agents, the coefficient associated with growth opportunities is negative but insignificant for SOE. Conversely, the same variable takes a negative but

significant sign for private firms. Sales growth is negatively associated with accounts payable and a negative effect is also detected for profitability, but only for private firms. Conversely, larger leverage, inventories and size are positively associated with accounts payable. Finally, results show that Chinese firms with larger growth opportunities have increased their accounts receivable since 2007. Conversely, no significant effect is recorded for accounts payable.

2.2.2.3.3. Trade credit, trust, political affiliation and the rule of law

Yano and Shiraishi (2014) analyse the determinants of the development of financial intermediation through trade credit across Chinese provinces not only relying on a micro-level approach. Starting from the stylized fact that more developed provinces show higher value of trade credit extended, they wish to check the role of four factors in determining the amount of accounts receivable. These entail the presence of a competitive environment, a well-functioning legal system, low corruption, plus a set of financial factors affecting demand and supply of trade finance. The authors rely on province-level aggregated data for the period 2001-2009 and build a dynamic model where the dependent variable is trade credit development, whereas the explanatory variables capture the four abovementioned features.

The regression is estimated by a system GMM and results show that a competitive market environment, a well-functioning legal system, and greater bank loans for non–state-sector firms enhance the development of trade credit in China. Conversely, corruption hampers its growth. Yet, a complex relationship amongst these factors is detected and the authors argue that the expansion of trade credit unfolds through an improvement in the legal system, then requires an increase in bank lending to non–state-sector firms, and, finally, a reduction in bank lending to SOEs.

The previous paper is closely connected to a contribution by Yano *et al*. (2013). They focus on the relevance of legal protection of property rights and financial development to explain entrepreneurial activity, proxied by private investment. The authors' main contribution does not rely on looking at the determinants of trade credit, but on their argument that accounts payable represent an intermediate position between property rights protection and financial development. Therefore they state that looking at the determinants of private sector investments is correct only if also simultaneously addressing the effect of the same determinants on accounts payable. They test this prediction relying on provincial-level aggregated panel data for China between 2001 and 2008. Yano *et al*. (2013) thus try to look at how accounts payable are affected by a threefold set of independent regressors. The first includes proxies of property rights protections. The second includes proxies of competition, whereas the third is the ratio of the bank loans over gross assets. The regression is estimated through a 3SLS and the results show that securing property rights and competitiveness enhance the development of trade credit.

Similarly, Wu *et al*. (2014) show that Chinese private firms have been suffering from discrimination in borrowing from banks for more than a decade. Their data include information on 659 Chinese non-state listed firms between 2003 and 2008 for a total of 2,479 firm-year observations. Wu *et al*. (2014) wish to explain how social trust affects the ratio of accounts payables to total assets and the ratio of accounts receivables to total assets. The results of a panel regression show that firms located in regions with higher social trust receive more trade credit from their suppliers and extend more accounts receivables to their customers. Moreover, when looking at the interaction between social trust and the quality of legal institutions on trade credit, it emerges that the effect of social trust is stronger in regions

with a weaker protection for property rights. A robustness check on private non-listed firms supports the results obtained for listed companies.

Guariglia and Mateut (2016) study the relationship between political affiliation and access to external finance as key determinant of the extension of trade credit. They analyze 65,706 Chinese unlisted firms over the period 2000-2007 obtaining 422,378 firm-year observations. The authors wish to test a set of hypotheses. First, they assume that firms use short-term bank loans and trade credit to finance their accounts receivables, in line with the maturity matching principle. Second, they state that supplier companies present an advantage relative to banks when it comes to finance their customers. This is especially true for firms producing differentiated goods, leading to a stronger relationship between business peers. Therefore the authors expect that accounts receivable will be more sensitive to short-term liabilities in differentiated than in standardized industries. Third, the authors recall that access to external finance is influenced by ownership type. SOEs and foreign firms have typically easier access to finance than private and collective firms, because they may have privileged relationship with government banks or because they may rely on internal sources through the mother company, respectively. This leads the authors to hypothesize that just private and collective firms present higher responsiveness of accounts receivable to short-term liabilities than what expressed by SOEs and foreign enterprises. Fourth, there is evidence that private firms try to overcome market and institutional failures by establishing connections with state bodies at different levels. Therefore the authors expect that the sensitivity of trade credit to short-term funding is lower for politically affiliated firms. The empirical specification aims at describing the behavior of accounts receivable through a set of explanatory variables including short-term liabilities, the stock of inventories, liquid assets, collateral, age, and size. The authors employ a first-difference GMM estimation technique. Results highlight that

politically connected firms benefit from an easy access to short-term finance and are thus more likely to extend trade credit than their unconnected peers. The panel study also shows that the sensitivity of accounts receivable to the availability of short-term liabilities is always positive and significant. However, it appears to be higher for firms operating in differentiated industries, for private and foreign enterprises and it declines with the degree of political affiliation. Private firms with no political affiliation and pertaining to differentiated industries show the highest values of sensitivity.

2.3. Our contribution

Our paper moves the literature forward along the following five dimensions.

First, we provide an extensive analysis of the determinants of accounts payable and accounts receivable for a wide sample of unlisted Chinese companies over the years 2004-2007. This represents an important step ahead in the study of trade credit in the Chinese context, as previous contributions concentrate either on an earlier time span, or on listed companies, or on just one dimension of trade credit. For instance, Ge and Qiu (2007) study the factors affecting trade credit granted and received for SOEs and non-SOEs between 1994 and 1998. Cull *et al*. (2009) investigate which types of firms are more likely to extend trade credit, taking into account the role of ownership and profitability. Guariglia and Mateut (2016) investigate how the extension of trade credit is affected by the degree of political affiliation across Chinese unlisted firms owned by different agents operating in differentiated and homogeneous industries. Wu *et al*. (2014) analyse the effect of trust on both accounts payable and receivable, but mainly focus on listed companies. They only provide a robustness check for private unlisted enterprises. Oh and Kim (forthcoming) observe the effect of growth

prospects on both accounts payable and accounts receivable, but limit their analysis to listed companies.

Second, we supply a clear picture of the determinants of accounts payable and account receivable for unlisted firms located in provinces characterized by different levels of marketization. Levels of economic, financial and institutional development are extremely heterogeneous across Chinese provinces. We argue that these differences may impact the determinants of trade credit.

Third, we differentiate firms into private, foreign, and state-owned plus collective enterprises. It is well known, in fact, that private firms in China suffer from constraints in their access to bank credit, which are more limited for foreign companies and practically absent for state-owned enterprises and collective firms (e.g. Allen *et al*., 2005; Ge and Qiu, 2007; Poncet *et al*., 2010; Guariglia *et al.*, 2011). Moreover, companies owned by different agents may be affiliated with governments at different territorial levels, which may affect their accounts payable and receivable (Guariglia and Mateut, 2016).

Fourth, we analyse for the first time in a large panel of Chinese unlisted companies if trade credit granted is a key determinant of trade credit obtained. We thus complement the findings by Fabbri and Klapper (2008) who rely on detailed information on the supplier-buyer relationship, but make use of a far smaller sample than ours. The interplay between accounts payable and receivable is of particular importance as firms suffering from financial constraints are those more interested in matching the terms of payables and receivables.

Fifth, we use dynamic models of trade credit extended and received (Benishay, 1968). This approach has not been previously used for unlisted Chinese firms. We expect the amount of trade credit a firm can obtain in the current period to depend positively on the amount it received in the previous period. To the best of our knowledge, only Huang *et al*. (2011) make

use of this technique in their effort to understand the substitution/complementarity between accounts payable and bank credit, focusing only on Chinese listed firms. In addition, the use of a dynamic specification allows for the first time in the Chinese context to test for the presence of a convergence towards a target level for both accounts payable and accounts receivable.

2.4. Development of hypotheses

A first dimension we wish to look at is checking whether trade credit behaves in a static or dynamic fashion. García-Teruel and Martínez-Solano (2010b) test the presence of a partial adjustment in the account receivable granted by a sample of Spanish SMEs. The authors recall first Emery (1984) to indicate that there is an optimal level of accounts receivable. This is reached when the revenue deriving from extending trade credit is equal to the marginal cost, leading to an optimal credit period. Second, they recall Pike and Cheng (2001) to emphasize that credit managers should keep accounts receivable at their target with the aim of avoiding any possible loss in the value of the firm that may arise from lost or uncollectible sales. Frictions slowing the adjustment to the target level include possible delayed payment periods, which are detected for SMEs Spanish firms, but we claim to also affect the Chinese companies in our sample, given the widespread presence of financial constraints.

In a somewhat symmetric fashion, García-Teruel and Martínez-Solano (2010a) describe the presence of frictions delaying the adjustment of accounts payable towards a target level. These include uncertainty in the estimated value of future sales with consequent uncertainty in the amount of predictable purchases, unforeseeable oscillations in the stock of

inventories, and the incapability to precisely forecast the costs associated with the implicit tax rate of trade credit.

Given the relative underdevelopment of the Chinese financial system, the complexity of the institutional setting and of the rule of law, we expect the following hypothesis to hold.

H1) Accounts payable and accounts receivable follow a model of partial adjustment

A further relevant dimension to take into account is whether and how firms manage the timing of current assets and current liabilities. Morris (1976, p. 29) claims that if a firm matches the maturity of debts to the duration of assets, then the costs associated with financing the assets are known over the entire life of the assets. In particular, the cash flow generated by the assets should be sufficient to service the debt once the life of the assets is over. In this respect, a more recent investigation by García-Teruel and Martínez Solano (2010c) shows that current assets are a key determinant of accounts payable both as a single entity and when disentangled into cash, inventories and accounts receivable. The importance of reputation and inter-firm reliability in the Chinese context provide companies with a strong incentive to reduce the risk of delinquencies and late payments. Therefore firms should put particular care in selecting the proportion of current and non-current assets in the overall amount of assets. Therefore, we postulate the following hypothesis.

H2) Firms match the maturity of their current assets with that of their current liabilities

2.5. Baseline specifications and estimation methodology

2.5.1. Baseline specifications

The empirical specifications we adopt to describe both components of trade credit rely heavily on García-Teruel and Martínez-Solano (2010c) who study the determinants of trade credit in a sample of European countries. Yet, following García-Teruel and Martínez-Solano (2010a) and García-Teruel and Martínez-Solano (2010b), we estimate dynamic models of accounts payable and receivable. This enables us to identify the speed of adjustment of accounts payable and receivable towards a target level. We thus specify one equation for the determinants of accounts receivable (Equation 2.1) and one for the determinants of accounts payable (Equation 2.2), as reported below:

$$AR_{it} = \beta_0 + \beta_1 AR_{i(t-1)} + \beta_2 AGE_i + \beta_3 AGE^2_i + \beta_4 CASHFLOW_{it} + \beta_5 SHORTLEV_{it} + \beta_6 FCOSTS_{it} + \beta_7 SALESGR_{it} + \beta_8 TURN_{it} + \beta_9 FOWNS_{it} + \beta_{10} STOCKS_{it} + \nu_j + \nu_t + \nu_p + \nu_o + e_{it}; \quad (2.1)$$[18]

$$AP_{it} = \beta_0 + \beta_1 AP_{i(t-1)} + \beta_2 AGE_i + \beta_3 AGE^2_i + \beta_4 CASHFLOW_{it} + \beta_5 SHORTDEBT_{it} + \beta_6 LONGDEBT_{it} + \beta_7 FCOSTS_{it} + \beta_8 SALESGR_{it} + \beta_9 FOWNS_{it} + \beta_{10} CASH_{it} + \beta_{11} STOCKS_{it} + \beta_{12} AR_{it} + \nu_j + \nu_t + \nu_p + \nu_o + e_{it;} \quad (2.2)$$

where *i* indexes firms and *t* years.

AR_{it}, is the ratio of accounts receivable to total assets and AP_{it}, is the ratio of accounts payable to total assets.[19]

[18] One may argue that the specification lacks from the inclusion of measures of gross profit to test for the price discrimination theory. Yet, we checked the Pairwise correlation between the earnings before interests and extraordinary items over sales and our measure of cash flow. We detected a value of 0.6142 (significant at the 1% level) and thus opted to keep only the measure of internal finance.

[19] Some authors, such as Petersen and Rajan (1997), Niskanen and Niskanen (2006), Cull *et al*. (2009), Guariglia and Mateut (2016) normalize accounts receivable with total sales. Other scholars, instead, scale accounts payable

In order to define the determinants of accounts receivable and accounts payable, we identify some explanatory variables that are common for the two and some others that are specific for trade credit given or received.

Common variables include two measures of creditworthiness and access to capital markets, AGE_i, and $SIZE_{it}$. AGE_i is the number of years since the establishment of the firm. Older firms are believed to have easier access to bank credit than their younger counterparts. In a similar fashion, $SIZE_{it}$, measured as real total assets in million Yuan, is also an indicator of reputation, as larger firms are believed to be more creditworthy and have an easier access to formal credit than smaller companies (e.g. Petersen and Rajan, 1997). From this perspective, we expect a positive relationship between AGE_i and $SIZE_{it}$ on the one hand, and accounts receivable, on the other hand. Yet, from the perspective of the information asymmetry between buyers and sellers, some studies find that smaller and younger firms that have a bad reputation need to extend more trade credit than their larger peers, with the scope of letting the buyers check for the quality of their purchases (e.g. Long *et al.*, 1993; Pike *et al.* 2005). In addition, larger customers may apply their market power to buy on credit when the vendor is small, in order to moderate the uncertainty about the quality of the product purchased (Van Horen, 2007). From this angle, we also expect a negative relationship between AGE_i, and $SIZE_{it}$ and the amount of trade credit extended. All in all, there is no, *ex ante*, reliable prediction between these two measures of creditworthiness and accounts receivable.

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and accounts receivable with total assets (e.g. Wu *et al.*, 2014; Yano and Shiraishi, 2010, 2012). Ge and Qiu (2007) scale accounts payable and net trade credit (measured as accounts payable minus accounts receivable) with both total assets and total sales. We decided to follow the contributions that scaled accounts payable and accounts receivable with total assets, as we wish to avoid possible misleading effects on measuring trade credit that may arise from the fluctuations in the level of sales in the period under investigation.

Looking at the relationship between AGE_i, and $SIZE_{it}$ on the one hand, and accounts payable on the other, Niskanen and Niskanen (2006) argue that larger and older firms should use less trade credit than smaller and younger companies due to minor investment opportunities. On the contrary, Petersen and Rajan (1997) claim that firms with higher quality, proxied by larger size, should receive more trade credit from their suppliers, but they record no significant effect for age. Therefore, once again, no clear-cut indication on the expected relationship with age can be formulated. The square of AGE_i (AGE^2_i) is included to account for the possible non-linear effect of AGE_i on both the equations. In this respect, Petersen and Rajan (1997, p. 674) argue that the amount a firm extends rises from a start-up to a 10-year old firm. We argue that as the firm grows it benefits from larger access to internal and external finance and it can thus extend more trade credit. Yet, Petersen and Rajan (1997, p. 674) also claim that the really old firms may extend lower amounts of trade credit as they may face a higher cost of obtaining credit. The use of age squared to explain accounts payable aims at capturing the declining effect that the passing of time has in old firms. In other words, we argue that the older the firm the easier is its access to bank credit and the less the need to resort to accounts payable.[20]

[20] We are thankful to Mitchell A. Petersen for clarifying this point for the use of age in his co-authored work with Raghuram G. Rajan, i.e. Petersen and Rajan (1997). In an email exchange with him, he argues that "…as the firm can prove it is a better type by living longer, the effect of each incremental year of life adds less. This is the thought behind some form of non-linearity (log or squared). This logic doesn't say there is a peak, and although we note the peak it was complete disclosure than believing that additional years actual make the firm appear worse. This would argue for a log opposed to a square specification. The squared specification will generate a peak and a decline even when it does not exist in the data. If most of the data is below the peak, then the squared term is fitting the shape of the curve before the peak, not the peak. This theory does not specify a peak…". Moreover he adds that "…accounts payable and debt are substitutes. Thus if as the firm ages, they get more bank debt *and* bank debt is cheaper than accounts payable, then they may borrow less from their suppliers. True, but again our data is not that precise. The account payable is more expensive or less expensive than debt depending upon which part you count (e.g. before the discount or after the discount) and what penalties are effectively enforced. Talking to many suppliers and customers the terms are more complicated as they are buried in a multi-dimensional relationship. Thus at best, we can describe the empirical results." Finally he also adds "For accounts receivable (lending to customers), what we really want by analogy is the age of the customer not the firm (supplier)".

CASHFLOW$_{it}$ is measured as the ratio between (net profit+ depreciation of fixed assets) and total assets. The ability of the firm to generate internal funds is expected to be positively related to accounts receivable. In fact, firms with a greater capacity to generate internal resources have more resources available and can offer more trade credit to their customers (Niskanen and Niskanen, 2006; García-Teruel and Martínez Solano, 2010c).[21] Conversely, a negative relationship is expected between *CASHFLOW*$_{it}$ and accounts payable as firms with higher ability to generate more internal funds may not need credit from their suppliers (Huyghebart, 2006; Ge and Qiu, 2007; García-Teruel and Martínez Solano, 2010b).

To control for the cost of external finance, we use the variable *FCOSTS*$_{it}$ which is measured as the ratio of interest payments to total assets. The higher the cost of formal finance, the greater the advantage in resorting to accounts payable. Conversely, the higher the cost of formal finance, the more expensive the extension of trade credit (García-Teruel and Martínez Solano, 2010c).[22]

SALESGR$_{it}$ is the yearly variation in sales. The more growth opportunities firms have, *ceteris paribus*, the higher their need of funds to carry out their operations, leading to a greater demand for accounts payable (García-Teruel and Martínez Solano, 2010a). At the same time, a positive association with accounts receivable may be in place. In fact, Wu *et al*. (2014) argue that from a supplier's perspective, a growing firm had less time to develop its reputation for product quality and thus it shows a limited bargaining power with respect to its customers. The firm may thus suffer from the contractual power of its clients and extend trade

[21] Petersen and Rajan (1997) also argue that firms with a greater capacity to generate internal funds are able to offer more accounts receivable. Yet, their results on U.S. SMEs do not support their prediction.

[22] We decided not to use the same measure employed by García-Teruel and Martínez Solano (2010c), i.e. the ratio of financial expenses over total debt minus accounts payable, given the broadest nature of our variable that captures interests paid. Yet, our indicator is similar to the one employed by Cull *et al*. (2009), who employ the ratio of interest paid over sales, as a proxy for the access to bank credit. Moreover, similarly to what we did to compute our measures of trade credit, we decided to scale interest paid with total assets rather than sales. This is to avoid possible biases arising from the fluctuation of sales.

credit not only to build credibility, but also to accommodate the will of a stronger counterpart However, Niskanen and Niskanen (2006) claim that firms whose "sales are declining may extend more accounts receivable than an average firm in its industry" (p. 91). Yet, their results show that when a company's sales are decreasing, the size of the drop does not affect the amount of trade credit it supplies. In a similar manner, trade credit could help to smooth irregular demand and stimulate sales by relaxing trade credit terms in periods of sluggish demand (Emery, 1984; Nadiri, 1969). Thus, no *ex ante* prediction can be formulated for the relationship between sales growth and accounts receivable.

A common additional explanatory variable is $STOCKS_{it,}$ measured as the ratio between stocks and total assets. As firms face a trade-off between holding costly stocks of inventories and accumulating accounts receivable, we expect to observe a negative relationship between the two. This is consistent with the inventory management motive for credit sales proposed by Bougheas *et al*. (2009) and the results obtained by Guariglia and Mateut (2016). Due to uncertain demand, producers have an incentive to extend accounts receivable to their business peers with the scope of promoting sales rather than accumulating costly stocks of inventories.[23]

The last variable which we believe should be a common determinant for accounts payable and accounts receivable is $FOWNS_{it}$, measured as the percentage of shares owned by foreign investors (e.g. Dixon *et al*., forthcoming). To the best of our knowledge, the literature does not take into account this feature as a separate determinant of both accounts payable and accounts receivable.[24] A larger presence of foreign participation in a firm's capital provides

[23] We will make use of $STOCKS_{it}$ also in the regression that explains accounts payable and we will provide the justification for the inclusion of this variable later on in this Section.

[24] Yet, some of the surveyed contributions provide evidence on the diverse impact that selected explanatory variables have on firms owned by different agents (e.g. Guariglia and Mateut, 2016). Among these, Ge and Qiu (2007) focus on the effect of ownership on trade credit, and make use of a dummy variable, which is equal to one

an indication of reliability not only to the banking system but to all potential creditors, which are more inclined to lend. In a mirroring way, a participated company is able to borrow formal and informal finance more easily than their non-participated peers. (Chen *et al*., 2014).[25] Yet, these firms can also rely on internal capital markets, and thus have a reduced need to access to external finance (Li *et al*., 2009).[26] Lastly, thanks to the trustworthiness that foreign participation brings about, a firm might not need to grant trade credit to their customers in order to supply a guarantee for their product (Lee and Stowe, 1993; Fabbri *et al*., 2012).[27] Due to this set of reasons, the relationship between $FOWNS_{it}$ and both accounts payable and accounts receivable is not easily predictable.

Some variables are considered only as determinants of accounts receivable. Among these, $SHORTLEV_{it}$, measured as the ratio of current liabilities to total assets, is expected to be positively related to trade credit extended. Petersen and Rajan (1997), amongst others, show that the access to formal finance is important to determine if a firm can supply trade credit. In fact, the higher the level of short-term financing, the larger the amount of trade credit firms are able to grant (García-Teruel and Martínez-Solano, 2010b, 2010c). Yet, a negative association is also in line with Long *et al*. (1993), as firms that obtain credit from different sources (supplier and non-supplier finance) do not need to offer accounts receivable as a means to provide a proof of quality.

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if the firm is state-owned, and zero otherwise. In a similar fashion, Cull *et al*. (2009) employ a set of dummies to understand if the redistribution from formal credit to trade credit changes across firms owned by different agents. Among these, they make use of a dummy variable which takes a value of one if the firm is foreign owned, and zero otherwise. Yet, they do not run separate regressions for diverse ownership groups and do not account for the presence of foreign ownership in non-foreign owned companies.

[25] The authors argue that the higher reliability that comes with foreign ownership should provide a signal of creditworthiness not only to the banking system but also to a firm's business peers.

[26] This contribution, as the one mentioned in previous footnote, lies on the realm of the studies on the capital structure of the firm. As previously stated, it is not our scope to supply a financial based view of trade credit. Yet, we recall these articles as they supply useful information to interpret the role of foreign ownership.

[27] Greenaway *et al*. (2014) also show that the presence of a foreign share in the total capital of a firm is associated with profitability in a non-linear fashion. In fact, the beneficial effect of a rising foreign ownership peaks but then decreases, showing an inverted U-shaped behaviour. This result may provide additional support for the presence of a negative association between foreign ownership and accounts receivable.

Next, we employ a measure of product quality, $TURN_{it}$, computed as the ratio of sales over total assets. According to Long *et al*. (1993) and Deloof and Jegers (1996), this proxy is expected to be negatively related to accounts receivable. Long *et al*. (1993) build a model in which, *ceteris paribus*, it takes longer to produce high-quality than low-quality goods, as additional production time is needed to undertake quality controls tests.[28] More precisely, Long *et al*. (1993) assume that the firms without established reputation (often because of their small size) and producing high-quality goods, proxied by turnover, will be inclined to offer trade credit to allow their customers to evaluate the features of the items sold. This is especially true when the cost of extending trade credit increases as firms will have a smaller incentive to cheat on the quality of the goods sold.[29]

Other variables are considered only amid the determinants of accounts payables. Among these, $SHORTDEBT_{it}$, measured as the ratio of short-term debt (net of accounts payable) over total assets, should be negatively associated with trade credit received. A substitution effect may be in place given the lower cost of bank credit than that of informal finance (e.g. Schwartz, 1974; Petersen and Rajan, 1997). Next, $LONGDEBT_{it}$, computed as the ratio of long-term debt to total assets, is employed in order to control for a possible substitution effect between long-term debt and the debt provided by the supplier (Deloof and Jegers, 1999). The third, the fourth and the fifth additional variables are components of current assets, namely cash, inventories and accounts receivable, all scaled by total assets. These are labelled $CASH_{it}$, $STOCKS_{it}$ and AR_{it} respectively. We expect that firms that are going to invest more in current assets, in these three different forms, will also make more use

[28] Long *et al.* (1993) argue that the most suitable measure of quality would be production lead time. Unfortunately they do not have such information and they employ turnover as a second best.

[29] The model the authors build is based on a separating equilibrium (proposition) that implies the presence of two types of firms, those producing high-quality goods and those manufacturing low-quality goods. They argue that in the presence of trade credit low-quality firms do not extend accounts receivable, whereas high-quality firms do.

of short-term debt, and trade credit in particular, in order to satisfy the maturity matching hypothesis.

The error term is made up of five components. v_j is an industry-specific effect, which we take into account by including two-digit industry dummies, which control for industry-specific characteristics. v_t is a time-specific effect, which we control for by including time dummies capturing business cycle effects in all our specifications, v_p is a province-specific effect, which we control for by including a full-set of provincial dummies, v_o is an ownership-specific effect which we control for by including ownership dummies for private, foreign, state-owned enterprises and collective firms. e_{it} is the idiosyncratic error term.

2.5.2. Further tests: the role of marketization

A thorough study on the determinants of trade credit requires to take into account how the extension of accounts receivable or the obtainment of accounts payable varies according to the level of economic and institutional development of the province where a selected firm is located.

To this end, we make use of the NERI index devised by Fan *et al*. (2010). The index is built from the premise that disparities in economic performance across provinces may mostly depend on differences in economic policies and quality of institutions. The indicator is called "Marketization Index for China's Provinces" and it measures the relative position of a selected province in the progress towards market economy compared to the progress of other provinces.[30]

[30] Appendix 2B provides a detailed description of the components of the index.

In our analysis, we make use of the index provided for each province for each year between 2004 and 2007, and we subsequently create a ranking of the provinces. We next construct a categorical variable aimed at identifying if in a given year, a given firm is located in a province that lies in the top third, the middle third, or the bottom third of the distribution of the NERI index for all provinces in that year. In this manner we aggregate firms in three different groups, if they show a high, medium and a low value of the marketization index. Firm *i* will fall in the first group if it is located in a province placed above the 66th percentile of the distribution of the NERI index for the provinces at time *t*, and zero otherwise. Firm *i* will fall in the second group if it is located in a province placed between the 33th and the 66th percentile of the distribution of the NERI index for the provinces at time *t*, and zero otherwise. Firm *i* will fall in the third group if it is located in a province placed below the 33th percentile of the distribution of the NERI index for the provinces at time *t*, and zero otherwise.[31]

Taking into account the effect of different levels of the NERI index on the determinants of trade credit is relevant, although the literature employs this index mostly to describe financially-related effects.[32] In fact, the use of the marketization index, thanks to its

[31] A full list of the provinces belonging to each group in each year is provided in Appendix 2C.

[32] Focusing on the capital structure of Chinese firms, Li *et al*. (2009) show that marketization is negatively correlated with leverage and the availability of long-term debt, but positively associated with short-term debt. Yet, the empirical specification shows that marketization interacts with ownership. In fact, in less developed regions, foreign and private firms show lower total and short-term debt than their state-owned counterparts. In contrast, in better developed regions, firms of different ownership structures tend to have similar total and short-term debt. State ownership is only significantly and positively associated with total and short-term debt in less developed regions. Firth *et al*. (2009) study how state-owned banks provide credit to private firms. They analyse the effect of the five main components of the NERI index and document that banking sector marketization exerts a positive and significant effect on access to bank loans and on the size of the loans. Additional works that employ the NERI index include, for example, Firth *et al*. (2011) who concentrate on causes and consequences of falsified financial statements; and Guariglia and Yang (forthcoming), who examine the behavior of corporate cash holdings for a panel of listed firms. An interesting insight on this aspect is provided by Zhang *et al*. (2015), who show that lower marketized provinces are less sensitive to economic and political uncertainty in shaping their capital structure as government intervenes to mitigate this uncertainty. They observe that the use of trade credit, measured in terms of accounts payable over total assets, increases when economic and political uncertainty raises.

composite nature, allows to take into account specific features of the legal framework. These include the development of intermediate institutions and the legal protection of property rights.[33] This last point is strictly connected with the previously described work by Yano *et al.* (2013) who argue that accounts payable represent an intermediate position between property rights protection and financial development. The extent of property right protection and, more in general, of the rule of law, is of particular relevance in building up inter-firm relations. This is especially relevant in China, where the large heterogeneity in the institutional setting across provinces may lead to a relevant interplay with the role inter-firm trust has in shaping trade credit.

Looking first at accounts receivable, we argue that firms located in provinces with medium and low levels of NERI should have less propensity to extend trade credit compared to their peers located in the provinces with high levels of NERI. This is a likely outcome of multiple factors. Companies located in a comparatively less developed part of the country from an economic, financial and institutional perspective, not only suffer from the presence of a poor business environment, but they also may face a poor rule of law. Firms involved in a commercial relationship will thus be particularly concerned about the fulfillment of a contractual agreement which implies a deferred payment. This is a matter of trust between the parts and the features of the institutional setting. Both factors may deter companies to grant delayed payments and push them to prefer payment on delivery. We may also argue that when a delay is allowed, the implicit costs of the trade credit granted is not itself representative of the agreed credit terms, but it may embed the uncertainty that the local environment brings about. This could be the case despite the government intervenes to limit the economic and policy uncertainty in provinces with the lowest levels of marketization (Zhang *et al*., 2015).

[33] See Appendix 2B for the components of the NERI index related to the legal framework.

The relevant role of inter-firm trust in the extension of trade credit is confirmed by Wu *et al*. (2014, p. 151). They find that companies located in regions with higher social trust, which are those featured by higher levels of marketization, offer more trade credit to customers and receive more timely payment of receivables from them.

The presence of higher degree of inter-firm trust in the provinces with higher levels of marketization is indirectly advocated by Yano and Shiraishi (2016) as they argue that inter-firm trust is more developed in the provinces along the coast. A glimpse at our Appendix 2C confirms that the largest fraction of provinces with higher levels of NERI are those located in the Eastern part of the country, whereas the opposite applies for inland provinces. Provinces with high marketization are also those where firms are allegedly able to have easier access to short-term external finance, given a more developed banking system. A complementary relationship between formal external finance and the extension of trade credit is thus expected in these provinces (Petersen and Rajan, 1997; Biais and Gollier, 1997). We may also expect that firms in these areas to be managed in a more efficient way than elsewhere in the nation. Firms will thus be capable to generate a higher amount of cash flow and more inclined to extend trade credit as proposed by Niskanen and Niskanen (2006). For the same reason they will stick to the inventory management motive for credit sales proposed by Bougheas *et al*. (2009) and extend less trade credit. Given the larger degree of inter-firm trust that characterizes these provinces, we may expect firm age and size to be positively associated with the extension of trade credit. Conversely, asymmetric information featuring the least marketized provinces may force smaller and younger firms to extend trade credit, pointing to a negative association. The need to quickly build reputation is larger for firms that grow fast. This may occur by granting accounts receivable in a more pronounced way in the less developed provinces (Wu *et al*., 2014). We also presume higher quality production to be

located in the provinces with higher levels of marketization and, consequently, assume a negative relationship between turnover and accounts receivable. We claim that an interplay could be in place between the foreign ownership (Chen *et al*., 2014), the level of marketization (Fan *et al*., 2011), and economic and political uncertainty (Zhang *et al*., 2015). This interrelation makes hard to formulate a reliable prediction. In a similar manner, the interconnections between the institutional and financial heterogeneity coupled with how inter-firm relationship are managed across territories does not allow for a correct prediction on the behaviour of financing costs on both sides of trade credit.

In a somewhat symmetric way, if we look at accounts payable, we observe that trust is more developed in the provinces with higher levels of marketization. As we notice from Appendix 2C, a large fraction of the provinces with the largest value of NERI are located along the coast. Firms placed in these provinces make a larger use of notes and accounts payable than those located in inland provinces, featured by lower levels of marketization (Yano and Shiraishi, 2016).[34] This may indirectly support the idea that companies operating in these provinces are more reliable and should receive more trade credit. This is likely to be true mainly for larger and older enterprises (Petersen and Rajan, 1997).

The better financial development of the provinces with high levels of marketization points to a controversial association between short-term debt and long-term debt, on the one hand, and accounts payable on the other. A complementarity could be recorded in the most developed areas where the implicit interest rate on accounts payable and bank credit may not

[34] Yano and Shiraishi (2016) do not look for the determinants of trade credit, but analyse which forms of trade credit are used to finance which types of corporate activities in China by non-state-controlled firms. They rely on firm-level panel data between 1998 and 2007, and compare interior and coastal areas. They document three facts. First, trade credit in China supports investments by non-state-owned enterprises. Second, trade credit in the form of notes and accounts payable is more developed and applied to foster investments in the coastal areas than in the inland provinces. Third, the dominant form of trade credit used changes during the period under scrutiny. In fact there is a shift from deposits received to notes and accounts payable. The authors argue that the latter change could be driven by an increase in interfirm trust and larger market competitiveness.

be extremely different, whereas substitution could be detected in the least developed areas, where the cost of informal finance could be higher than that of bank credit.[35] Yet, such allegedly complementarity between bank credit and accounts payable could be offset in the provinces with the highest level of marketization, due to the effect of cash flow on accounts payable. In fact, in these areas firms are more profitable than those located elsewhere and are thus able to internally generate finance.

2.5.3. Further tests: the role of ownership

A further aspect we wish to take into account when looking at the determinants of trade credit is how they change according to firms' ownership status.

Private firms make up the largest share of companies in our sample, and they also represent the ownership type that suffers the most from the presence of financial constraints in China (Allen *et al*., 2005; Guariglia *et al*., 2011, Ding *et al*., 2013). This is why most of the literature related to trade credit concentrates on the complementarity/substitution with bank credit and devotes little space to other drivers of trade credit (e.g. Huang *et al*., 2011; Du *et al*. 2012).

Comparing state and non-state enterprises, Ge and Qiu (2007) find that the latter use, on average, more trade credit than the former.[36] According to their findings, non-state owned-firms are more likely to have positive net trade credit than state-owned firms, and there exists a negative association between state ownership and all their measures of trade credit.

[35] As the scope of this paper is not to thoroughly examine the complementarity/substitution between trade credit, in general, and bank credit, we will not discuss this relationship in detail.

[36] This holds when using several measures of trade credit, i.e. accounts payable over total assets, accounts payable over total sales, net trade credit over total assets and net trade credit over total sales. Yet, as we mentioned in the literature review, Ge and Qiu (2007) do not run separate regressions for state and non-state firms, but employ a dummy to discriminate between the two groups.

Guariglia and Mateut (2016) observe that the accounts receivables to sales ratio is highest for state-owned firms and lowest for private firms. This difference may depend on the fact that SOEs have the largest short-term liabilities to sales ratio, thus indicating that the availability of external finance is associated with these firms' ability to extend trade credit.

In line with this last contribution, on which we largely rely for our predictions, we expect accounts receivable to be positively related to short-term leverage. This relationship is likely to be of a stronger magnitude for private companies than for both foreign firms and SOEs plus collective firms. This can be explained in the light of the internal capital markets that non-domestic firms can rely on (Desai *et al*, 2004) and of the soft budget constraints shown by state-controlled companies (Ding *et al*., 2013). Furthermore, we expect financing costs to be negatively related to accounts receivable for private firms, but not for SOEs plus collective firms. The younger and smaller private firms the higher the amount of trade credit they have to extend to build credibility in a market where information asymmetry plays a role. This argument also applies to justify our claim that private firms, despite growing the most in the period (Guariglia *et al.*, 2011), may need to extend trade credit to build trust and reputation. Moreover, given that private firms are able to generate large amounts of internal funds, we expect a positive relationship between cash flow and the extension of trade credit (Niskanen and Niskanen, 2006). Finally, in line with the inventory management motive outlined in Bougheas *et al*. (2009), a negative association between the amount of stocks and accounts receivable is expected for private and foreign firms.

Focusing on the determinants of accounts payables across ownership types, we advocate that a positive and significant relationship should be in place with short-and long-term debt, especially for private firms (Biais and Gollier, 1997). In this respect, a higher cost of financing sources other than trade credit should foster the use of more accounts payable,

mainly for private and foreign firms, but not for state-controlled companies. Given the previously mentioned ability of private firms to generate internal finance, we expect cash flow to be negatively associated with accounts payable (Huyghebart, 2006). We also assume private firms to have larger investment opportunities (Song *et al*., 2011) and to consequently resort more to accounts payable. We also expect private and foreign firms to be more careful in defining their matching of current assets with current liabilities, leading to a positive relationship between accounts payable on the one hand, and cash, inventories and accounts receivable, on the other (Ruan *et al*., 2014).

2.5.4. Estimation methodology

We estimate all our equations using the system GMM estimator developed by Blundell and Bond (1998), taking advantage of the well-established explanatory power it has in short panels. This approach allows us to control for unobserved firm-specific heterogeneity, and for the possible endogeneity of the regressors. The system GMM estimator combines the equation in first-differences with the equation in levels in a system. A notable enhancement in efficiency and a significant decrease in finite sample bias compared with the simple first-differenced GMM is observed by Blundell and Bond (1998) when adding the original equation in levels to the system and taking advantage of the additional moment conditions. We treat all the regressors in our equations (exception made for age) as endogenous and instrument them using their lagged levels in the differenced equation, and their lagged differences in the levels equation.

In the presence of serial correlation of order n in the differenced residuals, the instruments for the equation in first-differences need to be limited to lags $n + 1$ and deeper

(Brown and Petersen, 2009; Roodman, 2009). We assess the presence of n^{th}-order serial correlation in the differenced residuals using the *m*(*n*) test (AR p-value), which is asymptotically distributed as a standard normal under the null of no n^{th}-order serial correlation of the differenced residuals.[37] Yet, the *m2* is not available given the short time dimension of the panel.

The validity of the instruments is tested using the Hansen/Sargan statistics (or *J* statistics). Yet, according to the Monte Carlo outcome recorded by Blundell *et al.* (2000), the Sargan test has a tendency to over-reject the null hypothesis of instrument validity if the system GMM is employed to estimate a production function on a large panel data.[38] Considering the size of our panel, we are inclined to devote small attention to the *J* test.

2.6. Data and descriptive statistics

Information on unlisted companies is retrieved from the annual accounting reports filed by industrial firms with the Chinese National Bureau of Statistics (NBS) over the period 2004-2007. All state-owned enterprises and other types of enterprises with annual sales of five million yuan (about $650,000) or more are included. These firms belong to the manufacturing and mining sectors and come from 31 provinces or province-equivalent municipal cities. We delete observations with negative sales, as well as observations with negative total assets minus total fixed assets, total assets minus liquid assets, and accumulated depreciation minus current depreciation. We also omit firms that do not show complete information on our main

[37] However, due to the short-time span of our panel we will not be able to rely on the *m*(*n*) test to rule out the presence of autocorrelation.

[38] Nickell and Nicolitsas (1999) also indicate significant Sargan test statistics for all their estimation results. Similarly, Benito (2005), Benito and Hernando (2007), and Becker and Sivadasan (2010) show the *J* statistics for a large part of their outcomes.

regression variables. In order to control for the potential effect of outliers, we exclude observations in the one percent tails of all regression variables (with the exception of dummy variables). This process aims at removing the possible bias that may stem in the regression if abnormal values of the variables of interest are included. Our final unbalanced panel is made up of 117,191 observations.

The NBS data includes a continuous measure of ownership, which relies on the fraction of capital paid-in by four different types of investors. Using a majority rule we identify four different ownership types, namely private, foreign, state owned, and collective companies. Following Guariglia *et al.* (2011), we group investors from Hong Kong, Macao and Taiwan and other countries in the category of foreign companies.[39] In the present contribution we group together state-owned enterprises and collective companies on the basis of two main reasons. First, the two types of firms are both politically connected and rely on governments, at different territorial levels, to obtain a relevant resource support. SOEs are owned by the state and might be controlled by both the central and provincial-level governments. Collectives include rural townships, village enterprises, and urban collectives. They are owned collectively by the citizens of the community and are connected to the local government. However, there are some difference between SOEs and collective enterprises. Collectives are different from SOEs because they are not merely driven by the political motives defined by the local government with which they are connected, but also because they rely on a market-oriented mechanism. In fact, they are responsible for their own profits or losses (Chung *et al*., 2015). Second, collective enterprises undertook a large process of privatization since 1992 which allowed them to experience a relevant increase in profitability, especially in the early stages of the process. This lead to a reduced engagement of the central

[39] The characteristics of the firms belonging to the four different ownership groups are precisely described in Ding *et al*. (2013).

government in terms of financial support. Yet, their property rights remain still "fuzzy and unclear" (Li and Xia, 2008, p. 41).[40]

2.6.1. Summary statistics: the full sample

Table 2.1 shows descriptive statistics for the full sample. Table 2.2 reports the correlation matrix. Table 2.3 shows the descriptive statistics for firms pertaining to provinces with different levels of marketization. Table 2.4 provides the descriptive statistics for firms owned by different agents.[41]

We first look at the result of Table 2.1 for the full sample.

AP_{it} represent, on average, 13.7% of total assets. This value is consistent with previous studies, such as Ge and Qiu (2007) who focus on Chinese unlisted firms in the year 2000 and show that trade credit obtained represents 13% of total assets. It is also very close to the 13.2% observed at the provincial level for the years 2001-2008 by Yano *et al*. (2013). The ratio is larger than the 9.605% recorded by Wu *et al*. (2014) who focus on non-state controlled listed firms between 2003 and 2008.[42]

AR_{it} make up 19% of total assets. This value is slightly higher but consistent with the 17.2% recorded by Guariglia and Mateut (2016) in their analysis of political affiliation and trade credit extension for Chinese unlisted companies between 2000 and 2007. The value is

[40] A shift in performance towards an evolved profit-maximizing style of management is also confirmed by Lu *et al*. (2010, p. 283). They argue that collective privatized firms show a larger operating income to sales as a consequence of government disengagement.

[41] A complete definition of all variables described here is provided in Appendix 2A. The results of a two-tailed Welch t-test on the difference between the means of variables reported in Table 2.3 and Table 2.4 are not reported for the sake of brevity but are available from the authors upon request.

[42] The ratio is also higher than the 8.5% obtained by Yano and Shiraishi (2010) for firms operating in the light industry in the Guanxi province between 1992 and 1994. It is also greater than the 0.8% recorded by Yano and Shiraishi (2012) in their study of Chinese rural firms between 2001 and 2006. Probably the large differences between the figures shown by these two studies and those we recorded are due to the limited sample sizes analyzed by Yano and Shiraishi (2010, 2012)

instead quite larger than the 12.61% recorded by Wu *et al*. (2014) who, as pointed out above, concentrated on non-state controlled listed companies between 2003 and 2008.[43]

The firms under scrutiny are on average 12.22 years old (AGE_{it}), and their $SIZE_{it}$, measured as total assets, is about 0.806 million Yuan. Looking at the components of assets, $CASHFLOW_{it}$ represents 8.7% of total assets which is very similar to the 8.38% recorded by Guariglia *et al*. (2011) for private firms, accounting the largest part of the sample in ours and their work.[44] $CASH_{it}$ accounts for 22.3% of total assets, which is in line with the 21.1% recorded by Wu *et al*. (2012) in their study of the role of trade credit in shaping the amount of cash, as a result of the 2007 reform on the discipline of accounts receivable.[45] $STOCKS_{it}$ account for 17.6% of total assets, a value close the 18.5% recorded by Guariglia and Mateut (2016).[46] This digit is also very close to the 18.05% recorded by García-Teruel and Martínez Solano (2010a) pointing to a similarity between the role played by inventory in China for unlisted firms in the selected time span and for UK SMEs. If looking at the composition of liabilities we observe, instead, that current liabilities account for 49% of total assets ($SHORTLEV_{it}$). This figure decreases to 35.2% once accounts payable are deducted ($SHORTDEBT_{it}$). Both measures of current liabilities scaled by total assets are much higher than $LONGDEBT_{it}$, which only represents 3.8% of total assets.[47] A non-negligible role on

[43] Other studies scale accounts receivable by total sales. Yet, we already pointed out that this is not our strategy. See, for example, Petersen and Rajan (1997), Cull *et al*. (2009), García-Teruel and Martínez Solano (2010b; 2010c).

[44] This digit is higher than the value recorded by Ge and Qiu (2007). Yet, the percentage is similar to the 8.53% shown by García-Teruel and Martínez Solano (2010c) for Greek SMEs between 1996 and 2002. It is slightly lower than the 10.09% observed by García-Teruel and Martínez Solano (2010a) for UK SMEs in the period 1996-2001. Yet, it is higher than the 6.4% recorded for Spanish SMEs by García-Teruel and Martínez Solano (2010b) between 1997 and 2001.

[45] Yet, the value is largely higher than the 9.3% recorded by Yano and Shiraishi (2012). These authors analyze rural firms, which may not be able to generate as much cash as the firms in our sample.

[46] The slight differences in some of the independent variables between the contribution of Guariglia and Mateut (2016) and ours are attributable to the different time spans employed. We use data over the period 2004-2007, whereas they use information over the period 2000-2007, which may justify the difference in sample size

[47] These values indicate a leverage composition which is consistent with what was recorded by studies on the capital structure of Chinese firms, such as Chen (2004) and Bhabra *et al.* (2008), who analyse listed firm and Li

firms' investing and financing decisions is played by $FCOSTS_{it}$, which reach 1% of total assets. This figure may be cautiously compared to the values recorded by Cull *et al*. (2009, p. 178) for firms owned by different agent.[48]

Firms in the sample show an average growth of sales ($SALESGR_{it}$) of almost 11%. This figure is lower than the 16% recorded by Ge and Qiu (2007), but almost identical to the value they record for their subsample of non-state firms, which represent the majority in our sample. This value is however lower than the figure of 25.4% recorded by Wu *et al*. (2014) who focus on a small sample of 659 listed firms between 2003 and 2008. Furthermore, a significant average share of capital is owned by foreign investors, namely 22.9% ($FOWNS_{it}$). This value is higher than the 18% registered by Li *et al*. (2009) between 2000 and 2004. It is also larger than the 11% recorded by Chen *et al.* (2014) for Chinese SMEs in 2003 and 2004, pointing to an increasing attractiveness of Chinese firms in more recent years.[49] The assets turnover ratio ($TURN_{it}$) takes a value of 1.59 which means that for each Yuan in the balance sheet, firms are able to generate 1.59 Yuan of sales. This value is lower than what was recorded in the sample of European SMEs analyzed by García-Teruel and Martínez Solano (2010c), and specifically for the Spanish SMEs investigated by García-Teruel and Martínez Solano (2010b). Although such difference might be attributable to the use of different

et al. (2009), Chen *et al.* (2014) and Du *et al.* (2015), who study unlisted companies. As already pointed out, we do not wish to provide extensive analysis of leverage composition in this Chapter as it will be the focus of Chapter three.

[48] It is worth recalling once again here that these authors use the ratio between interest paid and sales as a proxy for formal finance. They record values of 6.2%, 3%, 3.2%, 2.2%, and 2% for SOEs, collective firms, legal person entities, domestic private enterprise and foreign firms, respectively. The value we record for our full sample is similar to the digits expressed by private firms, which represent the largest ownership group. Yet, no large differences are detected amongst different ownership groups.

[49] Li *et al*. (2009) look at how ownership structure and institutional development affect leverage choices of non-publicly listed Chinese firms. Chen *et al.* (2014) look, instead, at the role of foreign ownership on the cost of borrowing for Chinese SMEs. Both references are widely analysed in Chapter three as foundations to the study of the capital structure in China.

currencies, it is also questionable this could be the only reliable indication of a higher quality of production of Chinese firms.[50]

2.6.2. Summary statistics: different levels of marketization

Table 2.3 provides descriptive statistics for firms located in provinces with different levels of marketization. Observations for firms located in the provinces with the highest level of marketization account for the largest part of the sample, namely 77%. Observations for the firms located in the provinces with intermediate and low level of NERI account for the 16.53% and the 6.46% of the total, respectively. As recorded in the statistics for the full sample, we also observe here that in all areas under scrutiny, the level of accounts receivable is higher than the one recorded by accounts payable. Consistent with Wu *et al*. (2014), firms, on average, tend to grant more trade credit than the amount they obtain. This difference is largest in the provinces with the highest level of marketization and smallest in those with the lowest level of the NERI index. One explanation could be that firms located in provinces with higher marketization are likely to face stronger competition in the output market and extend accounts receivable as a competitive tool (Fabbri and Klapper, 2008).

If we observe the two proxies of creditworthiness, we notice that firms are younger and smaller the higher is the level of marketization. The most dynamic part of the country hosts the youngest group of firms, which are also the smallest in size. We may thus argue that the possible negative effects on credibility that age and size bring about could be mitigated by the presence of a better institutional environment. Such a claim may also justify that foreign

[50] It may also be that Chinese companies in the sample are comparatively slower in undertaking the production process because they lag behind in managerial practices and technology with respect to firms in countries with more efficient manufacturing techniques. Some evidence that may help support this view is provided by Bloom *et al*. (2016a, 2016b).

investors own the largest share of capital for firms located in these provinces (Yi *et al*., 2015). The same pecking order is recorded when looking at turnover and cash flow. Higher values of turnover for the provinces with the largest value of NERI may be consistent with an aggressive and competitive pricing that features the most developed provinces. Conversely, highest values of cash flow in the most developed provinces are consistent with the role played by internal finance in fostering companies' growth along the coast (Guariglia *et al*., 2011). The growth of sales is largest in the areas with intermediate levels of marketization. This may indicate a catching-up process towards the most developed provinces (Zilinski, 2016).

2.6.3. Summary statistics: ownership types

Table 2.4 provides the descriptive statistics for the firms owned by different agents. Private firms account for 64.06% of the total number of observations, whereas foreign firms, and SOEs plus collective enterprises represent 21.67% and 10.75% of the whole sample, respectively. If we observe accounts receivable over total assets, we notice that foreign firms show the largest value (20.4%), followed by private firms (18.9%), and then by SOEs plus collective companies (17.5%).[51] The same pecking order holds when we consider accounts payable over total assets, with 16.3%, 13.1%, and 12.1% recorded by the three ownership groups, respectively.[52] Foreign firms are the youngest, the largest, and those with the largest amount of inventories, broadly consistent with the values shown by Guariglia and Mateut

[51] This order is different from the one recorded by Cull *et al*. (2009) and Guariglia and Mateut (2013), who find the largest value for SOEs. Yet, they both scale accounts receivable by total sales and not by total assets, as we instead do. They also keep SOEs and collective firms into two separate groups whereas we merge them into one.
[52] Our pecking order for accounts payable over total assets is, to a certain extent, similar to the findings of Ge and Qiu (2007). They notice that for almost every industry, the ratio between accounts payable and total assets for non-state firms is higher than that for state firms.

(2016).[53] Foreign firms are also the group with the highest level of cash flow and facing the lowest incidence of external costs of finance. Conversely, private firms have the highest turnover, pay the highest amount of financing costs, but are nonetheless able to show the largest sales growth (Cull *et al*., 2009). In a nutshell, foreign and private firms represent the most dynamic ownership types in China, despite their different leverage composition.[54]

2.7. Evaluation of the results

2.7.1. The determinants of accounts receivable

2.7.1.1. The full sample

In order to identify the role played on accounts receivable by the set of explanatory variables we previously devised, we estimate Equation (2.1), using the one-step XTABOND2 system GMM implemented in STATA.[55] The results of the regressions are reported in Table 2.5, Column 1. The regression includes industry, year, province and ownership dummies.

[53] Cull *et al*. (2009) show that foreign firms are the youngest, but SOEs are the largest if considering the number of employees. Guariglia and Mateut (2016, p. 8), Table 2.1, show that SOEs are the group of firms with the largest amount of inventories. Yet, if we roughly compute the mean value of stocks including SOE and collective firms, the claim of consistency between our work and theirs could be considered broadly valid.

[54] Chapter three of this dissertation shows that for private firms and foreign companies the average ratio of total debt (net of accounts payable) to total assets is equal to 43.5% and 27.5%, respectively. It also shows that the average ratio of long term debt (net of accounts payable) to total assets for private firms and foreign enterprises is equal to 3.8% and 2.3%, respectively. In addition, the Chapter indicates that the average of ratio of short-term debt (net of accounts payable) to total assets for private firms and foreign companies is equal to 38.9% and 24.9%, respectively.

Further evidence of dissimilarities in the leverage composition across ownership types is provided, amongst others, by Li *et al*. (2009). Looking at unlisted companies over the period 2000-2004, they show that in less developed regions, foreign and private firms tend to have lower total and short-term debt than their state owned counterparts. It is also worth pointing out here that private firms resort more to informal finance than other types of firms do (Allen *et al*., 2005; Ayyaggari *et al*., 2010).

[55] We will apply the same estimation technique throughout the rest of the paper.

The use of a dynamic specification proves to be correct as the lagged dependent variable carries a positive and highly significant sign, providing support to our hypothesis H1. The speed of adjustment is 0.61, which can only be compared to the levels recorded by García-Teruel and Martínez-Solano (2010b). These authors are indeed the first and the only to document the dynamic nature of accounts receivable and record higher speed of adjustment than ours in their study of Spanish SMEs (between 0.73 and 0.77). The lower level we record may suggest that the companies in our sample could suffer from late payments and thus face higher frictions and transaction costs in their relationship with business peers. This could be confirmed by the large relevance of trade credit overdue especially across non-state companies that often do not meet their obligation within the set deadline and exploit the larger contractual power they have with respect to firms owned by different agents (Ge and Qiu, 2007).[56]

The variables that should indicate the firms' creditworthiness, such as $SIZE_{it}$ and AGE_i are not significant, and no role is also played by the squared term of AGE_i. This might be due to the heterogeneous nature of the firms within the sample, which hides different behaviours which are not captured in the baseline specification. The lack of significance for the age of the firms is also consistent with García-Teruel and Martínez-Solano (2010c), who find no effect for age in SMEs in five out of the seven countries they investigate. $CASHFLOW_{it}$ carries a negative and significant sign. Thus, we do not find support for the claim that firms able to generate more internal finance are also inclined to extend more trade credit as advocated, for example, by Niskanen and Niskanen (2006). Yet, the economic effect of such a decline is extremely small. In fact, one standard deviation increase in $CASHFLOW_{it}$ yields a 0.062%

[56] As we already pointed out, these authors employ four different measures of trade credit, but none of them is accounts receivable over total assets. Yet, they make use of two measures of net trade credit (accounts payable minus accounts receivable) either scaled by total assets, or by total sales. In this respect, we feel that our claim is generally correct.

decline in AR_{it}.[57] This negative association is however plausible in the Chinese case, as most firms face a tough access to external finance (Allen *et al*., 2005; Ding *et al*., 2013) and may be reluctant to supply trade credit. This claim is consistent with the negative and significant sign shown by $SHORTLEV_{it}$. Yet, one may argue that this result could be in line with Long *et al*. (1993), who stress that if firms obtain credit from different sources (supplier and non-supplier finance) they do not need to offer accounts receivable as a means to provide a proof of quality. A support to this latter claim comes from $TURN_{it}$ which carries a positive and significant sign. This outcome does not back up the quality signalling theory, but it is consistent with García-Teruel and Martínez-Solano (2010c), and Deloof and Jegers (1996) who study a sample of large Belgian firms. In both cases, firms that produce goods whose quality is the easiest to verify are those that grant more trade credit to their customers.[58] The negative sign shown by $FCOSTS_{it}$ brings support to the abovementioned idea that a large fraction of Chinese companies suffers from a limited and costly access to external finance through both formal and informal finance (Hale and Long, 2011). The economic effect is small, but not negligible. A one standard deviation increase in $FCOSTS_{it}$ leads to a 2.55% decline in AR_{it}.[59]

$SALESGR_{it}$, $FOWNS_{it}$ and $STOCKS_{it}$ do not play a significant role in determining the amount of trade credit extended. The irrelevance of the yearly variation in sales may be the

[57] More precisely, the coefficient of $CASHFLOW_{it}$ reported in Column 1 of Table 2.5 is -0.001360. Column 2 of Table 2.1 shows that that the standard deviation for $CASHFLOW_{it}$ is equal to 0.08702. Hence, a one standard deviation increase in $CASHFLOW_{it}$ yields a (-0.001360*0.08702) = -0.0001183472 decrease in AR_{it}. The mean value of AR_{it}, reported in Column 2 of Table 2.1, is equal to 0.190, so a one standard deviation increase in $CASHFLOW_{it}$ creates a (0.0001183472/0.190) = 0.062 % decline in AR_{it}.

[58] We thank Pedro Martínez-Solano for clarifying this point, which he claims in the work García-Teruel and Martínez-Solano (2010c). This is the exact expression he uses in an email dated August 6th, 2016.

[59] More specifically, the coefficient of $FCOSTS_{it}$ reported in Column 1 of Table 2.5 is -0.439780. Column 2 of Table 2.1 shows that that the standard deviation for $FCOSTS_{it}$ is equal to 0.011. Hence, a one standard deviation increase in $FCOSTS_{it}$ yields a (-0.439780*0.011) = -0.00483758 decrease in AR_{it}. The mean value of AR_{it}, reported in Column 2 of Table 2.1, is equal to 0.190, so a one standard deviation increase in $FCOSTS_{it}$ leads to (-0.00483758/0.190) = 2.55 % decline in AR_{it}.

result of opposite and neutralizing forces within the sample.[60] A similar argument can be recalled to justify the lack of significance of foreign ownership.[61] It is instead hard to justify the insignificant value of inventories, as a tradeoff is detected for all ownership types by Guariglia and Mateut (2016).

The Hansen test shows some problems with the specification of the model and/or the validity of the instruments. In fact, when samples with a very large cross-sectional dimension are employed in estimation, the Hansen test for overidentifying restrictions tends to overreject the null hypothesis of instrument validity (Blundell *et al.*, 2000; Benito, 2003; Guariglia *et al.*, 2011). Neither the *J* test nor the test for the *n*-th order serial correlation allow us to discriminate between poor model specification and/or bad instruments.

2.7.1.2. Controlling for the level of marketization

In order to examine the determinants of accounts receivable across provinces with different levels of marketization, we estimate Equation (2.1) for subsamples corresponding to the previously mentioned low, medium and high levels of the NERI index. The results are reported in Columns 1, 2 and 3 of Table 2.6. All regressions include industry, year, ownership and province dummies.

[60] Niskanen and Niskanen (2006) find that only a positive variation in sales leads to an increase in accounts receivable, whereas no change is recorded if sales decline. Conversely, distinguishing positive and negative sales growth, García-Teruel and Martínez-Solano (2010b) show that only a positive variation in sales is associated with a decline in accounts receivable. We tried to mimic this latter strategy by dividing annual sales changes into positive sales growth and negative sales growth but our results lead to insignificant coefficients throughout.

[61] We may argue that this relationship could be consistent with Fabbri and Klapper (forthcoming). They find "that firms with important foreign equity ownership" have a higher probability of offering trade credit (p. 13). As their notion of important foreign equity ownership implies control, we may argue that the lack of significance for foreign ownership we recorded depends on the fact that it does not necessarily imply control if the foreign agent does not hold the largest share

A consistent feature of the results for the firms across different levels of marketization is the persistence of the lagged dependent variable that supports, once again, our hypothesis H1. More precisely, we observe that the speed of adjustment is positive and significant at the 1% level. The largest speed (0.61) is recorded for firms located in the provinces with the highest level of marketization, which is consistent with Wu *et al*. (2014), who find that firms located in regions with higher social trust supply more trade credit to customers and receive more timely payment of receivables from them. This result may also be connected with the fact that accounts receivable, before the new pledge receivable policy implemented in 2007, required precautionary investment in cash. This larger investment could be undertaken in the provinces with larger financial deepening (Wu *et al*., 2012, p. 2871).

If we observe the behaviour of the two measures of creditworthiness, i.e. $SIZE_{it}$ and AGE_i, we notice that only the latter takes a significant and positive sign, and exclusively for firms located in the provinces with the highest and medium levels of the NERI index. Yet, the effect of AGE_i is not linear and shows an inverted U-shaped behaviour, consistent with Petersen and Rajan (1997) and Niskanen and Niskanen (2006). Firms located in the provinces with high level of marketization show a turning point at 24.92 years of age. This is far larger than the mean value of 11.55 recorded for the firms in the same group of provinces as reported in Column 2 of Table 2.3. In a similar manner, firms located in the provinces with medium level of marketization show a turning point at 26.25 years of age. This threshold is once again larger than the mean value of 13.60 for the companies located in the provinces under scrutiny and reported in Column 3 of Table 2.3. This may mean that the firms we are looking at are still relatively young and in a growing stage. This could be consistent with the claim that younger firms have low contractual power and extend trade credit to satisfy the requests of established older buyers. This could also be in line with the argument put forward

by Petersen and Rajan (1997, p. 674) that too old firms suffer from high costs in accessing finance and are thus reluctant to extend the funds they secured through accounts receivable.

If we consider the remaining set of explanatory variables we notice large differences between firms located in the three areas. Looking at the firms located in the provinces with the highest levels of NERI, reported in Column 1 of Table 2.6, only $SHORTLEV_{it}$ and $TURN_{it}$ are significant. $SHORTLEV_{it}$ takes a negative sign. Once again, as stated for the full sample, one may argue that this result could also indicate that firms obtaining credit from different sources (banks and supplier-related finance) are not financially constrained and do not need to provide a signal of their financial solidity by offering trade credit (Long *et al*., 1993). The economic effect is sizeable. In fact, a one standard deviation increase in $SHORTLEV_{it}$ yields a 6.19% decline in AR_{it}.[62] This explanation seems also plausible as we are observing the most developed part of the country. $TURN_{it}$ takes as well a negative sign. Yet, as we have previously indicated, this variable is employed as a broad proxy of product quality as it should approximate production lead times. As previously stated, Long *et al*. (1993) expect that more complex products will require more time to be appreciated by the customer and the seller has thus to extend more trade credit. In this regression $TURN_{it}$ bears a negative sign and it may indicate that firms located in this areas manufacture higher quality products, whose features can be appreciated by buyers only if the seller extends more trade credit.[63]

Looking instead at the firms located in the provinces with intermediate level of marketization, whose results are reported in Column 2 of Table 2.6, we observe that, besides

[62] More precisely, the coefficient of $SHORTLEV_{it}$ reported in Column 1 of Table 2.6 is -0.057636. Column 2 of Table 2.3 shows that the standard deviation for $SHORTLEV_{it}$ for firms located in provinces with high levels of NERI is equal to 0.218. Hence, a one standard deviation increase in $SHORTLEV_{it}$ yields a (-0.057636*0.218) = -0.012564648 decrease in AR_{it}. The mean value of AR_{it} for firms located in provinces with high values of NERI reported in Column 2 of Table 2.3, is equal to 0.203, so a one standard deviation increase in $SHORTLEV_{it}$ leads to (-0.00483758/0.190) = 6.19% decline in AR_{it}.

[63] These results are consistent with the outcomes on industrialised economies provided, for example, by Pike *et al*. (2005).

AGE_i, only two other regressors carry a significant sign, namely $FCOSTS_{it}$ and $FOWNS_{it}$. Financing costs are only marginally significant and are negatively associated with accounts receivable, thus indicating that the higher the cost of external finance, the lower the amount of trade credit extended.[64] The share of capital owned by foreign investors carries a positive sign, and it is significant at the 5% level. We confirm our intuition that the presence of a non-domestic investor may allow domestic firms to supply a signal of reliability to business peers and to the financial system. The same companies are thus more likely to extend trade credit.[65] The economic effect is large. In fact, a one standard deviation increase in $FOWNS_{it}$ yields a 19.25% increase in AR_{it}.[66]

As far as firms located in the provinces with low levels of marketization are concerned, the coefficients associated with all regressors except the lagged dependent variable are not statistically significant. It may be that the features leading firms to extend (but also to obtain) trade credit in these provinces are associated with institutional backwardness and limited market competitiveness, which are not explicitly addressed in the regression (Yano

[64] García-Teruel and Martínez-Solano (2010b, 2010c) employ a slightly different variable, but they never find statistically significant results, neither in their analysis of the Spanish case nor in their cross-country European comparison The lack of significance for $FCOSTS_{it}$ in the provinces with high level of marketization may indicate, as already advocated, that firms do not suffer from a limited access to external finance. Therefore the cost of finance does not affect their decision on trade credit extension. By contrast, the constraints in the access to external finance for firms located in the provinces with the lowest levels of marketization are so pervasive that it is not the cost of finance itself which plays a key role. It is, in fact, more likely that an interplay between the economic underdevelopment and institutional backwardness may direct firms' use of formal and informal finance far from both the dynamics of a competitive market and efficiency of corporate governance

[65] The insignificant coefficient of $FOWNS_{it}$ for firms located in the provinces with high marketization may be explained by its negligible effect in an already well-developed area, where financial credibility is not as relevant as in the rest of the country. In a similar fashion, the lack of significance of $FOWNS_{it}$ for firms located in the least developed provinces may derive from the fact they lag far behind companies located elsewhere from the attractiveness of foreign capital. A foreign non-controlling stake in the capital of these firms has again negligible effects on the extension of trade credit, because it does help in accessing to external finance and, therefore, does not foster the extension of accounts receivable.

[66] More precisely, the coefficient of $FOWNS_{it}$ reported in Column 2 of Table 2.6 is 0.119314. Column 3 of Table 2.3 shows that the standard deviation for $FOWNS_{it}$ for firms located in provinces with medium levels of NERI is equal to 0.242. Hence, a one standard deviation increase in $FOWNS_{it}$ yields a (0.119314*0.242) = 0.028873988 increase in AR_{it}. The mean value of AR_{it} for firms located in provinces with medium values of NERI reported in Column 3 of Table 2.3, is equal to 0.150, so a one standard deviation increase in $FOWNS_{it}$ leads to (0.028873988/0.150)= 19.25% increase in AR_{it}.

and Shiraishi, 2016, p. 88). This may entail, for example, the rule of law and the degree of interfirm trust.

The Sargan test points to some problems with the specification of the model for the firms located in the provinces with the highest levels of NERI. The *J* test seems to exclude concerns related to the choices of the instruments (Columns 2 and 3 of Table 2.6).

2.7.1.3. Controlling for ownership

In order to examine the determinants of accounts receivable across firms owned by different agents we estimate Equation (2.1) for subsamples corresponding to private firms, foreign companies and SOEs together with collective firms. The results are reported in Columns 1, 2 and 3 of Table 2.7. All regressions include industry, year, and province dummies.

A common result across firms owned by different agents is the persistence of the lagged dependent variable. The speed of adjustment is positive and significant at the 1% level, with a strong support for our hypothesis H1. The largest speed is recorded for foreign firms, followed by private companies and by SOEs plus collective companies, with values of 0.62, 0.61 and 0.58, respectively. These coefficients may point to a higher efficiency of foreign-owned companies, which show a lower size in payments delays compared to the other ownership groups (García-Teruel and Martínez-Solano, 2010b). Foreign firms thus might be able to reach their target level of accounts receivable in a faster manner than firms owned by other agents as their clients might be concerned to preserve a good relationship with them being those firms a reliable source of finance.

Looking at the two most widely used measures of creditworthiness, only $SIZE_{it}$, shows a significant coefficient, and its sign is different across ownership groups.[67] Consistent with the results of García-Teruel and Martínez-Solano (2010b), private firms show a negative sign. This can be explained considering that larger private companies that benefit from an established reputation need to offer less trade credit to their customers in order to guarantee their products. This association is also in line with the original argument of Long *et al*. (1993) who claim that smaller firms have less reputation and thus need to extend accounts receivable to provide a guarantee of their items. A similar argument may also hold for SOEs plus collective firms (Column 3 of Table 2.7). These companies have soft budget constraints and, especially if large, do not need to extend trade credit to provide a proof of creditworthiness to their clients. Conversely, the bigger they are the larger the contractual power they can exert to potential customers, reducing the amount of accounts receivable (Bai *et al*., 2006). Foreign firms show a positive and significant sign of $SIZE_{it}$, consistent with the claim of Petersen and Rajan (1997) who argue that larger firms have better creditworthiness, easier access to capital markets and can thus extend more trade credit (Column 2 of Table 2.7). Clearly, this last relationship is in net contrast with the literature on information asymmetry that we recalled for private companies, in a context where trust and transparency play a relevant role.

If we concentrate on the remaining significant variables shown by private firms, reported in Column 1 of Table 2.7, we observe that $CASHFLOW_{it}$ carries a negative and significant sign. Thus, firms able to generate higher volumes of internal finance are less inclined to extend accounts receivable. Such a negative association is reasonable in the Chinese context, as most private firms face a tough access to external finance (Allen *et al*.,

[67] The lack of significance for AGE_i across all ownership groups is consistent with Guariglia and Mateut (2016) and with Giannetti *et al*., (2011) who find that age generally does not impact on the extension of trade credit.

2005; Ding *et al*., 2013) and may be reluctant to supply trade credit.[68] This claim could be consistent with the negative and significant sign shown by $SHORTLEV_{it}$ recorded for private firms by Oh and Kim (forthcoming) in their study of Chinese listed firms between 2003 and 2013. Private firms that are able to generate finance internally will make first use of this source to fund transactions and investment. When their internal funds are exhausted they will resort to external finance. Therefore the higher the level of $SHORTLEV_{it}$ the lower the level of accounts receivable. In fact, this supposed evolution is indicative of increasing financial needs.[69] $TURN_{it}$ carries a positive and significant sign, which is consistent with the findings of García-Teruel and Martínez-Solano (2010c). They argue that the SMEs they analyse may be affected by limited bargaining power and poor reputation which push to an extension of trade credit in order to build credibility.[70] We argue that this justification can be fruitfully recalled in our case as Chinese private companies are the smallest amongst the ownership types we investigate and are likely to have also meager contractual power and scarce reputation. These features may thus induce domestic firms to extend more trade credit.

[68] Contrary to their expectations, Petersen and Rajan (1997) find a negative relationship between net profits and accounts receivable. To shed light on this association, they augment their regression with sales growth, multiplied by an indicator to show if sales do actually increase or decrease. They also split profits up into positive and negative values. The authors first find that firms making losses tend to extend more credit. Yet, they then separate losses into losses if the firm has positive sales growth and losses if the firm has negative sales growth. They find that firms that have a positive sales growth but negative profits extend trade credit. At the same time, they find that firms with negative sales growth and negative profits also supply accounts receivable. Niskanen and Niskanen (2006) do not find a significant effect of net profits on accounts receivable even when they divide them into profits and losses. As far as our contribution is concerned, we tried to disentangle positive from negative cash flow in our investigation, but our outcomes did not prove to supply supportive evidence of a different role of the positive or negative cash flow in the extension of trade credit.

[69] It is however worth pointing out that Oh and Kim (forthcoming) look at the effect on accounts receivable of total and not short-term leverage as we do. However, given that the largest part of total debt of Chinese firm is composed by short term debt, our proxy for total debt is comparable to theirs.

[70] We thank Pedro Martínez-Solano for providing his view with respect to his co-authored publication with Pedro Juan García-Teruel, i.e. García-Teruel and Martínez-Solano (2010c). In an email exchange with Pedro Martínez-Solano, and with reference to the positive value of the measure of turnover in the regression explaining accounts receivable he argues that "This result do not support Long *et al*.'s (1993) hypothesis of quality signaling (Deloof and Jegers (1996) did not confirm this hypothesis either). However, you have to take into account that $TURN_{it}$ is a proxy for quality product. Probably additional analyses are required considering other factors affecting asymmetric information between buyers and sellers." He also adds "…Maybe these results are affected by lower reputation, size and bargaining power of these firms."

If the firm is partially owned by a foreign agent, it may extend more trade credit.[71] In fact, private firms may benefit from access to capital through the foreign partner, via an internal flow of funds (Li *et al*. 2009; Tan and Ma, 2016). This may enable the private company to limit its financial weakness and even extend trade credit. In fact, this is the case, as a one standard deviation increase in $FOWNS_{it}$ yields a 5.31% increase in AR_{it}.[72,73]

Consistent with the inventory management motive for credit sales suggested by Bougheas *et al*. (2009) and the results recorded by Guariglia and Mateut (2016), the coefficient of $STOCKS_{it}$ shown by private firms is negatively associated with accounts receivable. Such a relationship is detected for private firms only as they are more likely to cope with the consequences of uncertain demand and may face difficulties in smoothing fluctuations in sales through a lean stock management. As far as the economic effect is concerned, a one standard deviation increase in $STOCKS_{it}$ yields a 6.42% decrease in AR_{it}.[74]

The Sargan test shows some difficulties with the specification of the model for private firms, but the *J* test excludes problems in the choices of the instruments for the other two ownership types (Columns 2 and 3 of Table 2.7).

[71] For a very similar dataset than ours, Guariglia and Mateut (2016) show that foreign owned firms (not firms partially owned by a foreign entity) present a mean value of accounts receivable over sales equal to 18.3%, compared to the 17.2% shown by their full sample.

[72] More precisely, the coefficient of $FOWNS_{it}$ reported in Column 1 of Table 2.6 is 0.065290. Column 2 of Table 2.4 shows that the standard deviation for $FOWNS_{it}$ for private firms is equal to 0.122. Hence, a one standard deviation increase in $FOWNS_{it}$ yields a (0.075833*0.127) = 0.00796538 increase in AR_{it}. The mean value of AR_{it} for private firms reported in Column 2 of Table 2.4, is equal to 0.150, so a one standard deviation increase in $FOWNS_{it}$ leads to a (0.00796538/0.150)= 5.31% increase in AR_{it}.

[73] Yet, we cannot rule out that the larger the commitment by the foreign entity the greater the beneficial effect in terms of managerial practices and the capability to extend trade credit despite the presence of financial constraints.

[74] More precisely, the coefficient of $STOCKS_{it}$ reported in Column 1 of Table 2.6 is -0.075833. Column 2 of Table 2.4 shows that the standard deviation for $STOCKS_{it}$ for private firms is equal to 0.127. Hence, a one standard deviation increase in $STOCKS_{it}$ yields a (0.075833*0.127) = -0.009630791 decrease in AR_{it}. The mean value of AR_{it} for private firms reported in Column 2 of Table 2.4, is equal to 0.150, so a one standard deviation increase in $STOCKS_{it}$ leads to a (-0.009630791/0.150)= 6.42% decrease in AR_{it}.

2.7.2. The determinants of accounts payable

2.7.2.1. The full sample

The estimates of Equation (2.2) are reported in Column 1 of Table 2.8. The regression includes industry, year, province and ownership dummies.

Similarly to what recorded for the regressions explaining accounts receivable, the use of a dynamic specification allows to identify that the lagged dependent variable carries a positive and highly significant sign, bringing support to our hypothesis H1. The speed of adjustment is 0.68, which can be compared to the levels recorded by García-Teruel and Martínez-Solano (2010a). These are once again the only scholars who analyse and document the dynamic nature of accounts payable and show that the speed of adjustment takes values between 0.77 and 0.79 in their sample of UK firms. These ratios point to a relatively quick convergence to the target ratio of payables, larger than the one we record for the Chinese case. The difference can be explained considering that China is a country where the presence of delays in payments may lead to a sticky adjustment.[75]

The coefficients associated with $SIZE_{it}$ and AGE_i are not significant and no role is also played by the squared term of AGE_i. These outcomes are consistent with those of Ge and Qiu (2007) who show that these regressors are significant for only one out of the four proxies of trade credit they use.[76] The results on size are also in line with Wu *et al*. (2014) and with

[75] We recalled the presence of long overdue trade credit in our explanation of the speed of adjustment of accounts receivable. Being accounts payable and accounts receivable mirroring parts of the same business relationship, we claim that such argument can be also employed here.

[76] Ge and Qiu (2007) record a negative and significant sign only if we look at their measures of trade credit computed as the ratio of accounts payable over total assets, which is the proxy we use. However, no significance is instead shown by accounts payable over total sales and by the two measures of net trade credit, either scaled by total assets or total sales.

Yano and Shiraishi (2010).[77] In addition, García-Teruel and Martínez-Solano (2010a) record no significant effect of both AGE_i and the squared term of AGE_i on accounts payable. Even when the latter is removed from the regression, the coefficient on AGE_i remains insignificant.

$CASHFLOW_{it}$ carries an insignificant sign, which is consistent with two of the results recorded by Ge and Qiu (2007, pages 522 and 529). In fact the absence of significance for cash flow is recorded in their baseline specification when they measure trade credit as the ratio between accounts payable (as we do), and also in their section studying the determinants of long-term trade credit. The insignificant association they record holds for non-state controlled companies and, they argue, supports the idea that the greater use of trade credit by non-state owned firms is mainly for financing, and not for operational motives. Despite our dataset does not contain information on the duration of trade credit contracts, we may claim that the lack of significance we also observe could be due to the mixed motivations driving the use of accounts payable in China. In fact, in well-developed financial systems we would have expected that firms with higher cash flow needed less accounts payable. This is a reasonable assumption if the maturity matching principle holds, and both cash flow, and accounts payable are used almost exclusively for transactional purposes. Yet, the evidence put forward by Ge and Qiu (2007) proves that this is not always the case and the use of accounts payable might be driven by non-negligible financing purposes. This relationship might be corroborated by the positive and significant sign shown by both $SHORTDEBT_{it}$ and $LONGDEBT_{it}$, which points to a complementarity between all forms of non-supplier finance

[77] Wu *et al.* (2014) record insignificant coefficient of size when the dependent variable is accounts payable over total assets and also when accounts payable are limited to those debtors whose maturity is less than one year. A negative relationship between size and accounts payable is instead recorded if the latter have a maturity larger than one year or in the case of accounts payable overdue. It is however worth pointing out here that Shiraishi and Yano (2010) use the number of employees and not total assets as their proxy of size.

and accounts payable.[78] This is in line with the theoretical hypotheses put forward by Biais and Gollier (1997) and Frank and Maksimovic (2005).[79] This result is also consistent with the recent outcomes of Oh and Kim (forthcoming), who find a positive association between accounts payable and leverage for Chinese listed firms between 2003 and 2013.[80] In addition, it is also in line with Yano and Shiraishi (2016) who find that trade credit is initially short-term credit, but it is often "rolled over" (*gundong*), and becomes long-term credit, which is frequently used to finance investment. This is as well consistent with the earlier finding by Ge and Qiu (2007, p. 87) on the use of long-term trade credit for financing purposes. We record a positive effect of $SALESGR_{it}$ on accounts payable, as firms experiencing higher growth are more likely to need finance to fuel their growth.[81] This is consistent with the predictions of the model described by Cuñat (2007) and with the results on the positive variation in sales obtained by García-Teruel and Martínez-Solano (2010a). It is also in line with the majority of countries analised in García-Teruel and Martínez-Solano (2010c). This might also be consistent with the idea that companies make use of short- and long-term debt to grow and

[78] The similar behaviour of $SHORTDEBT_{it}$ and $LONGDEBT_{it}$ is also likely to depend from the leverage composition of Chinese firms, which is mostly made up by short-term debt.

[79] In Biais and Gollier (1997) customers select the right proportion of trade credit and bank credit to commit credibly to avoiding collusion with their suppliers. In Frank and Maksimovic (2005), low-quality buyers obtain only trade credit, whereas high-quality buyers get both. It is worth reminding here that the literature on the relationship between trade credit and bank credit focuses primarily on the linkage between accounts receivable and bank credit, allowing for the complementarity between the two especially in countries with limited institutional development (e.g. Demirgüç-Kunt and Maksimovic, 2001). One notable exception on the type of trade credit analysed is provided by Huang *et al*. (2011) who look at the relationship between accounts payable and bank credit, where the former is employed as dependent variable. They concentrate on Chinese listed firms and find a substitution between the two sources of debt.

[80] To the best of our knowledge, only our work and that by Oh and Kim (forthcoming) identify a relationship of complementarity between accounts payable and leverage (short-term and long-term).

[81] Oh and Kim (forthcoming) record no significant coefficients on sales growth, measured in the same way as we do, for their whole sample and for the subsample of private firms. Conversely, a negative and significant relationship is recorded in their subsample of SOEs.

Firms with high growth opportunities, proxied by the market-to-book ratio, but with limited accessibility to formal markets, are likely to increase accounts payable. However, if they do increase the amount of trade credit received, they would have reduced internal resources suitable to finance investment in future growth because they would need these resources to repay the accounts payable later. Therefore, the authors expect that firms with larger growth opportunities to have a lower level of accounts payable. This prediction is supported only in the sample made up by SOEs.

expand, leading to a depletion of current funds needed for operations. Therefore firms will need to ask for delayed payments to their suppliers leading to an increase in accounts payable. The cost of access to external finance, $FCOSTS_{it}$, has a negative and significant sign. If supplier and non-supplier finance were substitutes, as advocated by the majority of the literature (e.g. Huang *et al*., 2011; Du *et al*., 2012; Lin and Chou, 2015), then we would expected a positive and significant sign. In other word, if the cost of bank finance was going to rise, then the firm would ask for more trade credit and less bank credit, but evidence shows that this is not the case. This could be explained by the results of a recent work of Yano and Shiraishi (2016) in a survey on managers of more than 200 firms between 1998 and 2007. They record an implicit interest rate on trade credit equal to zero.[82] Only for a small number of interviewee firms the rate is positive, but basically identical to the bank lending rate (Yano and Shiraishi, 2016, p. 84). This data thus brings support to the negative sign recorded for $FCOSTS_{it}$.

Current assets are split into their three main components: $CASH_{it}$, $STOCKS_{it}$ and AR_{it}. The regression results show that only accounts receivable are significant and carry a positive sign. This result does not provide a full confirmation to the maturity matching principle (Morris, 1976; Myers, 1977) and our hypothesis H2 thus finds only a limited support. Yet, it is partially in line with the results of García-Teruel and Martínez Solano (2010a, 2010b) and with Deloof and Jegers (1999) in their study of Belgian firms between 1989 and 1991.[83] Most importantly, it is consistent with the study of Chinese firms of Yano and Shiraishi (2010, p. 224) who claim and find that "causality runs from granting trade credit to receiving it".[84] In

[82] Please note that also Daripa and Nilsen (2011) allow for the possibility of a zero level of the implicit interest rate in trade credit contracts.

[83] In fact, García-Teruel and Martínez Solano (2010a, 2010c) and Deloof and Jegers (1999), find that cash and inventories are positively associated with accounts payable. The lack of significance of $CASH_{it}$ might be attributable to precautionary motives (Ding *et al*., 2013), whereas the insignificant coefficient of $STOCKS_{it}$ may indicate that inventories are primarily financed through internally generated funds.

[84] Despite their finding are limited to the year 1992, our evidence may point to the re-emergence of the Triangle Debt dilemma of the early 1990s. We tried to add accounts payable in our regression explaining the extension of

particular, a one standard deviation increase in AR_{it} leads to an 8.32% increase in AP_{it}.[85] This is a sizeable effect, especially taking into account the heterogeneity of the firms in the sample, in terms of geographic location and ownership type, which we will tackle in the next Sections.

$FOWNS_{it}$ does not carry a positive sign, possibly because of two counterbalancing effects. The positive effect that comes with partial foreign ownership (Connelly *et al*., 2011) might be offset by a better access to formal and internal finance that does lead firms to ask for accounts payable.

The Hansen test indicates some problems with the specification of the model and the validity of the instruments. In fact when dealing with estimation over samples with a very large cross-sectional dimension, the Hansen test for overidentifying restrictions tends to overreject the null hypothesis of instrument validity (Blundell *et al.*, 2000; Benito, 2003; Guariglia *et al.*, 2011). Neither the *J* test nor the test for the *n*-th order serial correlation allow us to differentiate between bad instruments and/or poor model specification.

2.7.2.2. Controlling for the level of marketization

In order to examine the determinants of accounts payable for firms located across provinces with different levels of marketization we estimate Equation (2.2) for subsamples corresponding to low, medium and high levels of the NERI index. The results are reported in

trade credit, but we found no significant results. We thus may argue that that in our specifications accounts receivable shape the amount of accounts payable, but the opposite does not hold. Yet, as the Triangle Debt Dilemma affected SOEs we will devote larger space to its analysis in the Subsection studying the determinants of accounts receivable for firms owned by different agents.

[85] More precisely, the coefficient of AR_{it} reported in Column 1 of Table 2.8 is 0.076478. Column 3 of Table 2.1 shows that that the standard deviation for AR_{it} is equal to 0.149. Hence, a one standard deviation increase in AR_{it} yields a (0.076478*0.149) = 0.011395222 increase in AP_{it}. The mean value of AP_{it}, reported in Column 3 of Table 2.1, is equal to 0.137, so a one standard deviation increase in AR_{it} creates a (0.011395222/0.137)= 8.32% increase in AP_{it}.

Columns 1, 2 and 3 of Table 2.9. All regressions include industry, year, ownership and province dummies.

We observe that the speed of adjustment is positive and significant at the 1% level for firms located in all three groups of provinces, thus providing support to our hypothesis H1. The largest value is recorded for firms located in the provinces with medium level of marketization, followed by those located in the provinces with low levels of NERI and then by those placed in the provinces with the largest value of NERI, with digits equal to 0.76, 0.69, and 0.67, respectively. This pecking order could be counterintuitive. Yet, it may be consistent with the findings of Yano and Shiraishi (2016) who show that unlisted firms in the most developed coastal areas have shifted to a larger use of accounts payable than deposits received due to the development of interfirm trust. The lowest value recorded for the provinces with the largest value of NERI may also depend from the fact that firms in these regions could be closer to the desired equilibrium level of accounts payable, whereas those in the rest of the country may still have a longer path to follow in the catching up to the most developed ones.[86]

Another striking feature which is common across firms located in provinces with different levels of marketization is the positive and significant sign of AR_{it}. It is the only component of current assets that brings limited support to the maturity matching hypothesis.

[86] The lowest speed of adjustment for the most marketized regions is not necessarily in contrast with the findings of Wu *et al*. (2014), who claim that firms located in regions with higher social trust will pay their accounts payables faster than those companies in regions with lower social trust. In fact, Wu *et al*. (2012) argue that "Firms usually grant and receive trade credit at the same time. As receivables can be regarded as a cash substitute, they can be used to cover payables. This means that firms can hold less cash to meet their payable obligations when they have receivables on the balance sheet. However, risk aversion means that $1 of receivables does not usually cover $1 of payables." (p. 2871). Making use of a sample of Chinese listed firms over the period 1999–2009 they show that accounts payable and accounts receivable have an asymmetric effect on cash holdings. In fact, firms hold an extra $0.71 of cash for every $1 of credit payable, but employ $1 of accounts receivable as a substitute for only $0.15 of cash. This asymmetry persists even if they look at provinces with different levels of financial deepening and it may help to support the heterogeneity in the speed of adjustment between accounts payable and accounts receivable in the provinces with largest levels of marketization.

Thus, once again, our hypothesis H2 finds only a partial, limited support. Yet, we can also observe that not only the coefficients become larger when we shift from the provinces with the highest to the lowest level of marketization, but also the economic impact of accounts receivable increases. In particular, a one standard deviation increase in AR_{it} in the provinces with highest level of NERI leads to an 8.46% increase in AP_{it}.[87] Conversely, a one standard deviation increase in AR_{it} in the provinces with medium level of NERI determines a 17.99% increase in AP_{it}.[88] In addition, one standard deviation increase in AR_{it} for firms located in the provinces with lowest levels of NERI yields a 28.95% increase in AP_{it}.[89] Such rise in the economic weight of AR_{it} when moving from provinces with low to high levels of NERI may indicate that there is a process of development of trust which affects business relationships. Granting trade credit is perceived as a signal of reliability in a greater extent the weakest is the institutional environment. This could be consistent with the outcomes of Wu *et al*. (2014) who find that the effect of social trust on trade credit is stronger for firms located in regions with a weaker appreciation for property rights.[90] This is also compatible with the pattern recorded by

[87] More precisely, the coefficient of AR_{it} for firms located in the provinces with high levels of marketization, reported in Column 1 of Table 2.9 is 0.079588. Column 2 of Table 2.3 shows that that the standard deviation for AR_{it} for firms located in the provinces with high levels of marketization is equal to 0.151. Hence, a one standard deviation increase in AR_{it} yields a (0.079588*0.151) = 0.012017788 increase in AP_{it}. The mean value of AP_{it} in the provinces with highest levels of NERI, reported in Column 2 of Table 2.3, is equal to 0.142, so a one standard deviation increase in AR_{it} creates a (0.012017788/0.142)= 8.46% increase in AP_{it}.

[88] More specifically, the coefficient of AR_{it} for firms located in the provinces with medium levels of marketization, reported in Column 2 of Table 2.9 is 0.157383. Column 3 of Table 2.3 shows that the standard deviation for AR_{it} for firms located in the provinces with medium levels of marketization is equal to 0.136. Hence, a one standard deviation increase in AR_{it} yields a (0.157383*0.136) = 0.021404088 increase in AP_{it}. The mean value of AP_{it} in the provinces with medium levels of NERI, reported in Column 3 of Table 2.3, is equal to 0.119, so a one standard deviation increase in AR_{it} creates a (0.021404088/0.119)= 17.99% increase in AP_{it}.

[89] More precisely, the coefficient of AR_{it} for firms located in the provinces with low levels of marketization, reported in Column 3 of Table 2.9 is 0.272106. Column 4 of Table 2.3 shows that that the standard deviation for AR_{it} for firms located in the provinces with low levels of marketization is equal to 0.133. Hence, a one standard deviation increase in AR_{it} yields a (0.272106*0.133) = 0.036190098 increase in AP_{it}. The mean value of AP_{it} in the provinces with low levels of NERI, reported in Column 4 of Table 2.3, is equal to 0.125, so a one standard deviation increase in AR_{it} creates a (0.036190098/0.125)= 28.95% increase in AP_{it}.

[90] They claim that firms located in regions with higher social trust will pay their accounts payables more quickly than those firms in regions with lower social trust. We claim that there might in place a catching-up process through which provinces with medium and low level of marketization tend to reach higher levels of trust by extending more trade credit.

Yano and Shiraishi (2016) who notice that despite interior provinces still primarily rely on deposits received, they show a rise in the use of accounts payable due to an increased relevance of interfirm trust.

If we observe the remaining explanatory variables for the firms located in the provinces with the highest level of marketization, reported in Column 1 of Table 2.9, we notice that the outcomes mirror very closely those recorded for the full sample. In fact, we confirm that there is a complementarity between both $SHORTDEBT_{it}$ and $LONGDEBT_{it}$ on the one hand, and accounts payable on the other hand, supported by a negative effect played by $FCOSTS_{it}$. If we rely on the motives outlined in the previous Section, the positive relationship between non-supplier debt and accounts payable is recorded only in the provinces with the highest levels of marketization because are those experiencing the largest growth of investment, consistently with Guariglia *et al*. (2011).

If we observe the variables that compose current assets, we notice a negative, but only slightly significant sign of $CASH_{it}$. This is not consistent with the maturity matching principle expressed by our hypothesis H2, but it might be coherent with the idea that firms located in the most marketised areas are those suffering the most from financial constraints and keep cash as a precautionary motive (Lian *et al*., 2012).

If we concentrate, instead, on the results of the determinants of accounts payable for firms located in provinces with medium levels of marketization and reported in Column 2 of Table 2.9 we observe that only two variables, beyond those already examined, carry a significant sign. $CASHFLOW_{it}$, is largely significant and shows a negative sign. This relationship could be consistent with the idea that firms located in these provinces are not as highly constrained as those placed in the provinces with high level of marketization, due to a lower inter-firm competition. At the same time, these firms received support from the state to

foster local development (Bai *et al*., 2006). We thus claim that these firms able to generate more internal funds in the two abovementioned ways may not need credit from their suppliers (Huyghebart, 2006; Ge and Qiu, 2007). The second one is $FCOSTS_{it}$ which is only marginally significant and carries a negative sign.

If we observe the behaviour of firms located in provinces with low levels of the NERI index, no variable, besides the lagged dependent one and AR_{it}, is significant. We claim that such picture may be probably explained by recalling the presence of institutional interferences we described when commenting the determinants of accounts receivable. They may in fact, lead to a misrepresentation of the effective role played by the determinants we selected.

The Hansen test shows some problems with the specification of the model for the firms located in the provinces with high levels of marketization (Column 1). However, it excludes issues in the choices of instruments for firms in the provinces with medium and low levels of marketization. (Columns 2 and 3).

2.7.2.3. Controlling for ownership

In order to examine the determinants of accounts payable across firms owned by different agents we estimate Equation (2.2) for subsamples corresponding to private firms, foreign companies and SOEs plus collective enterprises. The results are reported in Columns 1, 2 and 3 of Table 2.10. All regressions include industry, year, and province dummies.

We observe that the lagged dependent variable is positive and significant at the 1% level for all three ownership groups supporting the prediction of our hypothesis H1. The speed of adjustment is largest for private firms (0.70), followed by foreign companies (0.64) and then by SOEs and collective enterprises (0.63). This pecking order could be consistent

with the idea that private firms are the most financially constrained (Guariglia *et al*., 2011) and are more concerned to preserve their reputation and therefore to timely meet their payment obligations. Conversely, foreign companies with SOEs together with collective firms are able to benefit from internal flows of capital and soft budget constraints, respectively (Bai *et al*., 2006) and their motive to repay their customers on time could be weaker than that of private firms. This seems consistent with Wu *et al*. (2014) who argue that firms facing a restricted access to formal finance are more dependent on social trust to receive trade credit and, we claim, less inclined to dissatisfy their customers.

A striking feature common to private firms and SOEs plus collective enterprise is the positive and significant sign of AR_{it}. A one standard deviation increase in AR_{it} for private firms leads to a 10.95% increase in AP_{it}, whereas a one standard deviation increase in AR_{it} for SOE yields a 26.47% increase in AP_{it}.[91] We argue that the larger capability of SOEs and collective firms to obtain accounts payable with respect to private firms might derive from two different aspects. First, from the presence of the typical features of the Triangle Debt Dilemma recorded by Yano and Shiraishi, (2010, p. 222) at the beginning of the 1990s. At that time companies with relevant political influence, usually SOEs, needed to raise funds and firms that offered trade credit to publicly-controlled companies were forced to do so due to the large bargaining power of the state-controlled firms. Moreover, Yano and Shiraishi (2010) write that "When China's trade credit was involved in Triangle Debt, the supply of trade

[91] In particular, the coefficient of AR_{it} for private firms reported in Column 1 of Table 2.10 is 0.095526. Column 2 of Table 2.4 shows that the standard deviation for AR_{it} for private firms is equal to 0.150. Hence, a one standard deviation increase in AR_{it} yields a (0.095526*0.150) = 0.0143289 increase in AP_{it}. The mean value of AP_{it} for private firms, reported in Column 2 of Table 2.4 is equal to 0.131, so a one standard deviation increase in AR_{it} creates a (0.0143289/0.131) = 10.94% increase in AP_{it}. Conversely, the coefficient of AR_{it} for SOEs and collective firms reported in Column 2 of Table 2.10 is 0.213452. Column 4 of Table 2.4 shows that the standard deviation for AR_{it} for SOEa and collective firms is equal to 0.150. Hence, a one standard deviation increase in AR_{it} yields a (0.213452*0.150) = 0.0320178 increase in AP_{it}. The mean value of AP_{it} for SOEs and collective firms, reported in Column 4 of Table 2.4 is equal to 0.121, hence a one standard deviation rise in AR_{it} creates a (0.0320178/0.121)= 26.47% increase in AP_{it}.

credit by the firm should therefore explain the trade credit it received, whereas the latter cannot explain the former" (p. 231). Second, it may depend from the awareness, amongst business peers, of the soft budget constraints featuring state-controlled companies (e.g. Guariglia *et al*., 2011). In fact, Cull *et al*. (2009, p. 185) show that SOEs obtain significantly more informal credit when they have extended accounts receivable. Taking stock of these facts we argue that firms supplying goods to SOEs and collective firms will be more inclined to allow for delayed payments.

The lack of significance for AR_{it} for foreign firms, reported in Column 2 of Table 2.10, may depend from the fact that these companies do not need to provide a sign of credibility through the extension of accounts receivable in order to obtain non-supplier finance. Their creditworthiness is embedded in their ownership structure, in line with what recorded by Chen *et al*. (2014) for Chinese SMEs. They indeed, argue, that foreign ownership is likely to send a positive signal to loan officers when deciding if to grant finance to SMEs. This will allow firms to access bank finance and, only at this stage, obtain more accounts payable. Such line of hypothetical causality may also explain the significant and positive sign shown by $SHORTDEBT_{it}$. Yet, we claim that the insignificance of $LONGDEBT_{it}$ may depend from the heavy reliance of foreign firms on internal capital flows maybe in an attempt to finance durable investments (Poncet *et al*., 2010; Allen *et al*., 2011). Yet, these firms will not complement $LONGDEBT_{it}$ with (likely long-term) accounts payable, as we will instead claim for private companies. According to Cull *et al*. (2009), foreign firms represent the second most financially constrained group of companies in China and they are also those making use of formal finance the least, which the authors proxy through the ratio of interest paid over total sales. Therefore the negative and significant sign of $FCOSTS_{it}$ could be justified only if we accept the presence of causality that goes from formal finance to trade credit through a

signal mechanism. If the former becomes more costly, then the volume of bank credit shrinks and, as a consequence, also the amount of trade credit a firm may obtain declines. Despite foreign ownership carries an intrinsic signal of reliability, $SIZE_{it}$ does play a role for foreign firms. Larger companies are likely to receive higher amounts of trade credit, consistently with the prediction of Petersen and Rajan (1997).

If we concentrate on the significant variables of private firms, reported in Column 1 of Table 2.10 we first observe the two most frequently employed measures of firms' credibility, i.e. $SIZE_{it}$ and AGE_i. We notice that $SIZE_{it}$ carries a negative sign, as smaller private firms receive more accounts payable. This is in line with the results of García-Teruel and Martínez-Solano (2010a), and with most of the transition countries studied by Dellanay and Weill (2004). Looking at the Chinese experience, it is consistent with one out the four measures used by Ge and Qiu (2007), i.e. accounts payable over total assets. Moreover, this relationship could also be in line with the growth cycle model of Berger and Udell (1998) who stress that trade credit is more important for the financing purposes of smaller private firms. When we observe AGE_i, we notice that it takes a negative and significant sign, whilst its squared term is positive, pointing to the existence of a U-shaped behaviour with a turning point at 26.92 years of age. This value is much greater than the mean value, equal to 11.55 years of age, suggesting the prevalent effect of the linear term. In other words, younger private firms tend to receive less trade credit, because of limited creditworthiness, in line with the results recorded by Niskanen and Niskanen (2006).

If we continue our analysis on private firms, we notice that the results mimic those recorded by companies located in the provinces with the highest levels of marketization. As advocated in the previous Section, we claim that there is a complementarity between both $SHORTDEBT_{it}$ and $LONGDEBT_{it}$ on the one hand, and accounts payable on the other hand,

supported by a negative effect played by $FCOSTS_{it}$. Private firms are those suffering the most from financial constraints, but likely to have high credit quality.[92,93] Yet, according to Muñoz *et al*. (2015) credit quality becomes irrelevant in highly credit-rationed environments, leading to a very low likelihood of a substitution between trade credit and bank credit. This aspect may also corroborate the negative and significant sign shown by $CASH_{it}$. In particular, it is consistent with the fact that private firms are heavily financially constrained (e.g. Guariglia *et al*., 2011), but, at the same time, they wish to hold cash in order to preserve a fast cash conversion cycle and lower the days outstanding ratio (Ding *et al*., 2013, p. 1492).

If we observe the results for SOEs and collective firms, reported in Column 3 of Table 2.10, we notice that only the coefficient associated with AR_{it} is significant. We claim that the lack of relevance for the remaining variables might be associated with a biased type of governance. This may derive from the presence of corruption that the preferential access to bank finance brings about, although not addressed in our specifications (Yano and Shiraishi, 2014, p. 181). The limited support for hypothesis H2 is plausible for SOE and collective firms. These companies are likely to be not particularly concerned to match the maturity of their assets with that of their liabilities as having privileged access to bank credit insulate them from possible risks connected to meet their obligations.

For all three regressions on firms owned by different agents, the Hansen test of over-identifying restrictions shows *p*-values that cannot reject the null hypothesis that the instruments used for the estimations are exogenous (Columns 1, 2 and 3 of Table 2.10).

[92] Muñoz *et al*. (2015) measure credit quality through the Altman Z-score, based on numerous factors, such as liquidity, retained earnings, profitability, leverage, sales, and size. Taking stock of the results reported in the literature, (e.g. Allen *et al*., 2005; Guariglia *et al*., 2011; Ding *et al*., 2013) it does not seem incorrect to claim that private firms show high quality levels.

[93] The complementarity between $LONGDEBT_{it}$ and accounts payable may also support the idea that trade credit can be in long-term as recorded by Ge and Qiu (2007) for non-SOEs.

2.8. Conclusions

To the best of our knowledge, we are the first to provide a thorough analysis on the determinants of both accounts payable and receivable for Chinese unlisted firms. In doing this we complement two streams of literature. The first includes those studies on Chinese firms which analyse the specific effect of a selected factor only on either accounts payable or receivable or both. This is for example the case of Guariglia and Mateut (2016) who focus on the effect of political affiliation on accounts receivable, or the work of Wu *et al*. (2014), who concentrate on the effect of social trust on both sides of trade credit. We also complement the literature that looks at the broad set of determinants of trade credit, which so far neglected the Chinese experience, but concentrated on other countries. This is the case, for example, of García-Teruel and Martínez-Solano (2010a) for UK firms, and of García-Teruel and Martínez-Solano (2010b) for Spanish firms.

Making use of a large firm-level dataset for the years 2004-2007 and taking into account theories related to financing advantage, transaction costs, price discrimination and implicit product market guarantee, we document four sets of results.

First, we show that the decision to grant and receive trade credit follows a model of partial adjustment. Firms have a target level of both accounts receivable and accounts payable, which they try to reach. Looking at accounts receivable, companies located in provinces with the highest level of marketization and foreign enterprises (regardless of their location) show the highest speed of adjustment. Firms located in regions with higher social trust (allegedly those with higher levels of marketization) offer more trade credit to clients and receive more timely payment of receivables from them. Focusing on accounts payable, it is firms located in the provinces with intermediate levels of marketization and private firms

(regardless of their location) who show the largest speed of convergence. This could be consistent with the presence of regional convergence in China. In fact, Zilinsky (2016) shows that those regions that had relatively low per capita GDP in 2009 have grown much faster in the following years compared to the more developed provinces.

Second, we show a set of at least three relevant relationships on accounts receivable. The extension of trade credit decreases when both cash flow and any source of external finance increase. This may point to the need of preserving funds in a context of an underdeveloped credit market. Despite the argument could be counterintuitive, firms that are able to internally generate funds, or have the chance to access to any form of external finance, are willing to keep these accumulated resources. They are reluctant to extend them, possibly for the need to satisfy precautionary motives. This seems to be especially relevant for private firms, the most financially constrained ownership type. We also observe that the level of accounts receivable for private firms declines when the amount of stock rises. This indicates that the seller, who has to deal with an uncertain demand for its products, may extend accounts receivable to financially constrained customers with the scope of obtaining sales on credit. This will thus limit the amount of costly stock held, especially in the presence of unclear prospects for the vendor's future sales. The extension of accounts receivable for private firms also increases when the share of capital owned by a foreign investor raises. This may indicate that the larger the commitment by the foreign entity the greater the beneficial effect in terms of managerial practices and the capability to extend trade credit despite the presence of financial constraints. This implies that a larger foreign presence encourages buyers to fulfill their contractual obligations by paying their debts and, indirectly, foster participated firms to extend more accounts receivable.

Third, we show that the extension of accounts receivable is positively associated with the obtainment of accounts payable. This is recorded for the full sample, but the outcomes become particularly interesting for firms located in provinces with different levels of marketization. In fact, the relationship between granting and receiving trade credit is stronger the lowest the level of marketization, pointing to a possible greater role of trust and reliability the weaker the institutional environment. When looking at firms owned by different agents this result still applies, except for foreign firms, and is largest for SOEs and collective firms. The argument, here, is that SOEs obtain significantly more formal credit especially from state-controlled banks when they extend accounts receivable.[94]

Fourth, we observe that the determinants of both accounts payable and accounts receivable have explanatory power when looking at firm located in provinces with high or medium level of marketization, and for private or foreign firms, regardless of their location. Conversely, few regressors have explanatory power for companies located in provinces with low level of marketization, or for SOEs and collective firm, irrespective their location. This is especially true for the regressions explaining accounts payable and could be due to the relatively small sample size used in the estimations.

Our paper contributes to the trade credit literature in at least two ways. First, we investigate, for the first time, how factors related to the financing advantage theories, the transaction costs hypothesis, price discrimination and implicit product market affect the obtainment of payables and the extension of receivables in a sample of unlisted companies of

[94] We also show that there is a complementarity between short-term and long-term sources of debt, on the one hand, and accounts payable on the other. This result is different from most of the papers on China which advocate substitution (e.g. Huang *et al.*, 2011; Du *et al.*, 2012; Lin and Chou, 2015). However, it is in line with Oh and Kim (forthcoming) and possibly consistent with the theoretical predictions of Biais and Gollier (1997) and Frank and Maksimovic (2005). When looking at firms located in provinces with different levels of marketization, we confirm the abovementioned complementarity only in those with the highest level of marketization. As far as ownership types are concerned, we record the same complementarity association especially for private firms, and, to a smaller extent, for foreign companies.

a large transition economy. Second, we enrich our understanding on how the determinants of accounts payable and accounts payable change when firms are owned by different agents and are located in areas with different levels of marketization. In this respect, the institutional environment, together with the role of trust and reciprocity play a key role.

Our results have policy implications. The need for intervention by the Chinese government is desirable at least along three directions. First, we advocate the importance of reforming the architecture of business relationships amongst firms in provinces with the lowest levels of NERI towards a more competitive market structure. This could be achieved by taking appropriate measures aimed at improving the legal environment, especially the rule of law, fostering the development of interfirm business trust. Second, we argue that the government should continue the process of SOEs restructuring. This can be achieved by devising adequate tools to improve their corporate governance by incentivizing the need to perform in an efficient way and providing the management with adequate motivations to lead the enterprise as it was a profit maximizing entity. Third, we stress the possible risk of resurgence of the Triangle Debt Dilemma, a chain in which one firm forces unrecovered credit onto another one. In fact, we detect a positive association between the extension of accounts receivable and the obtainment of accounts payable. This relationship becomes stronger when moving from the provinces with the highest to those with the lowest levels of marketization and it is largest for SOEs and collective firms. It is consistent with the "anecdotal observation that large-sized SOEs forced their suppliers to grant trade credit" (Yano and Shiraishi, 2010, p. 246). The reduction of such an abusive behaviour, or its complete elimination, may be achieved, once again, by increasing the competition amongst firms in provinces with low levels of marketization, but also by reducing the political affiliation that all firms, not only SOE, can enjoy, especially in weak institutional

environments. It is in fact the intensified market competition that allowed in 1994 for a reduction in monopolistic or oligopolistic behaviour on the supplier side, changing the nature of trade credit (Yano and Shiraishi, 2010, p. 248).

Our study suffers from three main limitations. The first is the use of a short sample size. The second is the absence on information on where customers and suppliers are placed (i.e. in the domestic or in the foreign market), despite our knowledge on the location of creditor and debtor firms. The availability of this data would allow us to control for the role of marketization in the behaviour of both vendors and buyers, on the one hand, and of their suppliers of credit and debit, on the other. In fact, the level of economic, financial and institutional development in the province (or the country) where the buyer or the seller is placed may interact with the level of marketization that characterizes the location where the Chinese creditor or the debtor is operating. This is not trivial as a Chinese seller (creditor) located in a province with low levels of marketization may offer different conditions to a buyer (debtor) located in developed country or in a province with high levels of marketization. As largely pointed out in several parts of this Chapter, trust and reliability are likely to play a key role in this respect. The third is the lack of information on the duration of trade credit contracts. This would enable us to distinguish between short-term from long-term trade credit and also identify the presence of overdue trade credit, potentially shedding light on a possible interaction between trade credit and investment decisions. In fact, firms that repeated roll over accounts payable are able to use the accumulated cash to finance investment decisions.

Further research needs to be undertaken along several avenues. First, it would be interesting to test if our results hold for firms with high leverage and for those in financial distress. Second, one could test if our findings on accounts payable change when considering

firms' political affiliation and the industry they belong to. Third, one could analyse the interplay between the role social trust plays and the levels of marketization. This should be performed on unlisted firms owned by different agents, extending the work of Wu *et al*. (2014) who analyse only listed non-state owned firms and unlisted private companies.

Table 2.1. Summary statistics for the full sample

Variable	**N**	**Mean**	**S.D.**	**Min**	**1st Quartile**	**Median**	**3rd Quartile**	**Max**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
AGE	117,138	12.217	10.609	2.000	6.000	9.000	13.000	143.000
AGE^2	117,138	261.806	606.389	4.000	36.000	81.000	169.000	20000.000
SIZE	117,138	0.806	1.649	0.017	0.117	0.260	0.697	16.646
CASHFLOW	117,138	8.702	7.861	-4.696	3.468	6.589	11.759	47.062
SHORTDEBT	117,138	0.352	0.208	0.000	0.185	0.342	0.506	0.843
SHORTLEV	117,138	0.490	0.218	0.025	0.325	0.496	0.662	0.926
LONGDEBT	117,138	0.038	0.088	0.000	0.000	0.000	0.015	0.681
FCOSTS	117,138	0.010	0.011	-0.002	0.000	0.006	0.016	0.052
SALESGR	117,138	10.963	30.242	-86.118	-5.814	10.326	28.155	110.015
TURN	117,138	1.591	1.161	0.006	0.799	1.260	2.015	7.159
FOWNS	117,138	0.229	0.388	0.000	0.000	0.000	0.333	1.000
CASH	117,138	0.223	0.170	-0.295	0.091	0.186	0.321	0.937
STOCKS	117,138	0.176	0.128	0.000	0.074	0.152	0.255	0.556
AR	117,138	0.190	0.149	0.000	0.068	0.160	0.284	0.659
AP	117,138	0.137	0.127	0.000	0.035	0.102	0.207	0.663

Notes: AGE is the number of years since the establishment of the firm and AGE^2 is its square *SIZE* is measured by total assets, *CASHFLOW* is measured as the ratio between (net profit+ depreciation of fixed assets) and total assets, *SHORTDEBT* is measured as the ratio of short-term financial debt (net of accounts payable) to total assets, *SHORTLEV* is measured as the ratio of current liabilities to total assets, *LONGDEBT* is computed as the ratio of long-term debt to total, *FCOSTS* is measured as the ratio of interest to total assets, *SALESGR* is the yearly variation is sales, *TURN* is computed as the ratio of sales over total assets, *FOWNS* is the percentage of shares owned by foreign investors. *CASH* is the ratio between cash and total asset, *STOCKS* is the ratio between inventories and total assets. *AR* is the ratio between accounts receivable and total assets, whereas *AP* is the ratio between accounts payable and total assets.

Table 2.2. Correlation matrix

	AGE	*AGE²*	*SIZE*	*CASHFLOW*	*SHORTDEBT*	*SHORTLEV*	*LONGDEBT*	*FCOSTS*	*SALESGR*	*TURN*	*FOWNS*	*CASH*	*STOCKS*	*AR*	*AP*
AGE	1														
AGE²	0.9308*	1													
SIZE	0.1596*	0.1647*	1												
CASHFLOW	-0.1201*	-0.1083*	-0.0173*	1											
SHORTDEBT	0.0638*	0.0671*	0.0123*	-0.2132*	1										
SHORTLEV	0.0272*	0.0335*	-0.0062*	-0.2482*	0.8225*	1									
LONGDEBT	0.1227*	0.1212*	0.1008*	-0.0534*	-0.1538*	-0.1947*	1								
FCOSTS	0.001	0.0018	0.0408*	-0.0247*	0.2828*	0.2041*	0.1187*	1							
SALESGR	-0.0702*	-0.0450*	0.0447*	0.1691*	0.0064*	0.0165*	0.0015	0.0314*	1						
TURN	-0.1658*	-0.1418*	-0.1726*	0.4158*	-0.0503*	-0.0024	-0.0913*	0.0303*	0.2121*	1					
FOWNS	-0.1330*	-0.1441*	0.1120*	0.0484*	-0.2391*	-0.1681*	-0.0928*	-0.1874*	-0.0100*	-0.0679*	1				
CASH	0.0053	-0.002	0.0481*	0.0197*	0.1013*	0.0282*	-0.0688*	-0.0496*	-0.0097*	0.0207*	-0.0172*	1			
STOCKS	0.0172*	0.0119*	-0.0341*	-0.1008*	0.0515*	0.1360*	-0.0339*	0.0168*	-0.0217*	0.0427*	0.0753*	-0.3176*	1		
AR	-0.0471*	-0.0690*	-0.1005*	-0.0162*	-0.0197*	0.1558*	-0.1106*	-0.0524*	0.0143*	0.0679*	0.0218*	-0.2657*	-0.1223*	1	
AP	-0.0568*	-0.0516*	-0.0307*	-0.0779*	-0.2200*	0.3738*	-0.0832*	-0.1111*	0.0178*	0.0779*	0.1017*	-0.1168*	0.1493*	0.2994*	1

Notes: This table reports Pearson correlation coefficients. * denotes significance at the 5% level. See the Appendix 2A for definitions of all variables.

Table 2.3. Summary statistics for firms located in Chinese provinces with HIGH, MEDIUM, and LOW levels of the NERI marketization index

Variables	Full sample (1)		HIGH NERI (2)		MEDIUM NERI (3)		LOW NERI (4)	
	n	Mean (S.E.)	n	Mean (S.E.)	n	Mean (S.E.)	n	Mean (S.E.)
AGE	117,138	12.217	90,203	11.546	19,368	13.569	7,567	16.757
		(10.609)		(9.393)		(13.003)		(15.074)
AGE^2	117,138	261.806	90,203	221.537	19,368	353.173	7,567	507.991
		(606.389)		(540.179)		(729.095)		(867.219)
SIZE	117,138	0.806	90,203	0.790	19,368	0.811	7,567	0.971
		(1.649)		(1.620)		(1.691)		(1.867)
CASHFLOW	117,138	8.702	90,203	8.848	19,368	8.797	7,567	6.723
		(7.861)		(7.685)		(8.807)		(7.060)
SHORTDEBT	117,138	0.352	90,203	0.354	19,368	0.343	7,567	0.357
		(0.208)		(0.210)		(0.203)		(0.199)
SHORTLEV	117,138	0.490	90,203	0.496	19,368	0.462	7,567	0.482
		(0.218)		(0.218)		(0.218)		(0.211)
LONGDEBT	117,138	0.038	90,203	0.031	19,368	0.058	7,567	0.068
		(0.088)		(0.080)		(0.106)		(0.111)
FCOSTS	117,138	0.010	90,203	0.010	19,368	0.011	7,567	0.009
		(0.011)		(0.011)		(0.012)		(0.011)
SALESGR	117,138	10.963	90,203	10.815	19,368	13.155	7,567	7.121
		(30.242)		(29.827)		(31.413)		(31.625)
TURN	117,138	1.591	90,203	1.631	19,368	1.586	7,567	1.130
		(1.161)		(1.148)		(1.257)		(0.931)
FOWNS	117,138	0.229	90,203	0.275	19,368	0.083	7,567	0.059
		(0.388)		(0.412)		(0.242)		(0.203)
CASH	117,138	0.223	90,203	0.227	19,368	0.204	7,567	0.221
		(0.170)		(0.172)		(0.163)		(0.164)
STOCKS	117,138	0.176	90,203	0.173	19,368	0.183	7,567	0.196
		(0.128)		(0.127)		(0.130)		(0.134)
AR	117,138	0.190	90,203	0.203	19,368	0.150	7,567	0.143
		(0.149)		(0.151)		(0.136)		(0.133)
AP	117,138	0.137	90,203	0.142	19,368	0.119	7,567	0.125
		(0.127)		(0.129)		(0.120)		(0.121)

See note on Table 2.1 for complete definitions of all variables.

Table 2.4. Summary statistics for firms owned by different agents (private firms, foreign firms, SOEs and collective firms)

Variables	Full sample (1)		Private firms (2)		Foreign firms (3)		SOEs and collective firms (4)	
	n	Mean (S.E)	n	Mean (S.E)	n	Mean (S.E)	n	Mean (S.E)
AGE	117,138	12.217 (10.609)	75,040	10.924 (9.643)	25,388	9.798 (3.842)	12,588	23.828 (16.221)
AGE^2	117,138	261.806 (606.389)	75,040	212.335 (539.548)	25,388	110.756 (83.776)	12,588	830.882 (1,066.153)
SIZE	117,138	0.806 (1.649)	75,040	0.654 (1.430)	25,388	1.145 (1.951)	12,588	0.976 (2.015)
CASHFLOW	117,138	8.702 (7.861)	75,040	8.677 (7.845)	25,388	9.575 (7.942)	12,588	7.149 (7.568)
SHORTDEBT	117,138	0.352 (0.208)	75,040	0.385 (0.204)	25,388	0.246 (0.190)	12,588	0.372 (0.200)
SHORTLEV	117,138	0.490 (0.218)	75,040	0.517 (0.216)	25,388	0.409 (0.208)	12,588	0.493 (0.213)
LONGDEBT	117,138	0.038 (0.088)	75,040	0.039 (0.090)	25,388	0.023 (0.068)	12,588	0.057 (0.105)
FCOSTS	117,138	0.010 (0.011)	75,040	0.011 (0.012)	25,388	0.006 (0.009)	12,588	0.008 (0.011)
SALESGR	117,138	10.963 (30.242)	75,040	12.156 (30.774)	25,388	9.450 (28.660)	12,588	7.716 (29.874)
TURN	117,138	1.591 (1.161)	75,040	1.701 (1.223)	25,388	1.436 (0.957)	12,588	1.287 (1.077)
FOWNS	117,138	0.229 (0.388)	75,040	0.035 (0.122)	n.a.	n.a. n.a.	12,588	0.020 (0.091)
CASH	117,138	0.223 (0.170)	75,040	0.224 (0.171)	25,388	0.213 (0.169)	12,588	0.233 (0.170)
STOCKS	117,138	0.176 (0.128)	75,040	0.171 (0.127)	25,388	0.193 (0.129)	12,588	0.174 (0.133)
AR	117,138	0.190 (0.149)	75,040	0.189 (0.150)	25,388	0.204 (0.146)	12,588	0.175 (0.150)
AP	117,138	0.137 (0.127)	75,040	0.131 (0.126)	25,388	0.163 (0.132)	12,588	0.121 (0.120)

See note on Table 2.1 for complete definitions of all variables.

Table 2.5. Determinants of accounts receivable – baseline specification

VARIABLES	Full sample
	(1)
$AR_{i(t-1)}$	0.386542***
	(0.012413)
$SIZE_{it}$	-0.000763
	(0.000794)
AGE_i	0.002310
	(0.002311)
AGE^2_i	-0.000046
	(0.000043)
$CASHFLOW_{it}$	-0.001360***
	(0.000444)
$SHORTLEV_{it}$	-0.027497*
	(0.015842)
$FCOSTS_{it}$	-0.439780*
	(0.228761)
$SALESGR_{it}$	-0.000107
	(0.000200)
$TURN_{it}$	0.008179**
	(0.003229)
$FOWNS_{it}$	0.026274
	(0.018460)
$STOCKS_{it}$	-0.039218
	(0.027155)
Constant	0.083976***
	(0.022032)
Industry dummies	Yes
Province dummies	Yes
Year dummies	Yes
Ownership dummies	Yes
Observations	117,191
Number of id	54,060
Hansen *J* statistics	72.48
Hansen degrees of freedom	26

Hansen test (*p*-value)	2.87e-06
m1 statistics	-45.19
m1 statistics (*p*-value)	0
Model degrees of freedom	55
Wald chi-squared statistic	16730
p-value of Wald statistic	0
Estimated variance of the e_it	0.00687

Notes: The specification was estimated using a system GMM (Blundell and Bond, 1998) estimator. The figures reported in parentheses are asymptotic standard errors. Standard errors and test statistics are asymptotically robust to heteroscedasticity. *m1* is a test for first-order serial correlation of the differenced residuals, asymptotically distributed as *N* (0,1) under the null of no serial correlation. The Hansen *J* test of over-identifying restrictions is distributed as *Chi*-square under the null of instrument validity. We treat all regressors, except for AGE_i as potentially endogenous variables. Levels of these variables dated $t - 2$ are used as instruments in the first-differenced equations, and first-differences of these same variables lagged once are used as additional instruments in the levels equations. Also see Notes to Table 2.1 for complete definitions of all variables.

* indicates significance at the 10% level.

** indicates significance at the 5% level.

*** indicates significance at the 1% level.

Table 2.6. Determinants of accounts receivable for provinces with different levels of the NERI index

	NERI index		
	(1)	(2)	(3)
VARIABLES	HIGH	MEDIUM	LOW
$AR_{i(t-1)}$	0.386036***	0.438216***	0.409800***
	(0.013841)	(0.033993)	(0.047804)
$SIZE_{it}$	-0.000967	-0.000383	0.000041
	(0.000932)	(0.001770)	(0.003680)
AGE_i	0.004435***	0.005775***	-0.001266
	(0.001234)	(0.002162)	(0.001812)
AGE^2_i	-0.000089***	-0.000110***	0.000016
	(0.000023)	(0.000040)	(0.000032)
$CASHFLOW_{it}$	-0.000102	-0.001007	0.000478
	(0.000474)	(0.001091)	(0.001813)
$SHORTLEV_{it}$	-0.057636***	-0.024908	-0.024011
	(0.018522)	(0.036096)	(0.050722)
$FCOSTS_{it}$	0.194113	-0.869741*	-0.022587
	(0.272525)	(0.486728)	(0.813375)
$SALESGR_{it}$	-0.000329	-0.000247	0.000347
	(0.000219)	(0.000353)	(0.000303)
$TURN_{it}$	-0.005400*	-0.000737	-0.001709
	(0.003223)	(0.005805)	(0.009295)
$FOWNS_{it}$	0.033493	0.119314**	0.040634
	(0.020870)	(0.060463)	(0.066141)
$STOCKS_{it}$	-0.026968	-0.031717	-0.090019
	(0.032400)	(0.056783)	(0.082042)
Constant	0.080268***	0.044919	0.101962**
	(0.016383)	(0.031472)	(0.040906)
Industry dummies	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes
Year dumies	Yes	Yes	Yes
Ownership dummies	Yes	Yes	Yes
Observations	90,234	19,384	7,573
Number of id	41,813	10,078	3,974

Hansen *J* stastics	136.1	42.08	35.10
Hansen degrees of freedom	34	34	34
Hansen test (*p*-value)	0	0.161	0.416
m1 statistics	-35.27	-15.77	-8.933
m1 statistics (*p*-value)	0	0	0
Model degrees of freedom	36	37	37
Wald chi-squared statistic	9315	2342	1007
p-value of Wald statistic	0	0	0
Estimated variance of the e_it	0.00738	0.00655	0.00579

Notes: All specifications were estimated using a system GMM (Blundell and Bond, 1998) estimator. The figures reported in parentheses are asymptotic standard errors. Standard errors and test statistics are asymptotically robust to heteroscedasticity. *m1* is a test for first-order serial correlation of the differenced residuals, asymptotically distributed as *N* (0,1) under the null of no serial correlation. The Hansen *J* test of over-identifying restrictions is distributed as *Chi*-square under the null of instrument validity. We treat all regressors, except for AGE_i as potentially endogenous variables. Levels of these variables dated $t - 2$ are used as instruments in the first-differenced equations, and first-differences of these same variables lagged once are used as additional instruments in the levels equations. Also see Notes to Table 2.1 for complete definitions of all variables.

* indicates significance at the 10% level.

** indicates significance at the 5% level.

*** indicates significance at the 1% level.

Table 2.7. Determinants of accounts receivable for firms owned by different agents

	Ownership types		
	(1)	(2)	(3)
VARIABLES	Private firms	Foreign firms	SOEs and collective firms
$AR_{i(t-1)}$	0.392972***	0.382546***	0.415310***
	(0.015167)	(0.026152)	(0.045212)
$SIZE_{it}$	-0.004559***	0.004762**	-0.004277**
	(0.000902)	(0.001930)	(0.002047)
AGE_i	0.000458	0.006169	-0.002633
	(0.003226)	(0.009528)	(0.003090)
AGE^2_i	-0.000008	-0.000290	0.000036
	(0.000062)	(0.000454)	(0.000049)
$CASHFLOW_{it}$	-0.001678***	-0.001151	0.000875
	(0.000547)	(0.000843)	(0.001549)
$SHORTLEV_{it}$	-0.037420**	0.052938	-0.049362
	(0.018632)	(0.043736)	(0.046928)
$FCOSTS_{it}$	-0.403340	-0.673518	-1.784072*
	(0.252732)	(0.725334)	(0.987497)
$SALESGR_{it}$	0.000167	-0.000434	-0.000049
	(0.000240)	(0.000414)	(0.000415)
$TURN_{it}$	0.009619**	0.002884	0.006430
	(0.003796)	(0.009552)	(0.008425)
$FOWNS_{it}$	0.065290*	n.a.	0.079886
	(0.034407)	n.a.	(0.055717)
$STOCKS_{it}$	-0.075833**	0.042705	0.027439
	(0.031145)	(0.076754)	(0.076351)
Constant	0.109100***	0.055911	0.116121**
	(0.021547)	(0.057301)	(0.045577)
Industry dummies	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Observations	75,067	25,396	12,604
Number of id	34,168	11,801	6,165
Hansen *J* stastics	67.13	22.83	15.62
Hansen degrees of freedom	26	23	26

Hansen test (*p*-value)	1.72e-05	0.471	0.945
m1 statistics	-38.75	-16.96	-13.46
m1 statistics (*p*-value)	0	0	0
Model degrees of freedom	51	49	51
Wald chi-squared statistic	11719	1866	2709
p-value of Wald statistic	0	0	0
Estimated variance of the e_it	0.00689	0.00787	0.00592

Notes: All specifications were estimated using a system GMM (Blundell and Bond, 1998) estimator. The figures reported in parentheses are asymptotic standard errors. Standard errors and test statistics are asymptotically robust to heteroscedasticity. *m1* is a test for first-order serial correlation of the differenced residuals, asymptotically distributed as *N* (0,1) under the null of no serial correlation. The Hansen *J* test of over-identifying restrictions is distributed as *Chi*-square under the null of instrument validity. We treat all regressors, except for AGE_i as potentially endogenous variables. Levels of these variables dated $t - 2$ are used as instruments in the first-differenced equations, and first-differences of these same variables lagged once are used as additional instruments in the levels equations. Also see Notes to Table 2.1 for complete definitions of all variables.

* indicates significance at the 10% level.

** indicates significance at the 5% level.

*** indicates significance at the 1% level.

Table 2.8. Determinants of accounts payable – baseline specification

VARIABLES	Full sample
	(1)
$AP_{i(t-1)}$	0.320385***
	(0.011906)
$SIZE_{it}$	-0.001111
	(0.000859)
AGE_i	-0.003184
	(0.002079)
AGE^2_i	0.000053
	(0.000039)
$CASHFLOW_{it}$	-0.000291
	(0.000324)
$SHORTDEBT_{it}$	0.066993***
	(0.016179)
$LONDGEBT_{it}$	0.093739***
	(0.034514)
$FCOSTS_{it}$	-0.696719***
	(0.226433)
$SALESGR_{it}$	0.000373*
	(0.000206)
$FOWNS_{it}$	-0.017677
	(0.017732)
$CASH_{it}$	-0.026709
	(0.019163)
$STOCKS_{it}$	-0.002289
	(0.027676)
AR_{it}	0.098683***
	(0.026680)
Constant	0.076478***
	(0.022725)
Industry dummies	Yes
Province dummies	Yes
Year dummies	Yes
Ownership types	Yes

Observations	117,138
Number of id	54,050
Hansen *J* stastics	53.80
Hansen degrees of freedom	32
Hansen test (*p*-value)	0.00927
m1 statistics	-41.13
m1 statistics (*p*-value)	0
Model degrees of freedom	57
Wald chi-squared statistic	7044
p-value of Wald statistic	0
Estimated variance of the e_it	0.00652

Notes: The specification was estimated using a system GMM (Blundell and Bond, 1998) estimator. The figures reported in parentheses are asymptotic standard errors. Standard errors and test statistics are asymptotically robust to heteroscedasticity. *m1* is a test for first-order serial correlation of the differenced residuals, asymptotically distributed as *N* (0,1) under the null of no serial correlation. The Hansen *J* test of over-identifying restrictions is distributed as *Chi*-square under the null of instrument validity. We treat all regressors, except for AGE_i as potentially endogenous variables. Levels of these variables dated $t - 2$ are used as instruments in the first-differenced equations, and first-differences of these same variables lagged once are used as additional instruments in the levels equations. Also see Notes to Table 2.1 for complete definitions of all variables.

* indicates significance at the 10% level.

** indicates significance at the 5% level.

*** indicates significance at the 1% level.

Table 2.9. Determinants of accounts payable for provinces with different levels of the NERI index

	NERI index		
	(1)	(2)	(3)
VARIABLES	HIGH	MEDIUM	LOW
$AP_{i(t-1)}$	0.332772***	0.264169***	0.305370***
	(0.013348)	(0.031945)	(0.053116)
$SIZE_{it}$	-0.001469	0.001233	0.003902
	(0.000950)	(0.001803)	(0.005573)
AGE_i	-0.002999	0.005415	-0.001311
	(0.002534)	(0.004214)	(0.004668)
AGE^2_i	0.000050	-0.000105	0.000017
	(0.000047)	(0.000078)	(0.000081)
$CASHFLOW_{it}$	0.000034	-0.002070***	-0.000000
	(0.000367)	(0.000776)	(0.001874)
$SHORTDEBT_{it}$	0.081799***	-0.000332	-0.010139
	(0.018600)	(0.035202)	(0.059294)
$LONDGEBT_{it}$	0.107315**	0.008563	0.065530
	(0.042665)	(0.070331)	(0.091458)
$FCOSTS_{it}$	-0.566345**	-0.973052*	-0.481320
	(0.256833)	(0.522682)	(0.921123)
$SALESGR_{it}$	0.000236	0.000217	0.000591
	(0.000221)	(0.000336)	(0.000505)
$FOWNS_{it}$	-0.023469	0.022263	-0.072736
	(0.019625)	(0.054038)	(0.067533)
$CASH_{it}$	-0.037131*	0.060399	-0.088515
	(0.021426)	(0.047914)	(0.090191)
$STOCKS_{it}$	0.001202	0.057010	-0.083522
	(0.032140)	(0.065564)	(0.098764)
AR_{it}	0.079588***	0.157383***	0.272106**
	(0.029550)	(0.058122)	(0.105857)
Constant	0.064956**	0.017198	0.092588
	(0.026132)	(0.046568)	(0.065988)
Industry dummies	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes

Year dumies	Yes	Yes	Yes
Ownership dummies	Yes	Yes	Yes
Observations	90,203	19,368	7,567
Number of id	41,806	10,076	3,972
Hansen *J* stastics	59.06	35.76	26.31
Hansen degrees of freedom	32	32	32
Hansen test (*p*-value)	0.00249	0.296	0.750
m1 statistics	-35.94	-14.34	-9.252
m1 statistics (*p*-value)	0	0	0
Model degrees of freedom	38	39	39
Wald chi-squared statistic	5246	884.3	535.1
p-value of Wald statistic	0	0	0
Estimated variance of the e_it	0.00673	0.00572	0.00605

Notes: All specifications were estimated using a system GMM (Blundell and Bond, 1998) estimator. The figures reported in parentheses are asymptotic standard errors. Standard errors and test statistics are asymptotically robust to heteroscedasticity. *m1* is a test for first-order serial correlation of the differenced residuals, asymptotically distributed as *N* (0,1) under the null of no serial correlation. The Hansen *J* test of over-identifying restrictions is distributed as *Chi*-square under the null of instrument validity. We treat all regressors, except for AGE_i as potentially endogenous variables. Levels of these variables dated $t - 2$ are used as instruments in the first-differenced equations, and first-differences of these same variables lagged once are used as additional instruments in the levels equations. Also see Notes to Table 2.1 for complete definitions of all variables.

* indicates significance at the 10% level.

** indicates significance at the 5% level.

*** indicates significance at the 1% level.

Table 2.10. Determinants of accounts payable for firms owned by different agents

	Ownership types		
	(1)	(2)	(3)
VARIABLES	Private firms	Foreign firms	SOEs and collective firms
$AP_{i(t-1)}$	0.304367***	0.355391***	0.371225***
	(0.014519)	(0.028175)	(0.046369)
$SIZE_{it}$	-0.003124***	0.004109**	-0.002986
	(0.001070)	(0.001876)	(0.002475)
AGE_{it}	-0.007860**	-0.002151	-0.002011
	(0.003068)	(0.008557)	(0.002896)
AGE^2_{it}	0.000146**	0.000050	0.000031
	(0.000059)	(0.000403)	(0.000046)
$CASHFLOW_{it}$	-0.000387	-0.000862	0.000016
	(0.000399)	(0.000704)	(0.001082)
$SHORTDEBT_{it}$	0.053440***	0.139725***	0.023785
	(0.018726)	(0.048721)	(0.045250)
$LONDGEBT_{it}$	0.101931**	0.087439	0.063792
	(0.042492)	(0.089986)	(0.084735)
$FCOSTS_{it}$	-0.675282***	-2.263987***	0.002902
	(0.255317)	(0.787021)	(0.776397)
$SALESGR_{it}$	0.000381	-0.000072	0.000396
	(0.000245)	(0.000449)	(0.000386)
$FOWNS_{it}$	-0.002949	n.a.	0.050896
	(0.030628)	n.a.	(0.049263)
$CASH_{it}$	-0.043321*	-0.013050	0.029847
	(0.023575)	(0.043804)	(0.053628)
$STOCKS_{it}$	-0.013904	0.066772	-0.002383
	(0.033616)	(0.079491)	(0.066788)
AR_{it}	0.095526***	0.023377	0.213452***
	(0.033547)	(0.056133)	(0.072307)
Constant	0.104504***	0.042836	0.023968
	(0.024903)	(0.048629)	(0.048696)
Industry dummies	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes
Year dumies	Yes	Yes	Yes

Observations	75,040	25,388	12,588
Number of id	34,162	11,799	6,163
Hansen *J* stastics	33.95	38.21	23.75
Hansen degrees of freedom	32	29	32
Hansen test (*p*-value)	0.374	0.118	0.853
m1 statistics	-32.80	-15.26	-12.07
m1 statistics (*p*-value)	0	0	0
Model degrees of freedom	53	51	53
Wald chi-squared statistic	3008	1788	1021
p-value of Wald statistic	0	0	0
Estimated variance of the e_it	0.00662	0.00744	0.00491

Notes: All specifications were estimated using a system GMM (Blundell and Bond, 1998) estimator. The figures reported in parentheses are asymptotic standard errors. Standard errors and test statistics are asymptotically robust to heteroscedasticity. *m1* is a test for first-order serial correlation of the differenced residuals, asymptotically distributed as *N* (0,1) under the null of no serial correlation. The Hansen *J* test of over-identifying restrictions is distributed as *Chi*-square under the null of instrument validity. We treat all regressors, except for AGE_i as potentially endogenous variables. Levels of these variables dated $t - 2$ are used as instruments in the first-differenced equations, and first-differences of these same variables lagged once are used as additional instruments in the levels equations. Also see Notes to Table 2.1 for complete definitions of all variables.

* indicates significance at the 10% level.

** indicates significance at the 5% level.

*** indicates significance at the 1% level.

Appendix 2

Appendix 2A

Variable definitions

AGE is the number of years since the establishment of the firm.

AGE^2 is the square of the number of years since the establishment of the firm.

SIZE is the amount of total assets in million Yuan.

CASHFLOW is measured as the ratio between (net profit+ depreciation of fixed assets) and total assets.

SHORTDEBT is measured as the ratio of short-term financial debt (net of accounts payable) to total assets.

SHORTLEV is measured as the ratio of current liabilities to total assets.

LONGDEBT is computed as the ratio of long-term debt (net of accounts payable) to total assets.

FCOSTS is measured as the ratio of interest payments to total assets.

SALESGR is the yearly variation is sales.

TURN is the ratio of sales over total assets.

FOWNS is measured as the percentage of shares owned by foreign investors.

CASH is the ratio between cash and total asset

STOCKS is the ratio between inventories and total assets.

AR is the ratio between accounts receivable and total assets.

AP is the ratio between accounts payable and total assets.

Appendix 2B

Components and weights in the Marketization Index (Fan *et al*., 2010)

1. The role of government [0.231]

1a The proportion of resource allocation by market (0.344)
1b Extra-financial burden on farmers (0.271)
1c Business costs of dealing with government control (0.385)

2. Economic Structure [0.282]

2a Non-state sectors in GDP (0.328)
2b Non-state sectors in total fixed investment (0.343)
2c Non-state sectors in urban employment (0.329)

3. Free inter-regional trade [0.148]

3a Government price control (0.500)
(3a1) Price control on retail goods 0.400
(3a2) Price control on production goods 0.400
(3a3) Price control on agricultural goods 0.200
3b Non-price trade barriers (0.500)

4. Development of factor market [0.242]

4a Banking sector structure (0.187)
4b Allocation of financial resource in state vs. non-state sectors (0.376)
4c Environment for foreign direct investment (0.173)
4d Labor mobility (0.264)
(4d1). Immigrating workers as percentage of total employment 0.500
(4d2). Ratio of Immigrating workers over provincial GDP 0.500

5. Legal framework [0.097]

5a Development of intermediate institutions (0.429)
5b Legal protection of trade marks (0.157)
5c Legal protection of intellectual property rights (0.414)
(5c1) Ratio of patent application over GDP 0.500
(5c2) Ratio of patent registration over GDP 0.500

Two steps are taken to construct the actual components into the "summary" index. The first one is to transform all 19 variables into a 0-to-10 scale, whereas the second one is to determine the "weights" for each component by making use of a principal-component analysis. The index and all components are measured into a 0-10 scale. Each province gets an index value between 0 and 10 based on the values taken by all sub-components of the index.

"The numbers in brackets are the weights of area-components in the Index; the numbers in parentheses are weights of the components in the areas; the numbers without either bracket or parentheses are weights of a sub-component in the components at above level. The sum of the

weights of the Index, the sum of the weights of an area-component, and the sum of the weights of a component are all equal to unit. These weights are derived by principal component analysis." (Fan *et al*., 2010, p. 9).

Appendix 2C

List of provinces according to their level of marketization, for each year

Table 2.1C. Distribution of the provinces in the year 2004 according to the recorded NERI level

Distribution of the provinces in the year 2004 according to the recorded NERI level											
High level of NERI				**Medium level of NERI**				**Low level of NERI**			
Province	**Freq.**	**Percent**	**Cum.**	**Province**	**Freq.**	**Percent**	**Cum.**	**Province**	**Freq.**	**Percent**	**Cum.**
Beijing	1,511	2.93	2.93	Anhui	1,406	10.75	10.75	Gansu	308	6.35	6.35
Chongqing	943	1.83	4.76	Guangxi	743	5.68	16.43	Guizhou	539	11.11	17.46
Fujian	4,139	8.03	12.79	Hainan	135	1.03	17.46	Heilongjiang	586	12.08	29.53
Guangdong	8,08	15.67	28.46	Hebei	2,406	18.39	35.86	Neimenggu	435	8.97	38.50
Jiangsu	9,439	18.31	46.76	Henan	1,887	14.43	50.28	Ningxia	169	3.48	41.98
Liaoning	2,419	4.69	51.45	Hubei	1,246	9.53	59.81	Qinghai	87	1.79	43.78
Shandong	5,508	10.68	62.13	Hunan	1,706	13.04	72.85	Shaanxi	774	15.95	59.73
Shanghai	5,042	9.78	71.91	Jiangxi	787	6.02	78.87	Shanxi	953	19.64	79.37
Tianjin	1,286	2.49	74.41	Jilin	589	4.50	83.37	Xinjiang	350	7.21	86.58
Zhejiang	13,197	25.59	100.00	Sichuan	2,175	16.63	100.00	Yunnan	651	13.42	100.00
Total	51,564	100.00		**Total**	13,080	100.00		**Total**	4,852	100.00	

Notes: our elaboration from NBS data and Fan *et al.*'s (2010) data

Table 2.2C. Distribution of the provinces in the year 2005 according to the recorded NERI level

Distribution of the provinces in the year 2005 according to the recorded NERI level											
High level of NERI				**Medium level of NERI**				**Low level of NERI**			
Province	**Freq.**	**Percent**	**Cum.**	**Province**	**Freq.**	**Percent**	**Cum.**	**Province**	**Freq.**	**Percent**	**Cum.**
Beijing	1,415	2.79	2.79	Anhui	1,459	11.30	11.30	Gansu	293	6.50	6.50
Chongqing	948	1.87	4.67	Guangxi	738	5.72	17.02	Guizhou	488	10.83	17.32
Fujian	4,027	7.95	12.62	Hainan	129	1.00	18.02	Heilongjiang	559	12.40	29.72
Guangdong	8,127	16.05	28.67	Hebei	2,229	17.27	35.29	Neimenggu	376	8.34	38.07
Jiangsu	9,542	18.84	47.51	Henan	1,704	13.20	48.50	Ningxia	149	3.31	41.37
Liaoning	2,424	4.79	52.29	Hubei	1,419	10.99	59.49	Qinghai	82	1.82	43.19
Shandong	5,067	10.01	62.30	Hunan	1,638	12.69	72.18	Shaanxi	722	16.02	59.21
Shanghai	4,828	9.53	71.83	Jiangxi	765	5.93	78.11	Shanxi	860	19.08	78.28
Tianjin	1,376	2.72	74.55	Jilin	585	4.53	82.64	Xinjiang	324	7.19	85.47
Zhejiang	12,89	25.45	100.00	Sichuan	2,24	17.36	100.00	Yunnan	655	14.53	100.00
Total	50,64	100.00		**Total**	12,906	100.00		**Total**	4,51	100.00	

Notes: our elaboration from NBS data and Fan *et al*.'s (2010) data

Table 2.3C. Distribution of the provinces in the year 2006 according to the recorded NERI level

Distribution of the provinces in the year 2006 according to the recorded NERI level											
High level of NERI				**Medium level of NERI**				**Low level of NERI**			
Province	**Freq.**	**Percent**	**Cum.**	**Province**	**Freq.**	**Percent**	**Cum.**	**Province**	**Freq.**	**Percent**	**Cum.**
Beijing	1,350	2.77	2.77	Anhui	1,356	11.14	11.14	Gansu	275	6.94	6.94
Chongqing	902	1.85	4.62	Guangxi	700	5.75	16.89	Guizhou	423	10.67	17.61
Fujian	3,627	7.44	12.05	Hebei	2,043	16.79	33.68	Hainan	123	3.10	20.72
Guangdong	7,875	16.14	28.20	Henan	1,521	12.50	46.18	Heilongjiang	526	13.27	33.99
Jiangsu	9,249	18.96	47.16	Hubei	1,435	11.79	57.97	Ningxia	130	3.28	37.27
Liaoning	2,273	4.66	51.82	Hunan	1,444	11.87	69.84	Qinghai	75	1.89	39.16
Shandong	4,815	9.87	61.69	Jiangxi	728	5.98	75.82	Shaanxi	657	16.58	55.74
Shanghai	4,546	9.32	71.01	Jilin	597	4.91	80.72	Shanxi	848	21.40	77.14
Tianjin	1,276	2.62	73.62	Neimenggu	359	2.95	83.67	Xinjiang	297	7.49	84.63
Zhejiang	12,868	26.38	100.00	Sichuan	1,987	16.33	100.00	Yunnan	609	15.37	100.00
Total	48,781	100.00		**Total**	12,170	100.00		**Total**	3,963	100.00	

Notes: our elaboration from NBS data and Fan *et al*.'s (2010) data

Table 2.4C. Distribution of the provinces in the year 2007 according to the recorded NERI level

Distribution of the provinces in the year 2007 according to the recorded NERI level											
High level of NERI				**Medium level of NERI**				**Low level of NERI**			
Province	**Freq.**	**Percent**	**Cum.**	**Province**	**Freq.**	**Percent**	**Cum.**	**Province**	**Freq.**	**Percent**	**Cum.**
Anhui	1,339	2.95	2.95	Chongqing	905	9.26	9.26	Gansu	243	5.32	5.32
Beijing	1,165	2.57	5.52	Hainan	92	0.94	10.20	Guangxi	665	14.55	19.86
Fujian	3,409	7.52	13.04	Hebei	1,797	18.38	28.58	Guizhou	419	9.17	29.03
Guangdong	7,452	16.44	29.48	Henan	1,294	13.24	41.82	Heilongjiang	475	10.39	39.42
Jiangsu	8,533	18.82	48.30	Hubei	1,371	14.03	55.85	Neimenggu	317	6.94	46.36
Liaoning	2,072	4.57	52.87	Hunan	1,313	13.43	69.28	Ningxia	123	2.69	49.05
Shandong	4,398	9.70	62.57	Jiangxi	660	6.75	76.03	Qinghai	66	1.44	50.49
Shanghai	4,112	9.07	71.64	Jilin	521	5.33	81.36	Shaanxi	644	14.09	64.58
Tianjin	1,104	2.44	74.08	Sichuan	1,822	18.64	100.00	Shanxi	779	17.04	81.62
Zhejiang	11,752	25.92	100.00					Xinjiang	250	5.47	87.09
								Yunnan	590	12.91	100.00
Total	45,336	100.00		**Total**	9,775	100.00		**Total**	4,571	100.00	

Notes: our elaboration from NBS data and Fan *et al*.'s (2010) data

CHAPTER THREE

TO WHAT EXTENT DOES TRADE CREDIT AFFECT THE CAPITAL STRUCTURE OF CHINESE UNLISTED FIRMS?

3.1. Introduction

In the last three decades, the Chinese economy has shown high growth rates in assets, sales and fixed investment (Song *et al*., 2011). These achievements were possible despite the relatively underdeveloped financial and banking system, which lead to institutional biases and related credit constraints especially for private firms (Allen *et al*., 2005; Ding *et al*., 2013).

Ayyaggari *et al*. (2010) and Cull *et al*. (2009) point to the substantial irrelevance of informal finance in explaining firms' growth. Their findings are corroborated by Guariglia *et al*. (2011) who underline the importance of internal finance to sustain companies' survival and expansion. Yet, informal finance in the form of trade credit represents an important proportion of firms' total debt. In fact, between 2006 and 2012 the proportion of accounts payable relative to total liabilities for Chinese listed firms increased from 15% to 20%. By contrast, the proportion of bank loans relative to total liabilities declined from 27% to 17% and accounts receivable as a share of total liabilities remained fairly stable, at around 20%

(Lin and Chou, 2015). An interplay between informal finance, especially trade credit, and bank credit is thus an evident feature of the capital structure of Chinese firms.

A large body of literature looks at the determinants of the capital structure of firms in developed countries (e.g. Bradley *et al*., 1984; Titman and Wessels, 1988; Rajan and Zingales, 1995; Wald, 1999), and more recently in developing nations (e.g. Wiwattanakantang, 1999; Delcoure, 2007; Köksal and Orman, 2015 and Booth *et al*., 2001). Since the seminal paper by Modigliani and Miller (1958), scholars have tried to provide tests of two main theories, the static trade off theory (henceforth TOT) and the pecking order theory (henceforth POT). The TOT suggests that firms trade off the tax shield advantages of debt and the agency costs of keeping high levels of debt. Conversely, the POT advocates that companies take their leverage decisions following a pecking order to limit the inefficiencies derived from asymmetric information.

Only a handful of papers focus on the capital structure of Chinese enterprises. The majority of them concentrate on listed firms (Chen, 2004; Huang and Song, 2006; Chen and Strange, 2005; Wu and Yue, 2009; Zhang *et al*., 2015). To the best of our knowledge, only Li *et al*. (2009) look at unlisted companies, regardless their size, whereas later papers by Du *et al*. (2015) and Newman *et al*. (2012), analyze exclusively small and medium size enterprises (henceforth SMEs). Empirical evidence shows that neither the TOT nor the POT have solid explanatory power in the Chinese case (Chen, 2004). Thus, we will limit ourselves to study the determinants of the capital structure of Chinese firms, without over emphasis on the relative power of the different theories (Chen and Strange, 2005).

Yet, in the analysis of the leverage composition of Chinese firms, two distinct facts justify an *ad hoc* study of the role played by trade credit in the leverage composition of Chinese companies. First, and foremost, Chinese listed firms resort extensively to accounts

payable, which represent 5.93% of the leverage ratio, and 8.8% of total assets between 2003 and 2013 indicating how important trade credit is for both turnover and assets (Zhang *et al*., 2015, p. 444). If looking instead at Chinese unlisted firms, averages of accounts payable represent 13% and 27% of total assets and total sales values between 1994 and 1999, indicating how important trade credit is also for this type of firms (Ge and Qiu, 2007).[95,96] Second, the largest part of firms' total leverage is composed of short-term debt, due in part to the underdevelopment of the bond and insurance markets which limits access to long-term debt (Chen, 2004; Huang and Song, 2006; Bhabra *et al*., 2008). This reinforces the need to study trade credit which is primarily employed in the short-term, and therefore a complement/substitute with formal finance.[97,98]

To the best of our knowledge, no paper has previously analyzed the role of trade credit in shaping the capital structure of unlisted Chinese firms, taking into account heterogeneity in ownership and levels of economic and institutional development across provinces. This is relevant for two distinct reasons. First, the banking system is dominated by four large state-owned banks (the Industrial and Commercial Bank of China, the Agricultural Bank of China,

[95] Although this data is not very recent, it is however the most up-to-dated on unlisted firms.

[96] Guariglia and Mateut (2016) also show that accounts receivable represent 17.2% of turnover for a sample of 65,706 Chinese unlisted firms between 2000 and 2007.

[97] The share of long-term debt to total debt varies between SMEs and listed companies. Du *et al*. (2015) analyse Chinese SMEs. They indicate that only 24.4% of the firms used long-term debt during the period 2000-2006 and that long-term leverage is equal to 3.8%. Huang and Song (2006) look at listed companies from 1994 to 2003 and show that the book long-term debt ratio and the market long-term debt ratio are respectively equal to 8.88% and 3.37%. The unexpectedly higher access on long-term debt that SMEs enjoy with respect to the market long-term debt ratio might be due to two different reasons. First, the market long-term debt ratio is computed as long-term debt divided by long-term debt plus market value of equity. Therefore, adding the long-term debt to the market value of equity is likely to decrease the market long-term debt ratio. Second, the study on SMEs considers a more recent time period which includes possible improvements in financial market conditions.

[98] Ge and Qiu (2007) rely on a survey of 570 state and non-state enterprises to compare how these two ownership types make a different use of trade credit. They show that only 20% of the companies make use of long-term trade credit, which they argue occurs when the payments are made more than 30 days after delivery. Yet, a different time period is suggested by other authors to classify trade credit as long-term. In fact, Yano and Shiraishi (2016, p. 65) argue that trade credit must be rolled for example by three years over to become long term. Yet, in their domestic non-state owned firm-level panel data for 1998–2007, the credit terms only range between two weeks and three months.

the Bank of China and the China Construction Bank). These banks have historically favored state-owned enterprises (SOEs) in the allocation of credit, neglecting private and also foreign firms (Guariglia *et al*., 2011; Ding *et al*., 2013). Second, there is significant heterogeneity across Chinese provinces in terms of economic and institutional development, with large differences within the financial and credit market structure (Fan *et al*., 2010).

We fill this gap in the literature by making use of a large sample of Chinese unlisted companies over the period 2004-2007 and investigating how net trade credit affects the access to formal finance.[99] Our results indicate that net trade credit is positively related with total and short-term debt, but not with long-term debt. Next, we show that such relationship is magnified for firms located in the provinces with the highest levels of marketization. Finally, we show that net trade credit plays a positive role in the financial decision making process of private and foreign firms located in those provinces with highest levels of marketization.

The remainder of this paper is organized as follows. Section 3.2 provides a review of the relevant literature. Section 3.3 reports the hypotheses to be tested. Section 3.4 presents the baseline specification and the estimation methodology. Section 3.5 describes the research methodology and variables employed**.** Section 3.6 describes the data used and shows summary statistics. Section 3.7 illustrates our empirical results. Section 3.8 concludes and discusses policy recommendations and paths for future research.

3.2. Literature review

[99] Publicly listed companies cannot be separately identified in our dataset as their legal identification numbers were modified once they went public (Liu and Xiao, 2004). If looking at the time span between 2000 and 2007 there are more than 1,000 listed companies in the manufacturing and mining sectors, which represent less than 0.3% of the total number of companies in our sample.

This paper bridges two streams of the recent literature: the first one dealing with the capital structure of Chinese firms and the second on how trade credit affects the financing decisions of any country. We thus identify a gap in the literature. No previous paper has explicitly taken into account the role of trade credit as a determinant of the leverage choices of Chinese unlisted companies.

3.2.1. Studies on the capital structure of Chinese firms

3.2.1.1. Evidence from listed companies

3.2.1.1.1. The seminal studies

To the best of our knowledge, Chen (2004) made the first attempt to analyze the capital structure of Chinese firms, focusing on a panel of listed companies. First, the author tests whether firm-specific factors that have been found to be correlated with leverage in the Western economies are also correlated in the Chinese case. Second, he checks whether the weak and immature institutional architecture in China affects the choice of a specific capital structure. Third, he tests if the traditional models of the capital structure applied in the Western economies are also suitable to properly explain the behavior of Chinese firms.

The selected dependent variables are two different debt ratios. The first one is overall leverage, measured as the ratio of the book value of total debt to total assets, whereas the second is long-term leverage, measured as the ratio of book value of long-term debt to total assets. The explanatory variables include profitability, size, growth opportunities, tangibility, earnings volatility, and non-debt tax shields.

Data are taken from annual reports of 88 Chinese listed companies for the period 1995-2000. Results show four relevant relationships. First, a negative relationship between profitability and debt. Second, a positive association between growth opportunities and debt. Third a positive association between tangibility and debt. Fourth, a negative association between firm's size and long-term debt. Chinese firms make a larger use of short-term rather than long-term finance compared to their peers in developed countries. The results seem to support the presence of a modified, new version of the POT, in which retained earnings, equity and long-term debt are used in his order.

Chen and Strange (2005) analyze the behavior of 972 listed companies on the Shanghai Stock Exchange and Shenzhen Stock Exchange in 2003. The authors try to build a model of the determinants of capital structure by making use of intuitions from several branches of finance theory (such as the agency theory, the signalling theory and the theory of corporate control).

Two important advancements are provided with respect to the work by Chen (2004). In fact, Chen and Strange (2005)'s paper explicitly addresses how firms' leverage choices are influenced by the industry they belong to, but also by the specific nature of the institutional investors. These are differentiated into state agencies, state-owned institutions and domestic institutions. State agencies exercise the function of shareholders on behalf of the state; state-owned institutions are entities controlled by the state at different hierarchical levels, whereas domestic investors are bodies set up by a mix of shareholders.

The authors make use of two different measures of leverage as dependent variables. First, the book value of leverage, whereas the second one is the market value of leverage. The explanatory variables, instead, form three groups. The first includes a set of variables widely used in the capital structure of the firms. It includes size, asset tangibility, business risk,

growth opportunities, age and the percentage of corporate income tax. The second is related to the ownership structure of the firms. The third includes nineteen industry dummy variables.

Results show that profitability and institutional shareholding are negatively related to leverage. This is especially relevant for state ownership, both those held by state agencies and state-controlled institutions. Size, the risk of the firm, and the number of years the firm is listed are positively associated with the debt ratio.

Another pioneering paper on the study of the capital structure of Chinese listed companies is provided by Huang and Song (2006). They build in Chen and Strange (2005) by analyzing a larger sample for a longer period of time. They make use of the information on more than 1,200 Chinese listed firms for the years 1993-2004. The authors test two hypotheses. First, they assess the extent to which the leverage decisions taken by Chinese listed companies are different from those undertaken in countries where the rule of law is stronger and free market is historically in place. Second, they check if the factors that affect the cross-sectional variability in the capital structure of the firms in developed and developing countries have a similar effect on Chinese companies' capital structure.

The authors employ six different indicators of leverage. The first is book long-term debt ratio, measured as long-term debt divided by long-term debt plus book value of equity. The second is the book total debt ratio, measured as total debt divided by total debt plus book value of equity. The third is the book total liabilities ratio, measured as total liabilities over total liabilities plus book value of equity. The fourth, the fifth and the sixth indicators of leverage are the abovementioned three when the book value of equity is replaced by the market value of equity. The explanatory variables include profitability, tangibility, tax effect,

size, non-debt tax shields, and an indicator of growth opportunities proxied by the Tobin's Q, plus measures of ownership structure and managerial shareholding.[100]

The results can be summarized as follows. First, leverage has increased over the years, as a consequence of an underdevelopment of the bond market. Second, firms take the effect of tax into consideration in their leverage decision, although in a heterogeneous fashion across regions and ownership types. Outcomes also stress that leverage increases when size and collateral increase, but decreases when there is an increase of profitability, non-debt tax shields, growth opportunities and with the size of managerial shareholding.

Bhabra *et al.* (2008) study the capital structure decision of Chinese listed firms between 1992, when the number of firms was 54, till the year 2001, when the number of companies rose to 1,154. They follow five steps. First, the authors test how the leverage composition of Chinese companies compares to that of other developed and developing countries. Second, they analyse how the concentrated and non-tradable ownership by the state and legal-person shareholders affects listed Chinese firms' long-term debt. Third, they study whether there is a relationship between the rapid growth in stock market activity and the use of long-term debt. Fourth, they look at the determinants of the capital structure in a Chinese context compared to the drivers identified in developed and developing countries. Fifth, they assess whether the leverage composition differs between listed firms with state ownership and listed entrepreneurial private firms with no state ownership.

A key result is that Chinese firms employ less than 10% of long-term debt in their capital structure. This is a smaller figure than any described for firms in developed and other developing countries. The authors compare debt ratios of state-owned enterprises (SOEs) and

[100] Chen and Ling (forthcoming) demonstrate that better corporate governance leads to an increase in the equity levels. This is not the case of state ownership which facilitates the access to finance, but reduces the level of equity.

entrepreneurial private firms (EPFs). They argue that even after listing, the State remains the largest equity holder in SOEs to guarantee that these firms remain economically sustainable. The privatized SOEs are more likely to be the better performing group of all SOEs and the presence of the State provides implicit loan guarantees for the lenders, reducing SOEs' financial distress. Conversely, the EPFs that do not enjoy these guarantees, are younger than SOEs and present high growth. Bhabra *et al.* (2008) demonstrate that ownership plays an important role in the level and composition of leverage.

Next, the authors investigate the capital structure with special emphasis on the determinants of total and long-term leverage. The dependent variable is the leverage ratio, either total debt or long-term debt. Total debt is measured in two different ways, i.e. total liabilities divided by the book value of total assets and total liabilities divided by the market value of total assets. In a similar fashion, long-term debt is computed in two different ways, i.e. as long-term debt divided by the total book value of assets, and as long-term debt divided by total market value of assets. Independent variables include size, tangibility, profitability, growth, and industry membership.

The results indicate that the share of tangible assets and firm size (profitability and growth) have positive (negative) relationships with the long-term debt ratio, respectively. These outcomes are in line with the outcome recorded in other studies for both developed and emerging markets. The outcomes on firm-specific characteristics for the EPFs without state ownership are comparable to those for the SOEs. The long-term debt ratios of the EPFs are positively associated with the ownership of both domestic individual investors' A-shares and

legal persons' A-shares.[101] Yet, there are substantial interindustry differences in the use of long-term debt, which do change during time.

3.2.1.1.2. The role of industry, ownership, uncertainty and taxes

An interesting perspective on the study of the capital structure of Chinese listed firms is provided by Su (2010). This paper first investigates the extent to which corporate diversification into related and unrelated businesses influences the choice of the capital structure. Second, it investigates whether ownership structure is useful to the understanding of corporate diversification strategies and capital structure composition. A set of four hypotheses are tested. According to the first, under the coinsurance effect (Lewellen, 1971), leverage is positively associated with product diversification (related diversification). According to the second, under the organizational economics framework, leverage is positively associated with unrelated diversification and negatively associated with related diversification. According to the third, under the agency theory framework, and assuming that shareholders are able to influence the managers' decisions, leverage is positively associated with product diversification. According to the fourth, managers have large discretionary powers, and leverage is negatively associated with product diversification.

In order to test these hypotheses, the authors make use of a sample consisting of 789 companies from 74 two-digit industries with a total of 5,523 firm-years over the period 2000-2006. First, they find that, on average, firms that diversify across product lines have less leverage than non-diversified firms. Second, they observe that leverage is negatively

[101] A shares represent the largest part of the stock market and are sold only in the Chinese currency and only to domestic investors. These include the State, legal-person investors, employees, and domestic individual investors.

associated with the degree of related diversification, but positively associated with the degree of unrelated diversification. Third, they show that, on average, firms controlled by the government have less leverage than those that are not controlled by the state.

Taking stock of the large heterogeneity of economic, financial and institutional development across provinces, Zhang *et al.* (2015) study how economic policy uncertainty affects corporate capital structure for Chinese listed firms between 2003 and 2013. The authors make use of balance sheet information of listed Chinese firms from Quarter 1, 2003, to Quarter 4, 2013 for a total of 2,038 public listed A-shares firms plus macroeconomic information, such as amount of loans, investments and deposit amounts at the provincial level, together with the GDP growth rates, loan interest rates and deposit reserve rates at the national level.

Results show that when the extent of economic policy uncertainty raises, firms decrease their leverage ratios. Companies that are located in provinces with low marketization levels, are owned by the central or local government and benefit from a prior relationship with banks are able to reduce the negative effects of this uncertainty. Most of the time economic policy uncertainty derives from a worsening effect of the financial environment. Results also show that firms will adjust their financing patterns in the provinces with lower levels of marketization by increasing in the use of trade credit.

A specific analysis on the role played by the tax regime on leverage is provided by Wu and Yue (2009) who analyse how an increase in the corporate tax affects the capital structure of listed firms. The authors study a peculiar event recorded in China, in which the Central government ended a local government tax rebate policy (henceforth LGTR). In this case, firms that previously benefited from LGTR faced an exogenous increase in the tax rate, whereas other firms are exempted and, thus, are used as a benchmark.

The authors test two different hypotheses. According to the first, companies that had received LGTR raise their leverage level as a consequence to the end of the LGTR policy. In fact, the new legislative treatment imposed a 33% corporate income tax rate on listed companies. In this manner the actual tax rate for firms that had received LGTR rose from 15% to 33%, increasing the tax advantage of debt relative to equity. According to the second, the leverage increase after the end of the tax rebate policy depends on firms' access to finance, as those with low credit constraints are more able to change their leverage position. In order to test for these hypotheses, the authors make use of financial data from the CCER (China Centre for Economic Research) China Stock Database between the years 1999 and 2003 to obtain a final sample of 2,182 firm-year observations. The results show that firms that had received LGTR increased their leverage by more than 3% in the three years after the termination of the LGTR, compared to other companies that experienced no change of tax rate.

3.2.1.1.3. Dynamic versions of the capital structure

Probably the most authoritative attempt to focus on the dynamic version of the capital structure for Chinese firms is provided by Qian *et al.* (2009) who check if listed companies adjust to a target leverage level. The authors concentrate on the dynamic version of the TOT, and on the underlying assumption that in the presence of corporate taxes, firms are able to raise their value by augmenting the level of leverage. As corporate taxes are deductible, a rise in debt allows firms to obtain an increase in cash flow thanks to the interest tax shields. Yet, rebalancing leverage involves a cost and there is a tradeoff between benefits and costs, which should push firms to an optimal interior level of debt. This would be the maximum value of the firm given a level of operating cash flow. This type of analysis is useful for our

investigation. In fact, the presence of non-negligible transaction costs associated with the relatively underdeveloped nature of the Chinese financial system, especially for non-publicly listed firms, may lead to a lengthier adjustment process than that required in developed countries. Higher transaction costs may thus lead to a sticky relationship between net trade credit and leverage, weakening the effect of the signal of the former.

The authors wish to explain the target leverage ratio of firm *i* at time *t*, through a set of explanatory variables together with a parameter, lambda. This parameter is inversely related to the adjustment costs and takes values in the closed interval between zero and one. When it is zero there is no adjustment towards the target level of debt, whereas when it is one, the adjustment occurs instantaneously and without any friction. The explanatory variables include profitability, size, tangibility, non-debt tax shields, growth opportunities, and volatility. An additional key variable is state ownership, measured as the number of state-owned shares divided by total number of shares in issue.

The authors employ market and accounting data for 650 Chinese publicly listed companies over the period 1999-2004. Results of a baseline estimation show four main features of Chinese firms. First, companies show a very slow process of adjustment towards an optimal level of debt. Second, firms' size, tangibility and state shareholdings are positively related with firms' leverage ratio, while profitability, non-debt tax shields, growth and volatility show a negative association with companies' leverage ratio. Third, lagged profitability has a marginally small and positive impact on companies' leverage ratio. Fourth, for a firm experiencing a large reduction in its leverage ratio only one tenth of the difference between its favorite and actual leverage level is removed within a year, which is strikingly lower than the one fifth recorded for the full sample.

A similar research is undertaken by Zhou and Xie (forthcoming) who analyse if ownership affects firms' adjustment speed towards target capital structures for 9,130 Chinese publicly listed companies over the period 1999–2009. The authors split their sample into state-owned enterprises (SOEs) and private enterprises (non-SOEs) according to their ultimate ownership. Their work is different from Qian *et al.* (2009) who use the percentage of state-owned shares on the total amount of a firm's shares. Some companies may be indirectly controlled by the state, and therefore, the ultimate ownership data are more suitable for analysis. This approach is thus similar to ours as we explicitly take into account the heterogeneity across companies owned by different agents, an important determinant in firms' access to formal finance and their capability to reach a target level of debt.

The authors wish to explain the target leverage ratio (measured as total book debt divided by total assets) of firm *i* at time *t*, through a set of explanatory variables together with a parameter, gamma, which indicates the adjustment speed toward the target capital structure. The key independent variable is a dummy which takes a value of one when a firm's ultimate controlling shareholder is an individual or a non-state entity, such as a town/village enterprise, a foreign company, or another non-state-controlled enterprise (which are labelled as non-SOEs, i.e. non-state-owned enterprises); and zero otherwise (for the case of SOEs, i.e. state-owned enterprises). As the target level cannot be observed, the authors develop a reduced form which is first estimated by OLS and then by a fixed effect model. Results show that SOEs adjustment speeds in all models are slower than the non-SOEs speeds, whereas the adjustment speed for the sample as a whole is around 0.471. These results are notably larger than those of Qian *et al.* (2009), in which the adjustment speed for the whole sample is only 0.185. Outcomes are consistent with the TOT. They imply that the political dependence of

SOEs may actually lead to a higher persistence of leverage and to slower adjustment speeds in comparison to non-SOEs.

A related study on the role of the signal factor hypothesis in the theory of capital structure for Mainland China and Taiwan is proposed by Yang *et al.* (2014), who investigate how information asymmetries affect the attainment of a target capital composition. The aim is to test the validity of the signal factor hypothesis developed by Chou *et al.* (2011) by making use of a panel Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test with sharp drifts and the Fourier function. The null hypothesis is that all firms show an optimal capital structure, whereas the alternative is that some firms do not have an optimal capital structure.

The authors test the signal factor hypothesis on the stock market of both Taiwan and China. The top 50 constituent corporations of the Taiwanese stock exchange were selected to represent those enjoying from symmetric information in Taiwan. In a similar fashion, the top 50 constituent companies of the FTSE China A50 Index were selected to represent those firms that enjoy from symmetric information in Mainland China. Conversely, firms that were categorized as "full cash delivery stocks" (Yang, 2014, p. 1129) were used to represent firms with asymmetric information. The discrimination criterion to look at the capital structure is the debt-to-assets ratio.

Results show that the null hypothesis of the existence of an optimal capital structure for Taiwanese and Chinese firms cannot be rejected. Conversely, for firms suffering from information asymmetry the stationary null hypothesis was rejected both in the Taiwanese and in the Chinese case.

3.2.1.2. Evidence from unlisted companies

To the best of our knowledge there is only one paper looking at the capital structure of unlisted firms, that are not SMEs, and it is provided by Li *et al*. (2009) with the twofold scope of investigating the role of ownership structure and institutional development on leverage. This work is thus particularly relevant for our investigation, as our efforts not merely lie in understanding the effect of net trade credit on leverage, but also on specifically understanding its influence on the capital structure taking into account ownership and marketization heterogeneity.

The authors stress the uniqueness of the Chinese case, where the role played by government in financing decisions is relevant given its dual nature, first as the largest shareholder of state firms; and, second, as the owner of the four largest banks. This feature leads to the formulation of the first hypothesis, which predicts a positive relationship between firms' state ownership and leverage. Li *et al*. (2009) also argue that better legal rule and better protection of creditors are associated with more long-term debt financing. This leads to their second hypothesis, which predicts a positive association between the level of provincial institutional development and the access to long-term debt by local firms.

The authors rely on information on non-publicly listed manufacturing firms over the period 2000-2004. The dataset includes all state-owned enterprises (regardless of their sales) and other manufacturing firms with annual sales larger than five billion Yuan. After winsorizing the variables they are left with 417,068 firm-year observations.

The dependent variable is leverage, which can take three different forms. The first is measured as total liabilities over total assets. The second is short-term liabilities divided by total assets. The third is a dummy which takes a value of one if the firm has long-term liabilities in a specific year, and zero otherwise. Explanatory variables include firm size, profitability, asset tangibility, assets maturity, industry concentration, state ownership, foreign

ownership, and the marketization index, which captures the regional institutional development and it is supplied by Fan *et al*. (2010).

The results of the panel regression for the whole sample when the dependent variable is total leverage are supportive of the first hypothesis. Outcomes show that SOEs are inefficiently more highly levered, whereas the lower taxes associated with foreign ownership lead to lower leverage. When the dependent variable is short-term leverage, state ownership is no more significantly associated with the regressand, while foreign ownership is negatively related with the short-term debt ratio. In addition, firms located in provinces with high marketization are associated with high short-term debt ratios. When the dependent variable is the dummy for the use of long-term debt, a probit model is estimated and support for the first hypothesis is once again provided.

Results are instead not supportive of the second hypothesis as firms located in the provinces with high marketization are associated with a reduced access to long-term debt. Li *et al*. (2009) argue that this is the consequence of a threefold motive. First, credit institutions are required to monitor lenders, but due to their lack of credit management expertise, they are more inclined to offer and control only short-term debt. Second, when a province improves its marketization level, equity investors are more prone to offer long-term debt, rather than asking for it. Third, the improvement of the marketization level brings about a more strict legal environment and firms will be less inclined to ask for long-term loans because they are afraid of the negative consequences of default on outstanding loans.

3.2.1.2.1. Evidence from Small and Medium Size Enterprises

To the best of our knowledge, the first paper to look at the capital structure of private Chinese SMEs is provided by Newman *et al*. (2012), who observe whether existing theories on the financing behaviour of SMEs in developed economies, and elsewhere in the developing world, are applicable in China despite its peculiar institutional and cultural features. The authors formulate a set of hypotheses, connected with the predictions of both the static TOT and the POT. First, a positive association is expected between firm size and leverage. Second, a negative relationship is expected between profitability and leverage. Third, due to the large share of short-term debt on total debt in China, a negative relationship is expected between collateral and leverage.

The authors develop a cross-sectional regression, where the dependent variable can take the two forms: total and short-term leverage. The former is measured as total debt divided by total assets, whereas the latter is computed as short-term liabilities divided by total assets. Independent variables include size, profitability, tangibility plus a set of control variables.

The authors rely on firm-level data for over 1,536 SMEs in the Zhejiang Province for the period 2004-2005. Results of an OLS regression employed for each of the two years provide support for both the first and the second hypothesis but not the third. All variables are significant with the exception of collateral. Larger firms are more likely to obtain external finance in the long and in the short run, consistently with both the static TOT and the POT. Profitability shows a negative association with total and short-term leverage, an outcome that is more in line with the POT than with the TOT. More profitable firms rely mostly on internally generated funds and are less inclined to resort to external finance. There is instead no significant association between assets structure and both total- and short-term leverage,

which is in sharp contrast with the prediction of the third hypothesis and both the TOT and the POT.

Building on the research paths suggested in the previous article, Borgia and Newman (2012) enhance the traditional finance theories on the capital structure of the firm to understand how managerial characteristics affect Chinese SMEs' willingness and capability to borrow from external sources and thus reduce the information asymmetries with potential lenders.

In order to shed some light on the abovementioned relationship, a set of six hypotheses is developed. First, given the weak institutional quality and the related high agency problems, owner/managers will be reluctant to resort to external debt compared to SMEs in developed countries. Therefore a negative relationship is expected between the aversion to external control of the owner/manager, and leverage. Second, in developing countries such as China, the risk-taking propensity of the owner/manager is expected to be positively associated with leverage. Third, the growth intentions of the owner/manager are expected to be positively associated with leverage, despite the likely reluctance to access external finance for the management of Chinese firms, *ceteris paribus*. Fourth, the stronger the network ties of the SME owner/manager the higher the leverage in their capital structure. In a country like China the presence of network ties should supply information on firms' creditworthiness and reduce the high levels of asymmetric information between the company and its lenders. Fifth, the educational level of the owner/manager is expected to be positively associated with leverage, as higher levels of education may provide a positive signal to financiers on the ability to pay back the loan. Sixth, the managerial experience of the owner/manager should be positively related to leverage, as prior experience helps reducing the presence of information asymmetry.

The authors rely on data from 154 questionnaires filled in by CEOs in the Zhejiang Province in the year 2009.[102] The dependent variable is total leverage, measured as total debt divided by total assets. The explanatory variables include measures of aversion to external control, risk propensity, managerial growth intentions, managerial network ties, managerial experience and educational background.

By making use of a hierarchical regression, the authors are able to support the first two sets of hypotheses. No support is recorded, instead, for the third hypothesis and a surprisingly negative association between firm's network ties and total leverage is also detected, with a clear rejection of the fourth hypothesis. Managerial experience is positively related to leverage in line with the sixth hypothesis, but no support is detected for the fifth, indicating that the educational level does not impact the capital structure of firms.

In similar research, Du *et al.* (2015) analyze the degree to which firms can increase access to debt by pursuing choices directed at building social capital, e.g. entertaining and gift giving to others in their social network, but also aimed at establishing political connections. Despite this indirect approach, this research is useful to our investigation as the presence of heterogeneous forms of trust represent a possible factor driving how trade credit is perceived amongst business peers.

The authors argue that regular contact between firm representatives and others in their social network over a prolonged time span lets firms to transmit information about their solvency to potential lenders (either directly or indirectly) through network ties. One mechanism to ease access to outside funding is one based on the extension of credit by sponsors from feelings of loyalty or obligation to reciprocate behavior obtained from a given group or person in the past. In this respect, the use of entertainment and gift giving decreases

[102] 300 questionnaires were sent to a corresponding number of firms with 214 returned. Of those returned, 60 were discarded due to incomplete information on the key variables of the study, leaving 154 questionnaires.

asymmetric information between SMEs and their possible lenders. These elements lead the authors to hypothesize a positive association between entertainment and debt, not only total but also short- and long-term debt. Another mechanism that eases a firm's obtainment of external finance is instead based on political affiliation, i.e. whether a private firm has a *lishu* connection with the government at any territorial level. Even though such a *lishu* relationship does not provide any ownership right to the government, it supplies it with the legal authority to analyze the firm's activities and to control its structure. However, the *lishu* relationship allows the firm to obtain privileged treatment for example in terms of subsidies and lower tax rates.

The authors use information on a panel covering 65,485 industrial unlisted companies over the period 2000–2006, which correspond to 110,633 firm-year observations. From an empirical standpoint the authors develop a dynamic regression to account for firms' movement towards a target leverage ratio. The dependent variable takes three different forms of leverage, namely total leverage, short-term leverage and long-term leverage. The two key explanatory variables are entertainment expenditure and political affiliation. The model is estimated through an OLS technique for each of the three measures of leverage. Results show that while entertainment expenditure allows firms to obtain higher levels of total and short-term debt, it does not help companies to receive larger long-term debt in their capital structure. Conversely, political affiliation allows companies larger access to long-term leverage.

A related paper by Chen *et al.* (2014) uses a sample of more than 27,000 SMEs for the years 2003 and 2004 to study whether and how foreign equity investment influences the cost of debt.[103] The authors test two hypotheses. According to the first, foreign ownership lowers

[103] Although Chen *et al*. (2014) do not tackle directly the issue of the capital structure of Chinese unlisted firms, they provide clear and relevant results in that direction when foreign ownership and institutional development are involved.

the cost of borrowing when small businesses seek debt financing. The authors argue that foreign ownership signals better products, reputation, technology and management practices that the company in emerging countries can take advantage of. According to the second, the level of regional development interacts with foreign ownership to affect the cost of debt for SMEs, with a stronger relationship between foreign ownership and the cost of borrowing in more advanced regions.

The authors use a dependent variable that measures the marginal interest rate charged to borrowers, which serves as a proxy for the cost of debt financing. Independent variables include features to understand the role of foreign equity. First, a dummy that takes a value of one if a firm has foreign shareholders, and zero otherwise. Second, amongst firms that receive foreign equity investment, a dummy variable to measure if the foreign investors own more than 50 percent of the firm's equity, which takes a value of one if this is the case, and zero otherwise. Third, a continuous variable to measure the percentage of ownership held by foreign investors. In addition, the authors include a categorical variable that takes into account three different levels of the NERI marketization index, plus the yearly sales growth rate, liquidity, leverage, return on assets (ROA), age, firm size, and the number of employees.

The authors make use of a two-stage treatment effects model to address with potential endogeneity concerns. Results confirm the presence of a negative relationship between foreign ownership and the cost of borrowing especially in the most advanced provinces. The results complement the predictions of the POT as firms with foreign ownership located in the most developed provinces may provide a signal to credit institution and have easier access to credit and at a lower cost.

3.2.2. Studies on countries other than China: the role of trade credit

3.2.2.1. Evidence from unlisted firms: the case of Small and Medium Size Enterprises

Only a handful of articles explicitly address the role played by trade credit in shaping the composition of the capital structure in countries other than China.

A paper on the UK case is provided by Michaelas *et al.* (1999) who analyze the determinants of leverage choices by unlisted SMEs. They do not make use of just one theoretical prediction, but take the explanatory power of different frameworks to formulate testable hypotheses. Although it is not the main scope of the article, this is, to the best of our knowledge, the first paper to look at the relationship between trade credit and capital structure and as such, provides a relevant framework for our work.

One of the Michaelas *et al.* (1999) hypotheses is related to trade credit (which is measured as accounts payable minus accounts receivable scaled by total assets) and leverage.[104] The authors recall Chittenden and Bragg (1997), who stress that shareholders interests and long-term loans represent a limited share of a small firms' liabilities (as in the case of unlisted companies). There is thus less room to accept late payment of accounts receivable by increasing either equity or long-term debt. Therefore, the only two options SMEs can pursue are an increase in short-term bank borrowing, or to delay payments to creditors. A positive relationship between trade credit and leverage is thus expected.

Three different measures of leverage are employed, i.e. total debt to total assets, short-term debt to total assets, and long-term debt to total assets. The authors employ data from the profit and loss accounts and balance sheets for 3,500 sample firms for 10 years (1985 to 1996)

[104] The remaining hypotheses include the typical list of determinants used in the literature on the capital structure of the firms. These include size, collateral, taxes, expected growth, profitability, and age.

obtaining a set of 20,500 cases. Given the panel nature of the data, the authors make use of a least squares dummy variable model that satisfies the fixed-effects assumption. Results show that net trade credit takes the expected positive and significant sign for total debt, but also for short-term and long-term debt. The outcomes also indicate that trade credit is primarily financed by short-term rather than long-term finance.[105]

A more recent paper on the effect of trade credit on debt composition is provided by Degryse *et al.* (2012). Their article is focused on an examination of the impact of firm and industry characteristics on small firms' capital structure for Dutch SMEs. Similarly to Michaelas *et al.* (1999), Degryse *et al.* (2012) develop a set of hypotheses to look at firms' financing choices. The authors argue that trade credit is a proxy for liquidity, one of the components of firms' assets. Illiquid firms are less likely to receive bank credit as they have high bankruptcy costs. This is particularly important for SMEs, who have a limited contractual power to put pressure onto customers to pay their debts. Late payments can then

[105] Indirect indications on the role played by trade credit in firms' financing, but not as a separate determinant of leverage, and thus excluded from our literature review, are provided by Jõeveer (2013), de Jong *et al*. (2008), Cole (2011) and Lawless *et al*. (2015). Jõeveer (2013) aims at explaining debt composition for Western European firms, if leverage is measured in two different ways. The first one is the ratio between total debt and total assets, whereas the second one is the ratio between total debt over debt plus shareholders funds. The first measure captures non debt liabilities like trade credit. de Jong *et al*. (2008) analyse how firm- and country-level determinants affect firms' leverage decisions. The study makes use of information on 12,000 firms across 42 countries between the years 1997-2001. The dependent variable, leverage, is measured only by long-term debt, as short-term debt consists largely of trade credit which is a form of finance, they argue, affected by completely different determinants than leverage itself. They assert it is thus hard to interpret the total debt ratio if trade credit is part of it. Cole (2011) studies the use of credit by small U.S. SMEs employing data from the Federal Reserve Board's 1993, 1998 and 2003 Surveys of Small Business Finances. He shows that two in five firms use both bank credit and trade credit, pointing to the complementarity between the two. He also argues that his findings are consistent with the POT, but he does not explain leverage through trade credit leverage. Lawless *et al*. (2015) make use of firm-level survey data from the ECB's Survey of Access to Finance (SAFE) on Euro area SMEs between 2010 and 2013 to document the funding options employed across different countries and years. They show that trade credit is widely used, despite the relevant differences across countries, with a prevalence in the construction, industrial and trade sectors. Although the authors recall the explanatory power of the POT, no relation of causality is investigated between trade credit and leverage.
We wish to point out that in a later contribution, Cole (2013) makes use of same data employed in his 2011 study and introduces two dummy variables to capture, respectively, if the firm used trade credit and if so, if the payment occurred after the set deadline. The dependent variable is total leverage scaled by total assets whilst a set of firm characteristics is employed to test the POT and/or the TOT. He finds a complementarity and a substitution relationship between trade credit and bank credit depending on the selected year. However, he fails, from our point of view, to provide a thorough and satisfactory explanation on such association, thus his contribution is not part of the literature review.

be financed through net trade credit, computed as the difference between accounts payable and accounts receivable, scaled by total assets. Several reasons may explain why firms grant trade credit to their peers, and one is to help firms. Following Michaelas *et al.* (1999), the authors expect a positive relationship between trade credit and the debt level. A stronger impact is expected between trade credit and short-term debt than between trade credit and long-term debt.[106]

Three different measures of leverage are employed, i.e. total debt to total assets, short-term debt to total assets, and long-term debt to total assets. The authors make use of information on SMEs with less than Euro 20 million in sales between 2002 and 2005, giving an unbalanced panel of 99,031 firm-year observations. Given the panel nature of the data, Degryse *et al.* (2012) employ a fixed-effects model for the unobservable individual effects. Firm-level results on net trade credit support the hypotheses as they show a positive association with the level of total debt. Firms with low net trade credit have lower debt ratios. However, the empirical results show that the effect is only statistically significant and positive for short-term debt. This also supports the maturity-matching principle. When looking at industry-level results, the relationship between firm characteristics and debt levels varies significantly across sectors. The variations are most pronounced and significant for net trade credit, tangible assets, intangible assets, tax rate, and profitability. Moreover, trade credit shows the largest heterogeneity across industries.

Taking advantage of detailed information on various sources of debt, Bartholdy *et al.* (2015) conduct a meticulous test for pecking order behavior in medium-sized private Portuguese firms. Their purpose is twofold. First, they adapt the Shyam-Sunder and Myers (1999) analysis for the pecking order tests to determine whether there are specific breakpoints

[106] Similarly to Michaelas *et al.* (1999) the remaining set of hypotheses include the effect that size, collateral, profitability and growth opportunities play on leverage.

between funding sources as a firm's financing deficit changes. Second, to make pecking order financing decisions more appropriate for smaller firms, the authors analyze financing decisions between internal equity financing and four categories of debt: cheap trade credit, short-term and long-term bank loans, loans from other financial institutions, expensive trade credits and other expensive debt.

The authors make use of information on a sample that consists of 1,416 medium-sized private firms with 7,546 firm-year observations over the period 1990-2000. The authors hypothesize that the predicted pecking order for the Portuguese case should be internal equity, cheap trade credit, bank loans, credit from other financial institutions, overdrawn or expensive trade credit, and finally miscellaneous other debt. They argue that in a trade credit contract, the firm benefits from a discount if it pays within a certain time period, but it pays a penalty for late payments. Therefore, the firm can choose to cheap financing if it pays in due time and expensive financing if it delays payment. Theoretically, this distinction between cheap trade credit and expensive trade credit should be easily drawn according to the time when the payment is done. However, Portuguese balance sheets do not provide details about trade credits, thus the authors estimate the number of days, terms, and standard deviation of credit days for firms to obtain a cut-off point between the two types of trade credit in six different industries. If a fraction of the firms has to resort to external equity, then the relationship between the financing deficit for any firm at a given time will influence the change in debt, for any given firm at a given time, through a kinked relationship.[107] The location of the kink is not known and it is not clear if all firms have different debt capacities (i.e. face the same "kink"). For the Portuguese sample it is not feasible to jointly test for debt capacity and for a breakpoint. A kink is assumed to exist for each funding source Portuguese firms have access

[107] The financing deficit is defined as the sum of dividend payments, capital expenditures, the net increase in working capital, the current portion of long-term debt, but minus operating cash flows after interest and taxes.

to. The slope coefficient will be equal to one up to the breakpoint, and zero thereafter. After the breakpoint, the firm will move on to the next most desired source of funding.

Once the data are sorted by funding deficit, the authors estimate a regression for each source of debt funding, starting from the most preferred, cheap trade credit, till the least preferred, expensive trade credit. By making use of breakpoint tests they are able to confirm the pecking order financing predictions of breakpoints between funding sources.[108] Results not only on all firms, but also on those with positive funding deficits for each funding source are broadly consistent with a loose interpretation of the POT. Portuguese firms generally follow their financing choices along the pecking order, even if they do not completely consume each source before moving on to the next higher cost funding source.

3.2.2.2. Evidence from listed firms

Voutsinas and Werner (2011) analyze how financial constraints, especially in the supply of credit, affect the capital structure of Japanese firms, by explicitly addressing the role played by trade credit. Japan represents an ideal case study as a result of the large fluctuations in the supply of credit over the last 30 years. A large economic expansion is recorded during the '80s, but the asset "bubble" burst in 1991 lead to a prolonged recession associated with a credit crunch.

The authors are interested in numerous aspects of corporate capital structure, thus three different variables are examined: leverage, private debt and public debt. Leverage is measured as total debt scaled by total assets. Private debt is defined as the sum of short-term

[108] The authors make use of seemingly unrelated regressions (SUR), where the dependent variables are changes in the financing sources.

and long-term bank loans divided by total liabilities. Public debt is defined as the sum of long-term and short-term corporate bonds divided by total liabilities.[109]

In order to explain firms' financial policies decisions, the authors make use of a set of factors provided by the previous theoretical and empirical contributions in the realm of the capital structure. Trade credit is included as one of the potential determinants capable to shed some light on firms' leverage choice.[110] Trade credit, measured as the ratio between accounts payable and total assets, is expected to play a key role in the Japanese context, where a large amount of intra-firm ties are recorded, given the large extent of cross-shareholding.[111]

The analysis is undertaken on two overlapping data sets; one covering the land value bubble (1980–1999) and the other investigating the credit crunch (1990–2007). The authors make use of 1,537 publicly listed Japanese firms from 1980 to 2007, reaching 32,947 firm-year observations, and, estimate panel data regressions.[112] When looking at the broad measure of leverage, results show that during the 1980s, trade credit plays the role of a debt substitute and it carries a negative sign, no matter the definition of leverage employed. Conversely, during the credit crunch trade credit plays a different role: with the exception of long-term leverage, it supplies signals for the firms' quality levels as pointed out by Biais and Gollier (1997). This seems to be the explanation why trade credit is positively related with short-term

[109] For all of the three aforementioned variables, long-term and short-term values of debt are kept.
[110] The authors support their use of trade credit by recalling Atanasova and Wilson (2004) and Steijvers (2004) who, however, do not address the role of trade credit in the capital structure of the firms. More precisely, Atanasova and Wilson (2004), investigate the monetary transmission mechanism in the UK and find that net trade credit has a negative effect in the demand for loans for small and medium size firms. Steijvers (2004) concentrates on credit rationing for Belgian SMEs, companies that heavily rely on bank finance. He documents that trade credit is positively related to bank loans demand. He also shows that the use of more accounts payable compared to the amount of accounts receivable reduces the amount of short- and long-term bank credit offered.
[111] Additional explanatory variables include measures to capture the credit supply fluctuations, bank dependency, asset tangibility, profitability and non-debt tax shields.
[112] In order to choose between the random or the fixed effect estimator the authors make use of selected tests. If the Woolridge test has a value under 0.05 then first order autocorrelation is detected and the XTREGAR STATA command is used. If the Breusch-Pagan test has a value of under 0.05, then OLS are rejected. If OLS are rejected, then the Hausman test is run; if its value is under 0.05, then fixed effects estimators are employed; if not, then random effects are selected.

leverage. When looking at private debt, trade credit has, instead, a negative statistically significant sign on both data sets, pointing to a possible substitution between the two. An analogous association is recorded when looking at public debt, although with a smaller magnitude.

3.3. Our contribution: to what extent does trade credit affect the capital structure of Chinese unlisted companies?

The contribution of our paper is threefold. First, we investigate the extent to which trade credit affects the financial structure of Chinese unlisted companies. The previous literature analyzed almost exclusively the capital structure of listed Chinese firms (Zhang *et al.*, 2015; Wu and Yue, 2009; Chen, 2004; Huang and Song, 2006; Chen and Strange, 2005). To the best of our knowledge, Li *et al*. (2009) were the first to concentrate on the capital structure of unlisted firms, followed by a series of articles who focused only on SMEs, namely Newman *et al*., (2012), Borgia and Newman (2012), Chen *et al.* (2014) and Du *et al.* (2015).[113] Our research fills this gap as we explicitly investigate the extent to which net trade credit is associated with total, short- and long-term leverage. Trade credit could play an important role on the financing decisions of Chinese unlisted companies for signalling reasons. Along these lines, Biais and Gollier (1997) argue that "sellers extend trade credit to their customers only if they have received a good signal, and where the positive information contained in the availability of trade credit induces the bank to also lend, if it also has received a good signal. In this context, trade credit plays an important role [on improving the chances of buyers to

[113] It is worth stressing here that we are working almost exclusively with unlisted firms and that circa 65% of Chinese GDP is produced by SMEs (Chen *et al.*, 2014). These are mostly unlisted companies that typically suffer from more severe financing constraints than their listed counterparts.

access formal credit] because it is a credible way for the seller to convey its private information to the bank. If the seller is willing to extend trade credit, and thus to bear the default risk of the buyer, it must be that it has good information about the latter. On observing this, the bank updates positively its beliefs about the buyer, and therefore agrees to lend" (p. 905).[114] This argument is likely to be particularly relevant in the Chinese context, where financial markets are relatively underdeveloped and dominated by state-owned banks.

Second, given the considerable heterogeneity characterizing the Chinese territory, we differentiate the effect of trade credit on the capital structure of firms based on their location. In particular, we distinguish provinces according to their economic, financial, institutional and legal development, and examine whether the effects of net trade credit on firms financing decision differ across provinces.[115] We expect the signal associated with net trade credit to be larger in those provinces characterized by high levels of marketization. In these areas, a reduced government intervention, lower market distortions, a more evolved institutional and legal architecture allow business peers to fully appreciate and exploit the message embedded in net trade credit. Conversely, firms and banks in provinces with low levels of marketization may suffer from biases associated with non-market factors, such as political and social connections, which may alter the interpretation of the signal or even prevent from its delivery.

Third, as firms' total leverage in China is primarily short-term in nature, we analyse the extent to which trade credit affects short-term leverage only taking into account corporate ownership. We differentiate firms into private, foreign, and state owned plus collective. It is

[114] We are thus focusing on the demand side of trade credit, which has largely been neglected by the literature. A few notable exceptions are provided by Fabbri and Menichini (2010) and Giannetti *et al.* (2011), although they do not account for the role of trade credit in the capital structure of the firm.
The signalling role of trade credit is also claimed by Agostino and Trivieri (2014), who focus on Italian SMEs. Yet, they do not use net trade credit and they are thus unable to capture the net amount of short-term financing that firms obtain from their suppliers.

[115] The differentiation of provinces according to their marketization level is also considered by Zhang *et al.* (2015) in order to understand how economic and political uncertainty affects the leverage and trade credit of listed firms. However, these authors do not take into account the links between trade credit and leverage.

well known that private firms in China face constrained access to bank credit. These constraints are more limited for foreign companies and practically absent for state owned and collective enterprises (Allen *et al*., 2005; Guariglia *et al.*, 2011).

We expect the use of net trade credit by private firms to be positively related with short-term leverage as it provides a strong signal of credibility (Connelly *et al*., 2011) to their business peers and, indirectly to the banks (Biais and Gollier, 1997). We also expect a positive association between net trade credit and short-term bank loans for foreign firms, as the quality signal derives not only from trade credit itself, but also from the non-domestic nature of the ownership (Chen *et al*., 2014). Yet, we expect this association to hold only in the provinces with the highest level of marketization. This is due to the abovementioned features of the banking, institutional and legal framework which allow only in these areas for a transparent transmission and interpretation of the signal.[116]

3.4. Development of hypotheses

3.4.1. Net trade credit and leverage: hypotheses on the full sample

A key double aspect of Chinese firms' financing needs to be addressed. First, accounts payable over total assets are a relevant source of short-term finance. The mean value is equal to 8.80%, which represents 1/6 of the leverage ratio between 2003 and 2013 (Zhang *et al*., (2015). Second, the share of long-term debt to total debt is small, as reported in Zhang *et al*. 2015). Because shareholders' interests and long-term loans represent a small share of Chinese

[116] The different level of economic and institutional development across provinces and the relevance of ownership structures in the capital structure of unlisted companies is addressed by Li *et al*. (2009) although they do not address the role played by trade credit in shaping firms' financing decisions.

firms, especially unlisted ones, there is less chance to accept late payments by increasing either equity or long-term debt (Chittenden and Bragg, 1997, p. 29). The only two options offered to firms suffering from late payments – to survive and operate – are an increase in short-term bank borrowing, or a delay in payments to creditors. However, delaying payments to creditors cannot exceed a certain threshold, and an increase in short-term debt is expected when firms suffer from late payments, pointing to a first motive to why look at net trade credit in firms' balance sheets.[117] An additional explanation for the role of trade credit in the capital structure comes from Degryse *et al.* (2012) who argue that the difference between accounts payable and accounts receivable is a proxy for liquidity. Illiquid firms tend to have a lower likelihood of obtaining credit due to high bankruptcy costs. One should therefore expect a positive relationship between liquidity and leverage.

In the Chinese case the motive for looking at net trade credit is peculiar and the abovementioned explanations must be complemented with features taken from the signalling theory (Connelly *et al.*, 2011). As pointed out by Bias and Gollier (1997, p. 905), firms obtaining trade credit provide a signal of reliability and trustworthiness to the banking system.[118] Yet, we hypothesize that accounts payable and accounts receivable should not be taken into account separately, as the use of their difference is better able to express the overall effect of trade finance on the capital structure. We therefore follow Michaelas *et al.* (1999) who find that net trade credit, measured as account payable minus accounts receivable, over

[117] We thank Hans Degryse for his insight on this part. He argues that "…you can stretch late payments to some degree but if you do too much you would stop finding suppliers and might go out of business."
[118] Chen *et al.* (2014) stress that the higher the amount of accounts payable a firm is able to receive from its peers, the higher the perceived trustworthiness of the debtor and the higher its likelihood of receiving additional funds from credit institutions.

total assets, is positively associated with total and short-term leverage. We therefore formulate the following three hypotheses.[119]

H1a) Net trade credit is positively associated with total leverage

H1b) Net trade credit is positively associated with short-term leverage

H1c) Net trade credit has no significant association with long-term leverage.

3.4.2. Net trade credit and leverage: hypothesis on marketization

Large development gaps are identified across different Chinese provinces. Provinces located along the Coast show high levels of economic and institutional development, whereas those located in the rest of country perform much worse (Li *et al*., 2009). Although the latter have been targeted by large state intervention through investment in infrastructure, they still lag behind, in terms of institutional quality, rule of law and financial depth. Moreover, companies headquartered in different regions have diverse leverage (Huang and Song, 2006). Firms located in inland provinces may benefit from financial incentives thanks to policies targeted at developing those areas (Goodman, 2004). Conversely, coastal areas may enjoy from a more advanced banking sector and from a more pervasive presence of foreign banks, which could reduce the burden of financial constraints (Firth *et al*., 2009). At the same time, trade credit is likely to be more employed in the East than in the West given a larger degree of interfirm trust that features the former but not the latter areas (Wu *et al*., 2014; Yano and Shiraishi, 2016).

[119] Given that only a limited percentage of the firms in our sample have long-term liabilities (as we will pinpoint in Section 3.5), all our hypotheses for total leverage mirror those for short-term leverage, consistent with the strategy applied by Du *et al*. (2015).

Zhang *et al.* (2015) observe that institutional development is uneven across regions and provinces and notice that government intervention would mitigate the impact of economic policy uncertainty. This is of particular relevance for the linkage between trade credit and leverage. The authors document that the weight of trade credit in firms' financing increases with policy uncertainty and they argue that "firms tend to switch from bank loans (formal finance) to trade credits (informal finance) in the presence of increasing policy uncertainty" (Zhang *et al.*, 2015, p. 442). Moreover, firms from low marketized provinces appear to be less sensitive to economic and policy uncertainty. This finding indicates that government attempts to intervene to smooth the effect of economic and policy uncertainty (Zhang *et al*., 2015, p. 446-447) can protect areas that already suffer from economic, financial and institutional backwardness. This should limit the divide between the more advanced Coastal areas and the less developed Western provinces.

We also assume that firms obtaining trade credit provide a signal of reliability to the banking system. However, the signalling effect is perceived in different ways across different provinces. In more developed and institutionally mature provinces, net trade credit will provide a strong positive signal of the fact that the firm is creditworthy. It will therefore make it easier for the firm to obtain bank credit. Conversely, in provinces with limited economic and institutional development, net trade credit will not necessarily be perceived as a good signal. This is due to the prevailing role of non-market factors which will limit the strength of the signal or even distort it (Chen *et al.*, 2014, p. 699). A key advantage of observing provinces on the basis of their marketization level (i.e. their degree of economic, financial, institutional development)[120] and not only on their mere geographical location lies on the dynamics that affects the former with respect to the latter. The degree of province

[120] A definition of the NERI index, which defines the level of marketization is provided in Section 3.5.2.

marketization may evolve during time and thus affects the behavior of the firms under scrutiny in a selected area.

On the basis of these arguments, we formulate the following hypothesis

H2) Net trade credit is positively associated with total and short-term debt *only* for firms located in the provinces with high marketization.

3.4.3. Net trade credit and leverage: hypothesis on firms' ownership

We turn our attention on the role trade credit plays in shaping the short-term leverage decision across firms owned by different agents. Private firms suffer the most from the presence of financial constraints in China (Guariglia *et al*., 2011, Ding *et al*., 2013). Given the relatively underdeveloped financial and banking system, commercial bank loans cannot satisfy firms' overall financing demands, and private firms need to resort to trade credit to meet their financial requirements (Zhang *et al.*, 2015). In this respect it becomes relevant to understand how trade credit and leverage are related. Some controversy exists on the complementarity/substitution between trade credit and formal finance. Some authors see trade credit as an alternative to bank credit (e.g. Atanasova and Wilson (2004) and Steijvers (2004)). Others argue, instead, that trade credit signals the quality of the firm, and predict a positive association between the two variables (Biais and Gollier, 1997). We support the idea that in the Chinese case, the reliability and creditworthiness signal transmitted through net trade credit is particularly relevant for private firms as trust and social capital represent a peculiar feature in inter-private firms relationships (Wu *et al*., 2014). Furthermore, taking into account the arguments discussed in the previous Subsection, we expect this association to

only appear for firms located in provinces with high level of marketization. Similar arguments apply to foreign firms, which have also been shown to suffer from financing constraints (Guariglia *et al*., 2011; Ding *et al*., 2013).

As state owned, and collective firms have been shown not to suffer from significant financing constraints (Guariglia *et al*., 2011; Ding *et al*., 2013), we do not expect their trade credit to significantly affect their leverage, regardless the province in which they are located. This leads to the following hypotheses:

H3a) Net trade credit is positively associated with short-term debt for private and foreign firms

H3b) Net trade credit is positively associated with short-term debt for private and foreign firms only if located in provinces with high marketization levels.

3.5. Research methodology and variables

3.5.1. Baseline specification

In order to test our hypotheses, we rely on the specification developed by Degryse *et al.* (2012) with additional insights from Chen (2004), Chen and Strange (2004), Huang and Song (2006), and allowing for persistence in leverage following Benishay (1968). Benishay (1968) analyses how trade credit is affected by short-term debt and argues that the current amount of trade credit is largely dependent on the amount available in the previous period. We argue that formal finance, i.e. leverage, at the current time, is largely dependent on the previous amount of leverage of the firm. The inclusion of the lagged dependent variable allows us to check for

the speed of adjustment towards a target level of leverage (Qian *et al*., 2009). We claim that the use of a dynamic model helps to better tackle the analysis of the capital structure of Chinese firms, as in the presence of corporate taxes, companies are able to increase their value by leveraging. Since debt interest is tax deductible, a rise in debt determines a higher cash flow due to interest tax shields. There is a trade-off between the costs and benefits of leverage which pushes the firm to reach an optimal level of debt. The optimal level is the maximum value of the firm given a level of operating cash flows. However, rebalancing leverage generally involves costs. Due to the presence of non-negligible transaction costs associated with the relatively underdeveloped nature of the Chinese financial system, the adjustment speed towards a target level of leverage may be lengthier than that required in developed countries.[121] We therefore estimate the following model:

$$TOTALDEBT_{it} / LONGDEBT_{it} / SHORTDEBT_{it} = \beta_0 + \beta_1 TOTALDEBT_{i(t-1)} / LONGDEBT_{i(t-1)} / SHORTDEBT_{i(t-1)} + \beta_2 SIZE_{it} + \beta_3 AGE_i + \beta_4 COLL_{it} + \beta_5 ROA_{it} + \beta_6 INTANG_{it} + \beta_7 TAX_{it} + \beta_8 DEPREC_{it} + \beta_9 FOWNS_{it} + \beta_{10} NETTC_{it} + \nu_j + \nu_t + \nu_p + \nu_o + e_{it;} \quad (1)$$

where i indexes firms and t years. The three dependent variables are respectively $TOTALDEBT_{it}$, $LONGDEBT_{it}$ and $SHORTDEBT_{it}$. The first is the ratio of total debt (net of accounts payable) over total assets. The second one is the ratio of long-term debt (net of accounts payable) to total assets.[122] It encompasses noncurrent liabilities that have maturity

[121] Larger publicly listed firms show faster convergence as they can relatively easily access to both bond and equity markets compared to their unlisted peers (Qian *et al*., 2009).

[122] Trade credit can also be long-term. Ge and Qiu (2007) study the relationship between bank credit and trade credit for a sample of 570 Chinese firms over the period 1994-1999. They define the payments made more than 30 days after delivery as long-term trade credit. Twenty percent of the firms in their sample report that they did payments more than 30 days after delivery.
Yano and Shiraishi (2016) look at which form of trade credit finances corporate activities of Chinese non-SOEs. They make use of information obtained from interviews with managers of more than 200 firms over the period

over a year. $SHORTDEBT_{it}$ is the ratio of short-term debt (net of accounts payable) to total assets. It refers to current liabilities that have less than one year of maturity.[123]

On the basis of the TOT firms will rebalance their capital structure only when the costs of deviating from the target level are higher than the adjustment costs. According to the TOT, firms put value on the target level of the leverage ratio, and deviations from the target level are likely to be transitory. However, if firms do not attribute much relevance to their leverage ratios, then the correction of the capital structure towards the optimal level due to a shock (external event) might be slow, or even not take place at all. In fact, according to the POT, firms are unlikely to quickly offset the effect of the shock, as it is assumed that there is no target leverage ratio.

The two theories therefore have different predictions on the presence and the size of the speed of adjustment. In addition, the institutional setting of the economy may contribute to determine if, and with at speed, a firm rebalances its capital structure towards a target level. Whether or not this adjustment process is finalized in a given time frame depends on the degree of rationality of the firm and on the costs and benefits that the adjustment process brings about. Qian *et al*. (2009) argue that in the Chinese context, publicly listed firms that underwent a process of reform starting from 2005 are still state-dominated, and that soft budget constraints are still in place. However, the more power the private management acquires over time, the higher is the incentive to increase leverage, "as a way to project their increased controlling power" (Qian *et al*., 2009, p. 665). Therefore, the leverage ratio may deviate from the optimal value, but as the reform process continues firms will start to operate

1998-2007. According to their field survey, the majority of their credit terms ranges between two weeks and three months. Yet, they also argue that it appears relevant to understand how frequently a credit can be rolled over to become long-term trade credit. They argue that three years is a likely maximum amount of time for rolling over (Yano and Shiraishi, 2016, p. 65).

[123] All leverage variables (total, long- and short-term) are scaled by total assets. This is a normalization in line with the literature (Rajan and Zingales, 1995; Faulkerden and Petersen, 2006).

as neo-classical agents and aim to smoothly reach the target level. Given these premises, we expect a positive and significant value of the lagged dependent variable despite the fact that we are only looking at unlisted companies. In fact, these firms face larger transaction costs than listed firms, as their access to bank finance is much more constrained and they are unable to resort bond financing.

Our key variable of interest is $NETTC_{it}$, measured as the difference between accounts payable and accounts receivable, scaled by total assets. The higher the (net) amount of credit the firm receives from its peers, the higher the perceived trustworthiness it signals to lending institutions. This enables it to increase its leverage.[124] Therefore, in order for our H1a to be supported, we expect β_{10} to have a positive sign. Chinese firms rely almost exclusively on short-term debt. Thus, in order for our hypotheses H1b to hold, we expect β_{10} to have a positive sign. Finally, hypothesis H1c suggests net trade credit does not to influence the use of long-term leverage.

In addition to the lagged dependent variable and to the key regressor, eight additional variables are included in our model as control variables. $SIZE_{it}$, is measured by total real assets. Both the TOT and the POT predict a positive relationship between size and leverage (Fama and French 2002; Michaelas *et al.* 1999; Cassar and Holmes 2003; Sogorb-Mira 2005, Huang and Song, 2006, Du *et al.*, 2015). We thus expect that firm size will be positively associated with total, short-term and long-term debt. AGE_i, is proxied by the number of years since the establishment of the firm and a positive relationship is expected with all three measures of leverage. Previous studies indicate that older firms present higher levels of

[124] Degryse *et al.* (2012) and Michaelas *et al.* (1999) find a positive association between net trade credit and leverage for SMEs, especially in the short-term, suggesting that firms suffer from late payments and have to resort to bank finance. Even if that would be the case for the Belgian and the UK firms, we claim that in the Chinese context the complementarity between accounts payable and bank credit derives mostly from the signal embedded in net trade credit, rather than from the effect of late payments

leverage and a better access to bank financing (Berger and Udell, 1998; Li *et al*., 2009; Newman *et al*., 2012).

$COLL_{it}$ is the ratio between tangible fixed assets and total assets and it is used to measure asset structure. According to both the TOT and the POT, asset tangibility is positively related to leverage, as it is a means to reduce the confidence gaps between prospective borrowers and lenders in a context of information asymmetries. In China a negative (positive) influence of asset structure on short-term (long-term) leverage is recorded (Newman *et al.*, 2012). In a similar fashion, Li *et al*. (2009) find a negative association between collateral and both total and short-term debt, but a positive association between tangibility with long-term debt for a sample of unlisted firms similar to ours. In fact, tangible assets can be liquidated in the long- but not in the short-run (Frank and Goyal, 2009) and this explains our expectation of collateral being negatively associated with total and short-term debt, and positively related with long-term debt.

ROA_{it}, computed as the ratio of profit before taxes and extraordinary items over total assets, is our proxy for profitability. The POT predicts a negative relationship between profitability and leverage (Ang, 1992; Michaelas *et al.*. 1999; Sogorb-Mira 2005). In fact, under conditions of asymmetric information companies will prefer internal to external sources of finance in order to minimise interference with ownership. However, no agreement exists when we disentangle long-term from short-term debt. Short-term debt can be paid back more easily and brings higher interest rates. This suggests a stronger impact on short-term debt, which is corroborated by several studies on SMEs (Van der Wijst and Thurik 1993; Cassar and Holmes 2003; Sogorb-Mira 2005). Following these studies, we expect profitability to be negatively related to leverage, with a greater negative effect on short-term than long-term debt.

INTANG$_{it}$ is a proxy of growth opportunities, measured by the ratio of intangible fixed assets to total assets (Degryse *et al*., 2012). Agency theory predicts a negative relationship between intangible assets and leverage, as firms with more intangible assets are likely to borrow less to avoid excessive monitoring costs. The POT suggests a positive relationship, as firms with more intangible assets should issue debt to mitigate the presence of information asymmetries (Harris and Raviv, 1990). The relationship between intangible assets and both short-term and long-term leverage has been found to be positive by Degryse *et al.* (2012) and Michaelas *et al.* (1999) (who focus on Belgian and UK firms respectively). Thus, we expect growth opportunities to be positively associated with leverage, although no *ex ante* prediction can be formulated on the relationship with short- and long-term debt.

TAX$_{it}$ is the ratio of income tax to the amount of profit before taxes and extraordinary items. A positive relationship between the tax burden and the amount of leverage is expected. *Ceteris paribus*, the higher tax rate will reduce the cost of debt capital (Modigliani and Miller, 1963; Miller 1977), a relationship confirmed by the results of Huang and Song (2006) for Chinese listed firms.

DEPREC$_{it}$, calculated as the ratio between depreciation and total assets is our measure of non-debt tax shields. The TOT predicts a negative relationship between depreciation and leverage (DeAngelo and Masulis, 1980). Prevailing literature finds a negative association (e.g., Huang and Song, 2006; Sogorb-Mira, 2005; MacKie-Mason, 1990). We thus expect a negative relationship between non-debt tax shield and leverage, but we are not able to formulate predictions for long-term and short-term debt.

$FOWNS_{it}$ is computed as the percentage of capital owned by foreign investors.[125] According to Li *et al*. (2009), the presence of foreign capital may provide internal flows of foreign finance. We therefore expect to observe a negative association between $FOWNS_{it}$ and leverage.

The error term is made up of five components. v_j is an industry-specific effect, which we take into account by including two-digit industry dummies, which control for industry-specific characteristics. v_t is a time-specific effect, which we control for by including time dummies capturing business cycle effects in all our specifications, v_p is a province-specific effect, which we control for by including a full-set of province dummies, v_o is an ownership-specific effect which we control for by including ownership dummies for private, foreign, state-owned enterprises and collective firms. e_{it} is the idiosyncratic error term.

3.5.2. The effects of marketization

We next make use of the NERI index devised by Fan *et al*. (2010) to describe the extent to which provincial heterogeneity affects the relationship between net trade credit and corporate financing decisions. The index is built from the premise that disparities in economic performance across provinces may depend on differences in economic policies and the quality of institutions. The indicator is called "Marketization Index for China's Provinces" and it comprises 19 components across the following five areas: 1) size of the government in the regional economy; 2) economic structure, mainly concerning the growth of the non-state sector and the reform of the state enterprises; 3) inter-regional trade barriers, including the

[125] Companies with foreign investment benefit from a tax holiday during their first two years of establishment, and then face a reduced tax burden of 7.5% for the next three years (Chen and Strange, 2005). Please note that this variable will not be used in the regression for foreign firms.

price control; 4) factor-market development, including factor mobility; and 5) legal frameworks.[126]

Two steps are taken to construct the actual components into a "summary" index. The first is to transform all 19 variables into a 0-to-10 scale, whereas the second is to determine the "weights" for each component by making use of a principal-component analysis. The index and all components are measured with a 0-10 scale. Each province gets an index value between 0 and 10 based on the values taken by all sub-components of the index. The index measures the relative position of a selected province in the progress towards a market economy compared to the progress of other provinces.

In our analysis we make use of the index provided for each province for each year between 2004 and 2007, and we subsequently create a ranking of the provinces for each year. We next construct a categorical variable aimed at identifying if in a given year, a given firm is located in a province that lies in the top third, the middle third, or the bottom third of the distribution of NERI index for all provinces in that year. More precisely we create three dummy variables, namely $NERIDUMHIGH_{it}$, $NERIDUMMEDIUM_{it}$ and $NERIDUMLOW_{it}$. $NERIDUMHIGH_{it}$ is a dummy that takes value of 1 at time *t* if firm *i* is located in a province placed above the 66th percentile of the distribution of the NERI index of all provinces in that same year, and zero otherwise. $NERIDUMMEDIUM_{it}$ is a dummy that takes value of 1 if firm *i* is located in a province placed between the 33th and the 66th percentile of the distribution of the NERI index for the provinces at time *t*, and zero otherwise. $NERIDUMLOW_{it}$ is a dummy

[126] The role of the government includes the proportion of resource allocation by market, the extra-financial burden on farmers, and the business costs of dealing with government control. The economic structure includes the non-state sectors in GDP, the non-state sectors in total fixed investment and the non-state sectors in urban employment. Free inter-regional trade includes price control on retail goods, price control on production goods, price control on agricultural goods, non-price trade barriers. The development of factor market includes banking sector structure, allocation of financial resource in state vs. non-state sectors, environment for foreign direct investment, immigrating workers as percentage of total employment and the ratio of immigrating workers over provincial GDP. The legal framework includes development of intermediate institutions, legal protection of trade marks, the ratio of patent application over GDP and the ratio of patent registration over GDP.

that takes value of 1 if the firm *i* is located in a province placed below the 33th percentile of the distribution of the NERI index for the provinces at time *t*, and zero otherwise.[127]

In order to test our Hypothesis H2 we interact our $NETTC_{it}$ variable in turn with these dummies and estimate the equation below.

$$TOTALDEBT_{it} / LONGDEBT_{it} / SHORTDEBT_{it} = \beta_0 + \beta_1 TOTALDEBT_{i(t-1)} / LONGDEBT_{i(t-1)} / SHORTDEBT_{i(t-1)} + \beta_2 SIZE_{it} + \beta_3 AGE_i + \beta_4 COLL_{it} + \beta_5 ROA_{it} + \beta_6 INTANG_{it} + \beta_7 TAX_{it} + \beta_8 DEPREC_{it} + \beta_9 FOWNS_{it} + \beta_{10}(NETTC_{it} * NERIDUMHIGH_{it}) + \beta_{11}(NETTC_{it} * NERIDUMMEDIUM_{it}) + \beta_{12}(NETTC_{it} * NERIDUMLOW_{it}) + \nu_j + \nu_t + \nu_p + \nu_o + e_{it;} \quad (3.2)$$

In provinces where the level of economic and institutional development is the highest, bank lenders will put weight on firms' quality and the signal associated with net trade credit will be transmitted with no interferences. Therefore, if H2 is supported, β_{10} will be positive and significant, whilst β_{11} and β_{12} will be either negative or not significant.

3.5.3. The role of ownership

Given the important share of short-term debt to total leverage for the Chinese context, we wish to check how net trade credit affects the access to short-term debt only for private firms, foreign companies and SOEs together with collective firms. Private firms are those that are thought to suffer the most from restricted access to bank finance (Guariglia *et al*., 2011, Ding *et al*., 2013), but also those for whom we assume the signal of creditworthiness to bear more relevance. Foreign owned firms have the possibility to resort to internal flows of funds, but

[127] A full list of the provinces included in each categorical variable for each year is provided in Appendix 3A.

the signalling effects is still in place and reinforced by the non-domestic nature of the ownership (Chen *et al*., 2014). SOEs and collective companies enjoy from political connections and do not need to send a signal to obtain bank credit (Li *et al*., 2009). We thus estimate a version of the previously described Equation (3.1) which tries to explain only short-term debt, and separately for firms owned by different agents.

$$SHORTDEBT_{it} = \beta_0 + \beta_1 SHORTDEBT_{i(t-1)} + \beta_2 SIZE_{it} + \beta_3 AGE_i + \beta_4 COLL_{it} + \beta_5 ROA_{it} + \beta_6 INTANG_{it} + \beta_7 TAX_{it} + \beta_8 DEPREC_{it} + \beta_9 FOWNS_{it} + \beta_{10} NETTC_{it} + \nu_j + \nu_t + \nu_p + e_{it} \quad (3.3)$$

In order for our hypothesis H3a to be supported we expect β_{10} to bear a positive and significant sign for the samples of private firms and foreign enterprises, but we expect no significant effect for net trade credit when considering SOEs and collective firms. Finally, in order to take into consideration the effects of marketization we estimate the following modified version of Equation (3.3) separately for firms owned by different agents.

$$SHORTDEBT_{it} = \beta_0 + \beta_1 SHORTDEBT_{i(t-1)} + \beta_2 SIZE_{it} + \beta_3 AGE_i + \beta_4 COLL_{it} + \beta_5 ROA_{it} + \beta_6 INTANG_{it} + \beta_7 TAX_{it} + \beta_8 DEPREC_{it} + \beta_9 FOWNS_{it} + \beta_{10}(NETTC_{it} * NERIDUMHIGH_{it}) + \beta_{11}(NETTC_{it} * NERIDUMMEDIUM_{it}) + \beta_{12}(NETTC_{it} * NERIDUMLOW_{it}) + \nu_j + \nu_t + \nu_p + e_{it} \quad (3.4)$$

Hypothesis H3b predicts a positive β_{10} coefficient for private and foreign firms. β_{11} and β_{12} are expected to be insignificant. By contrast, for state owned and collective firms, β_{10}, β_{11} and β_{12} are all expected to be insignificant.

3.5.4. Estimation methodology

Given the short nature of the time span of our panel, we estimate all our equations using the system GMM estimator developed by Blundell and Bond (1998). This enables us to control for unobserved firm-specific heterogeneity, as well as for the possible endogeneity of all of our regressors. The system GMM estimator combines in a system the equation in first-differences with the equation in levels. A notable enhancement in efficiency and a significant decrease in finite sample bias compared with the simple first-differenced GMM is observed by Blundell and Bond (1998) when adding the original equation in levels to the system and taking advantage of the additional moment conditions. We treat all the regressors in our equations (except age) as endogenous and instrument them using their lagged levels in the differenced equation, and their lagged differences in the levels equation.

The dynamic model specifications that we estimate can only be applicable if they are exempt from serial correlation in the first-differenced residuals. In the presence of serial correlation of order *n* in the differenced residuals, the instrument set for the equation in first-differences needs to be restricted to lags *n + 1* and deeper (Brown and Petersen, 2009; Roodman, 2009). We assess the presence of n^{th}-order serial correlation in the differenced residuals using the *m*(*n*) test (AR *p*-value), which is asymptotically distributed as a standard normal under the null of no n^{th}-order serial correlation of the differenced residuals. Yet, the *m2* is not available given the short time dimension of the panel.

The validity of the instruments can be tested using the Hansen/Sargan statistics (or *J* statistics). Yet, according to the Monte Carlo outcome recorded by Blundell *et al.* (2000), the Sargan test has a tendency to over-reject the null hypothesis of instrument validity if the

system GMM is employed to estimate a production function on a large panel data.[128] Taking stock of the size of our panel, we are inclined to pay negligible attention to the *J* test.

3.6. Data and descriptive statistics

Information on unlisted companies are drawn from the annual accounting reports filed by industrial firms with the Chinese National Bureau of Statistics (NBS) over the period 2004-2007. All state-owned enterprises and other types of enterprises with annual sales of five million yuan (about $650,000) or more are covered. These firms operate in the manufacturing and mining sectors and come from 31 provinces or province-equivalent municipal cities. We drop observations with negative sales, as well as observations with negative total assets minus total fixed assets, total assets minus liquid assets, and accumulated depreciation minus current depreciation. We also drop firms that do not have complete records for our main regression variables. To control for the potential influence of outliers, we exclude observations in the one percent tails of all regression variables (with the exception of dummy variables). This process is meant to remove the potential bias that may arise in the regression if abnormal values of the variables of interest are included. Our final unbalanced panel is made up of 119,148 observations.

The NBS data entails a continuous measure of ownership, which is based on the fraction of capital paid-in by four different types of investors. Using the majority rule, we define four different ownership types, namely private, foreign, state-owned, and collective companies. Following Guariglia *et al.* (2011), we group investors from Hong Kong, Macao

[128] Consistent with this, Nickell and Nicolitsas (1999) also show significant Sargan test statistics for all their estimation results. Similarly, Benito (2005), Benito and Hernando (2007), and Becker and Sivadasan (2010) show the *J* statistics for a large part of their outcomes.

and Taiwan and other countries in the category of foreign companies.[129] In the present investigation we also group state-owned enterprises and collective companies, as the latter is a small category whose behaviour mimics the former when it comes to investment choices (Xia *et al*., 2009).

3.6.1. Summary statistics

Table 3.1 shows the descriptive statistics for the full sample. Table 3.2 is the correlation matrix. Table 3.3 provides summary statistics for the firms located in provinces with different levels of marketization. Table 3.4 provides summary statistics for firms owned by different agents. [130]

We first look at the result of Table 3.1 for the full sample. $TOTALDEBT_{it}$, takes a value of 0.40, i.e. total debt accounts for 40% of total assets. This ratio is largely lower than the 56.7% recorded by Li *et al*. (2009) for unlisted firms between 2000 and 2004, and the 58.7% registered by Du *et al*. (2015) for SMEs between 2000 and 2006. It is instead closer to the 44.82% shown by Huang and Song (2006) for listed firms between 1994 and 2003 and to the 46% shown by Borgia and Newman (2012) for a small sample of Chinese SMEs in the Zhejiang Province in 2009. Table 3.2 indicates that the majority of firms' leverage is $SHORTDEBT_{it}$, as it accounts for 35.7% of total assets, whilst $LONGDEBT_{it}$ represents only 8.6% of all firms' assets. These figures are consistent with Chen (2004) and Bhabra *et al.* (2008) who analyse listed firms, and with Li *et al*. (2009), Chen *et al.* (2014) and Du *et al.*

[129] The characteristics of the firms belonging to the four different ownership groups are described in Ding *et al*. (2013).

[130] A complete definition of all variables described here is provided in Appendix 3B. Appendix 3C provides descriptive statistics for firms owned by different agents, located in provinces with different levels of marketization. The results of a two-tailed Welch two sample t-test on the difference between the means of variables reported in Table 3.3 and Table 3.4 are not reported for the sake of brevity but are available from the authors upon request. This also applies to Tables 1C, 2C and 3C reported in Appendix 3C.

(2015) who study unlisted companies. In all these three examples, short- term debt represents the largest share of total debt. It is also noteworthy to emphasize that current liabilities and non-current liabilities represent, respectively, 89.04% and 8.74% of total liabilities in our sample.[131]

The average value of $NETTC_{it}$ is negative and equal to -0.054, which means that there is a slight prevalence of trade credit extended over trade credit received. This figure differs from the corresponding values of 0.056 and 0.046 observed by Michaelas *et al.* (1999) and Degryse *et al.* (2012), respectively for UK and Belgian firms. These differences could be explained by a fivefold set of motives. First, as private firms face constraints in their access to bank finance (Guariglia *et al*., 2011), they may use the extension of trade credit as tool to maintain a domestic market share when they are in financial distress (Petersen and Rajan, 1997). Second, the domestic expansion implies extending risky trade credit to less-reliable counterparties and the bargaining power of large firms shifts the balance against small firms. SMEs selling only at the domestic level will grant much more trade credit to their clients than the amount they receive from their suppliers (van Biesebroeck, 2014). Third, the large presence of SOEs in the Chinese economy is also determinant (Allen *et al*., 2005). In fact, Cull *et al*. (2009) show that trade credit extension is positively associated with state ownership: SOEs exploit their political power to force their suppliers to grant trade credit (Yano and Shiraishi, 2010). Fourth, we make use of a different time span than that covered by the works of Michaelas *et al*. (1999) and Degryse *et al*. (2012). The former analyses data for 1995, whereas the latter makes use of information over the years 2002-2005. Fifth, we focus on a large transitional economy, whereas Michaelas *et al*. (1999) and Degryse *et al*. (2012) study two European developed nations.

[131] The sum of the two does not lead to 100% due to the likely presence of other non-recorded residual liabilities and possible mistakes in the building-up and processing of the original database in China.

The firms in our sample are on average 12.21 years old (AGE_i) and their $SIZE_{it}$ is about 0.808 million Yuan. $COLL_{it}$ represents 32.7% of total assets. This value is consistent with the majority of the previous studies. It is indeed almost identical to the one recorded by Du *et al.* (2015) for Chinese SMEs (32.2%) and by Huang and Song (2006) for listed firms (32.2%), and only slightly smaller than then the 34.8% recorded by Li *et al*. (2009). ROA_{it} takes an average value of 7.4%, which is higher than the 3.4% recorded by Zhang *et al.* (2015), the 5.83% recorded by Huang and Song (2006) and the 2.38% by Chen and Strange (2005), who all look at Chinese listed companies. The value is also higher than the 4.4% recorded on unlisted companies by Li *et al*. (2009), but almost identical to the 7.5% recorded by Du *et al.* (2015) between 2000 and 2006. It is higher than the 6% recorded by Chen *et al.* (2014) who focus on SMEs for the years 2003 and 2004. This ratio thus points to an allegedly higher profitability of unlisted than listed companies. Similar figures for profitability (6.9%) are recorded by Michaelas *et al.* (1999) from 1988 and 1995 for UK SMEs. The proxy for growth opportunities is given by $INTANG_{it}$, which takes a 2% value, lower than the 4.93% recorded by Chen and Strange (2005) in their analysis of listed firms for the 2003. The value is instead similar to the 3.47% recorded by Sogorb-Mira (2005) on Spanish SME between 1994 and 1998, and very close to the 1.7% reported by Degryse *et al.* (2012). These similarities between our sample and the studies on SMEs in developed nations may point to an underdeveloped use of tools that could foster growth, such as patents and copyrights. The variable TAX_{it} takes a value of 15.9%. A similar percentage, 16.57%, is recorded by Huang and Song (2006), and a slightly higher value, 19.27%, is recorded by Chen and Strange (2005), both looking at listed firms. This indicates a level of tax burden comparatively lower than those recorded in developed nations, as recorded by de Jong *et al*. (2008).[132] Yet, the

[132] de Jong *et al*. (2008, pp. 1957-1958) make use of information provided by Compustat Global, where tax rate

digits are in line with those of Asian developing countries (Demirgüç-Kunt and Maksimovic, 2001, p. 92). The proxy for non-debt tax shield, $DEPREC_{it}$, takes a value of 2.6%. This value is slightly higher than the 1.92% recorded by Huang and Song (2005) for Chinese listed firms, but much larger than the value of 0.03% recorded by Du *et al.* (2015) for Chinese SMEs. $FOWNS_{it}$, the percentage of shares owned by foreign investors, takes an average value of 22.7%, i.e. almost one quarter of the capital is owned by a foreign investors. This value is higher than the 18% registered by Li *et al*. (2009) between 2000 and 2004 and larger than the 11% recorded by Chen *et al.* (2014) for Chinese SMEs in 2003 and 2004, which may point to an increased attractiveness of unlisted companies in more recent years. It is also higher than the figure reported for listed firms between 2004 and 2010 in Dixon *et al.* (2015) (4%), which could indicate a preference of foreign investors for non-publicly listed companies due to less stringent regulations.

Focusing on Table 3.3, which reports the descriptive statistics for firms located in provinces with different levels of marketization, we notice that provinces with the highest level of NERI account for the majority of the observations in the sample, namely 76.82%. Observations for the firms located in the provinces with the intermediate and low level of NERI, account for the 16.73% and the 6.45% of the total, respectively. The key variable of interest, $NETTC_{it}$, always takes a negative value. A prevalence of trade credit extended over trade credit received is recorded by Wu *et al*. (2014). They do not study the capital structure of Chinese firms but analyse the role of trust in the use of trade credit for 659 non-state listed Chinese listed firms over the period 2003-2008. The authors find that the mean values of accounts payables over total assets and accounts receivables over total assets are 9.61% and 12.61%, respectively. In a telephone contact with one of the authors, Oliver Rui on July 20th,

is defined as total income taxes divided by pre-tax income. For example, France, Germany, Italy, Japan, the UK and the US, show tax rate equal to 26.07%; 31.03%, 32.99%, 38.83%, 21.20%, 24.90%, respectively.

2016 he argues that the prevalence of accounts receivable over accounts payable (both scaled by total assets) should be normal feature firms in any country. He also states that the difference between accounts receivable and accounts payable describes the behaviour of working capital in China as trade credit extended and received are, he argues, the main components of current assets and current liabilities. Moreover, $NETTC_{it}$, becomes larger, in absolute value, the higher the level of marketization. This points to a prevalence of accounts receivable over accounts payable when the economic and institutional development increases. According to Oliver Rui, this is not only a consequence of higher access to bank credit in provinces with higher NERI, but also of the increased inter-firm trust that is a feature of such provinces.[133]

The values of $TOTALDEBT_{it}$, $LONGDEBT_{it}$ and $SHORTDEBT_{it}$ are not particularly different from those recorded in the full sample. As far as control variables are concerned, we observe that firms are larger, older and have more collateral the lower is the level of marketization. These are the features that allow firms, of any ownership, to receive credit by financial institutions and business peers in an environment with poor economic, financial and institutional development, and where inter-firm trust is low (Yano and Shiraishi, 2016, p. 67). Moreover, firms located in these areas are predominantly SOEs that often operate in heavy industries, in which collateral represents the largest part of assets. Conversely, the higher the level of marketization the higher is the profitability, the tax burden, the non-debt-tax shields and the foreign share in firms' capital. Better economic, institutional and financial conditions allow firms, which are mostly private, to work efficiently with limited market distortions, thus attracting investors from abroad. Yet, higher income levels expose companies to a higher tax

[133] We are thankful to Prof. Oliver Rui for his helpful insights.

burden, and pushes them to take advantage of any possible measure to reduce taxable income, beyond interests on debt.

Table 3.4 shows that the private sector accounts for 64.13% of the observation in our sample. Foreign firms represent 21.38% of the observations, whereas the SOEs plus collective firms encompass 10.92% of the total number. We observe that $NETTC_{it}$ always takes a negative value. The smallest digit is however recorded for private firms. This might be explained by recalling two different motives. First, we claim that private firms are those to likely face the toughest competitive pressure in the product market and, according to Fabbri and Klapper (2008, p. 3), are more likely to extend trade credit and have a larger portion of goods sold on credit. Second, we argue that private firms suffer from a lower bargaining power as they are comparatively smaller than the companies in the other two ownership groups. Therefore, they might be forced to grant a much higher amount of trade credit than the amount they receive from their suppliers, in a similar fashion to what recorded by van Biesebroeck (2014).[134] The value of $TOTALDEBT_{it}$ is notably smaller for foreign firms when compared to the other ownership groups (0.275 million Yuan). In fact these types of firms may partially access finance through internal capital flows, possibly motivated by cross-country differences in taxation (Desai *et al*., 2004). Looking, instead, at $SHORTDEBT_{it}$, we notice that it always remains the dominant form of leverage for all three types of ownership. Observing the control variables we notice that foreign firms are the largest, the youngest and those with the lowest collateral. It is not surprising that foreign firms enjoy from the lowest

[134] He argues that firms in developing countries, such as China, might have a limited access to formal finance and thus resort extensively to trade credit. He claims that SMEs selling only at the domestic level grant much more trade credit to their clients than the amount they receive from their suppliers. This implies that many SMEs "operate at a low, sub-optimal scale and they do not exhaust the scale economies the production technology allows. They operate below efficient scale, because marginal sales are more risky in terms of nonpayment." (van Biesebroeck, 2014, pp. 2-3). Exporting may represent a solution to this situation as foreign buyers may be less financially constrained and therefore have a reduced need to extend them accounts receivable. Moreover, exporting firms may enjoy from a better rule-of-law as specific institution are in place with the specific aim to enforce contracts.

tax burden, 10.4%. Defever and Riaño (2016) indicate the presence of a preferential tax treatment for foreign firms that are engaged in import-export processing activities. Huang and Song (2006) pinpoint that foreign firms enjoy a reduced tax rate equal to 7.5% in the first two years of companies' lives. Private firms are the most profitable, have greater prospect of growth, but suffer from the highest tax burden. These companies are in fact the most productive, despite being financially constrained, and employ the internally generated funds (retained earnings) to foster their growth (Guariglia *et al*., 2011).[135]

3.7. Evaluation of the results: the role of trade credit in the capital structure

In order to determine the effect of net trade credit on the capital structure of Chinese unlisted firms we estimate Equation (3.1) using the one-step XTABOND2 system GMM implemented in STATA.[136] The results for $TOTALDEBT_{it}$, $LONGDEBT_{it}$ and $SHORTDEBT_{it}$ are reported in Table 3.5, respectively in Columns 1, 2 and 3. All regressions include industry, year, province and ownership dummies.

We first analyse the association between of our key variable of interest and the three measures of leverage. The coefficient of $NETTC_{it}$, reported in Column 1 of Table 3.5 suggests the presence of a positive and significant relationship with $TOTALDEBT_{it}$. In fact, a one standard deviation increase in $NETTC_{it}$ leads to a 13.00% increase in $TOTALDEBT_{it}$. This result is consistent with our H1a, as well as with the results recorded by Degryse *et al.* (2012) and Michaelas *et al.* (1999).

[135] The higher corporate tax rate that domestic firms had to face compared to foreign companies lasted until 2007 (33% vs 15-24%, Li *et al*., 2009, p. 473). Thanks to the new Corporate Income Tax Law of 2007, a single interest tax rate of 25% for both private and foreign firms is in place (Li *et al*., 2009, p. 473).
[136] We will apply the same estimation technique throughout the rest of the paper.

The relationship between net trade credit and both long-term and short-term debt is reported, respectively in Columns 2 and 3 of Table 3.5. $NETTC_{it}$ shows a significant and positive association with $SHORTDEBT_{it}$, but not with $LONGDEBT_{it}$. In fact, a one standard deviation increase in $NETTC_{it}$ leads to a 12.04% increase in $SHORTDEBT_{it}$.[137] One explanation is that the higher the net amount of short-term financing that firms obtain from their suppliers, the higher the message of credibility transferred to the banking system and the possibility to obtain credit in an environment characterized by limited financial development. These findings support our hypotheses H1a and H1b, but are only partially consistent with the previous literature. In fact, Michaelas *et al.* (1999) find that that net trade credit exerts a positive effect on both short- and long-term debt, even if the association is stronger for the former. Degryse *et al.* (2012) find a significant association between net trade credit and short-term debt only, but when their analysis is differentiated by industry, net trade credit has a positive association also with long-term debt (although with a smaller magnitude than with short-term debt). In the Chinese case, the absence of a significant relationship between net trade credit and long-term debt can be explained due to overwhelming majority of short-term debt on total debt

We observe that all dependent variables show a significant and positive degree of persistence, as the coefficient on the lagged dependent variables is always positive and significant. There is thus evidence of convergence towards a target level of leverage. We next observe that $SIZE_{it}$ is positively associated with all three measures of leverage. The positive linkage between size and total leverage is consistent with the predictions of both the TOT and

[137] More precisely, the coefficient of $NETTC_{it}$, reported in Column 3 of Table 3.5, is 0.260236. Colum 3 of Table 3.1 shows that the standard deviation for $NETTC_{it}$ is 0.164. Hence, a one standard deviation increase in $NETTC_{it}$ leads to a (0.260236*0.164) = 0.042678704 increase in $SHORTDEBT_{it}$. The mean value for $SHORTDEBT_{it}$ is 0.357 so a one standard deviation increase in $NETTC_{it}$ is associated with a (0.04267804/0.357) = 12.04% increase in $SHORTDEBT_{it}$.

the POT and with previous research (e.g. Huang and Song, 2006; Fama and French, 2002; Sogorb-Mira, 2005). Moreover, the positive and significant association between size and both short- and long-term debt is consistent with Du *et al.* (2015). AGE_i also has a positive coefficient. Being older makes it easier to access formal finance, in line with results recorded by Li *et al*. (2009) and Newman *et al*. (2012). $COLL_{it}$ is negatively associated with $TOTALDEBT_{it}$, and $SHORTDEBT_{it}$, but positively associated with $LONGDEBT_{it}$. These results are consistent with the findings of Li *et al*. (2009) who focus on unlisted Chinese firms and with both Du *et al.* (2015) and Newman *et al.* (2012) who analyse Chinese SMEs. ROA_{it} is negatively associated with all three forms of leverage. Consistent with the predictions of the POT, firms with higher profitability will reinvest their profits before looking for external sources of finance. The negative relationship between ROA_{it} and leverage is consistent with prior studies on the capital structure of Chinese firms (Huang and Song, 2006, Chen and Strange, 2005, Chen, 2004, Li *et al*., 2009). $INTANG_{it}$ shows a significant, but negative association with $TOTALDEBT_{it}$ and $SHORTDEBT_{it}$, but no significant relationship with $LONGDEBT_{it}$, thus possibly supporting agency theory motives (e.g. Myers, 1977). There is no literature that finds this result. The coefficients associated with TAX_{it} and $DEPREC_{it}$ are statistically insignificant for all three measures of leverage. The absence of significance for taxes is in line with the results obtained by Chen and Strange (2005) on Chinese listed companies, and, more broadly, with the experience of developing countries described by Booth *et al.* (2001). The absence of significance for $DEPREC_{it}$ is instead consistent with the results of Huang and Song (2006) on listed companies, although only for the measures of long-term debt divided by long-term debt plus book value of equity and of market long-term debt ratio. $FOWNS_{it}$, is positively and significantly associated with $SHORTDEBT_{it}$. This is in contrast with Li *et al*. (2009) who find a negative relationship between high foreign

ownership and all three measures of leverage (total, short-term and long-term), which they justify considering that foreign ownership may lead to lower taxes and hence to a lower need of using debt. Yet, we hypothesize that the positive association we record may derive from the reliability that being partially foreign-owned brings about. Banks and other financial institutions will be thus more inclined to lend the larger is the foreign share a domestic firm shows (Chen *et al*., 2014).

In all specifications in Table 3.5, the Hansen test indicates some problems with the specification of the model and/or the validity of the instruments. In fact when samples with a very large cross-sectional dimension are used in estimation, the Hansen test for overidentifying restrictions tends to overreject the null hypothesis of instrument validity (Blundell *et al.*, 2000; Benito, 2003; Guariglia *et al.*, 2011). Neither the *J* test nor the test for the n-th order serial correlation allow us to discriminate between bad instruments and poor model specification.

3.7.1. Controlling for the level of marketization

In order to take into account the different effect of net trade credit on leverage across provinces with different levels of marketization we next estimate Equation (3.2). The results are reported in Table 3.6. All regressions include industry, year, ownership and province dummies.

The only interactions showing significant values are the ones for firms located in provinces with high levels of marketization, and only for the regressions explaining total debt and short-term debt (Columns 1 and 3 of Table 3.6). The economic effect of net trade credit for total leverage and short-term debt in the most developed areas are sizeable. In fact, a one

standard deviation increase in $NETTC_{it}$ * $NERIDUMHIGH_{it}$ leads to a 17.83% increase in $TOTALDEBT_{it}$ in the selected group of provinces.[138] If we concentrate, instead, on $SHORTDEBT_{it}$, we observe that a one standard deviation increase in $NETTC_{it}$ * $NERIDUMHIGH_{it}$ leads to a 16.63% increase in $SHORTDEBT_{it}$ in the selected group of provinces.[139,140]

These results provide confirmation of our hypothesis H2. The signal supplied by firms through net trade credit is able to provide an increase in total and short-term leverage only in the provinces with the highest level of marketization. The message that comes with net trade credit in provinces with high NERI does not suffer from interferences due to the underdevelopment of the local financial system, or from its institutional backwardness. Conversely, in provinces with medium and low levels of marketization, the signal associated with net trade credit might be distorted and thus no significant association with leverage is detected. This is consistent with Li *et al*. (2009) who show that companies in well-developed regions show high short-term debt ratios, pointing to the fact that banks in more advanced regions are more inclined to lend on a short-term basis. This is also consistent with the

[138] More precisely, If we observe the results explaining $TOTALDEBT_{it}$ reported in Column 1 of Table 3.6, we notice that the coefficient of $NETTC_{it}$ * $NERIDUMHIGH_{it}$ is 0.420688. Column 2 of Table 3.3 shows that the standard deviation for $NETTC_{it}$ in the provinces with high marketization is 0.167. Hence, a one standard deviation increase in $NETTC_{it}$ * $NERIDUMHIGH_{it}$ leads to a (0.420688*0.167) = 0.070254896 increase in $TOTALDEBT_{it}$. Column 2 of Table 3.3 shows that the mean value for $TOTALDEBT_{it}$ in the provinces with high marketization is 0.394 so a one standard deviation increase in $NETTC_{it}$ * $NERIDUMHIGH_{it}$ creates a (0.070254896/0.394) = 17.83% increase in $TOTALDEBT_{it}$ in the selected group of provinces.

[139] More precisely, if we concentrate on $SHORTDEBT_{it}$, we observe that the coefficient of $NETTC_{it}$ * $NERIDUMHIGH_{it}$ reported in Column 3 of Table 3.6, is 0.357461. Column 2 of Table 3.3 shows that the standard deviation for $NETTC_{it}$ in the provinces with high marketization is 0.167. Hence, a one standard deviation increase in $NETTC_{it}$ * $NERIDUMHIGH_{it}$ leads to a (0.357461*0.167) = 0.059695987 increase in $SHORTDEBT_{it}$. Column 2 of Table 3.3 shows that the mean value for $SHORTDEBT_{it}$ in the provinces with high marketization is 0.359 so a one standard deviation increase in $NETTC_{it}$ * $NERIDUMHIGH_{it}$ determines a (0.059695987/0.359) = 16.63% increase in $SHORTDEBT_{it}$ in the selected group of provinces.

[140] A t-test performed on the difference across the coefficients of the interactions shows that the coefficients associated with $NETTC_{it}$ * $NERIDUMLOW_{it}$ and $NETTC_{it}$ * $NERIDUMMEDIUM_{it}$ are stastistically different at the 5% level, but only for the regression of $TOTALDEBT_{it}$ and $SHORTDEBT_{it}$. The coefficients of $NETTC_{it}$ * $NERIDUMLOW_{it}$ and $NETTC_{it}$ * $NERIDUMHIGH_{it}$ are stastistically different at the 10% level, for the regression of $TOTALDEBT_{it}$ and $SHORTDEBT_{it}$. There is no statistical difference, instead, between the coefficient of $NETTC_{it}$ * $NERIDUMMEDIUM_{it}$ and $NETTC_{it}$ * $NERIDUMHIGH_{it}$ across all three regressions. This may indicate a catching-up process of the provinces with intermediate levels of marketization.

findings by Chen *et al.* (2014) who stress that the political and economic backwardness that features selected Chinese provinces weakens or deletes the positive signal that comes with foreign equity investment in domestic SMEs. We finally observe that results for control variable are very similar to those reported in the previous Section.

3.7.2. Controlling for ownership

The analysis undertaken in Sections 3.7 and 3.7.1 stressed the relevance of net trade credit as a key determinant of total and short-term leverage for the whole sample of firms under investigation. This result deserves a more in-depth investigation as net trade credit may affect the capital structure of firms owned by different agents in different ways, as these firms may be dissimilar in terms of their ability to access credit (Allen *et al*., 2012).

In what follows, we will concentrate on the role played by net trade credit on short-term debt only, as it represents the largest component of total debt, accounting for 89.53%, 93.74% and 82.18% of total liabilities for private firms, foreign companies, SOEs and collective firms, respectively. Estimates of Equation (3.3) for the determinants of short-term debt for private firms, foreign companies and SOEs together with collective firms, are respectively reported in Columns 1, 2 and 3 of Table 3.7. All regressions include industry, year and province dummies.

We observe that the coefficient of net trade credit is significant only for private and foreign firms. This can be explained considering that, contrary to SOEs and collective firms, these companies generally face financing constraints (Guariglia *et al.*, 2011), and hence need to provide a signal of reliability to institutions granting formal finance.

The signal effect associated with net trade credit is large. If we first focus on private firms, we notice that a one standard deviation increase for $NETTC_{it}$ leads to 11.84% increase in $SHORTDEBT_{it}$ for this group of firms.[141] If we focus instead on foreign firms, we notice that one standard deviation increase for $NETTC_{it}$ leads to 13.58% increase in $SHORTDEBT_{it}$ for the same group of firms under scrutiny.[142]

These results provide confirmation of hypothesis H3a. The economic effect of net trade credit leads to a higher increase in short-term debt for foreign than for private firms, which can be tracked down to two motivations. First, there seems to be a reinforcing signalling effect that foreign ownership has on top of net trade credit. Firms will in fact receive bank debt not only on the basis of the reliability embedded in net trade credit, but also thanks to the trustworthiness that foreign ownership brings along (Chen *et al*., 2014). Second, local governments offered, and still offer, preferential treatment to foreign investors to compete for foreign direct investment, including a privileged access to finance (Huang, 2003). There thus may be the chance that foreign firms have *per se* higher access to formal finance. Therefore, the higher sensitivity of short-term debt to net trade credit that we record for this ownership type could not merely be a halo effect associated with foreign ownership, but also the outcome of a deliberate policy action. Thus, a complex interplay could be in place between state targets of inward investment and foreign access to bank credit, on the one hand,

[141] More precisely, the coefficient of $NETTC_{it}$, reported in Column 1 of Table 3.7 is significantly and positively associated with $SHORTDEBT_{it}$ and its coefficient is equal to 0.280807. Column 2 of Table 3.4 shows that the standard deviation for $NETTC_{it}$ for private firms is 0.164. Hence, a one standard deviation increase in $NETTC_{it}$ leads to a (0.280807*0.164)= 0.046052348 increase in $SHORTDEBT_{it}$. Column 2 of Table 3.4 shows that the mean value for $SHORTDEBT_{it}$ for private firms is 0.389, so a one standard deviation increase in $NETTC_{it}$ creates a (0.046052348/0.389) = 11.84% increase in $SHORTDEBT_{it}$ for this group of firms.

[142] More precisely, the coefficient of $NETTC_{it}$, reported in Column 2 of Table 3.7 is significantly and positively associated with $SHORTDEBT_{it}$ and its coefficient is equal to 0.206164. Column 3 of Table 3.4 shows that the standard deviation for $NETTC_{it}$ for foreign firms is 0.164. Hence, a one standard deviation increase in $NETTC_{it}$ leads to a (0.206164*0.164)= 0.033810896 increase in $SHORTDEBT_{it}$. Column 2 of Table 3.4 shows that the mean value for $SHORTDEBT_{it}$ for foreign firms is 0.249 so a one standard deviation increase in $NETTC_{it}$ creates a (0.033810896/0.249) = 13.58% increase in $SHORTDEBT_{it}$ for the same group of firms under scrutiny.

and perceived reliability of the foreign presence, on the other hand. This may challenge the effective role played by net trade credit in the ability to obtain short-term debt by foreign companies and we cannot disentangle the magnitude of the two separate effects.

Focusing on the control variables, we observe that the coefficient associated with the lagged dependent variable is positive and significant for all ownership groups, confirming the presence of a convergence towards a leverage ratio. When we observe the behaviour of $SIZE_{it}$, we observe that it carries a significant and positive sign for foreign firms only. We claim that this relationship is not primarily driven by the trustworthiness that being larger brings about, as advocated by the TOT (Rajan and Zingales, 1995). Yet, we recall the argument put forward by Wiwattanakantang (1999, p. 388) who claim that foreign investors may be geographically distant from the country of investment, and might thus find problematic to monitor the management. In order to address this issue, foreign investors could impose on the management an increase in the use of debt as a tool to keep the directors under control. $SIZE_{it}$ is, instead, not significant for private firms. Similarly to what is advocated for foreign firms, we claim that the linkage between $SIZE_{it}$ and short-term debt cannot merely traced back to the explanations provided by both the TOT and the POT. Conversely, we argue that the lack of significance could be due to the heterogeneous nature of short-term debt, partially consistent with the results recorded by Bevan and Danbold (2002, p. 168). They find no significant linkage between size and short-term leverage for a sample of 588 UK listed firms in 1991. In fact, only a detailed disaggregation of short-term leverage allows them to show that size is positively associated with both trade credit and equivalent, and short-term securitized debt, whereas it is negatively correlated with short-term bank borrowing. We claim that a similar issue could be in place in our sample of Chinese private firms, despite our measure of short-term debt does not include accounts payable, but may include some other sources of informal

finance. We thus argue that the use of informal finance by private firms may be affected by size in a diverse manner than that influencing the obtainment of bank debt. Smaller private firms may require a larger amount of informal finance, whereas larger private firms are able to obtain formal finance from the banking system thanks to their transmitted reduced risk of bankruptcy. $SIZE_{it}$ is also not significant for SOEs and collective firms, in line with the claim (but not the results) of Huang and Song (2006) who assert that this proxy for bankruptcy costs may have no effect in their capital structure. Moreover, it could be argued that SOEs (especially) and collective firms are larger than the firms in the other ownership groups and, as such, may choose long-term debt (whilst smaller firms prefer short-term debt) (Marsh, 1982).[143]

AGE_i carries a positive and significant sign for private firms (Column 1) and, unexpectedly, also for SOEs and collective firms (Column 3). The result recorded for private firms mimics the behavior of the entire sample[144] and it is in line with prior literature though dealing with Chinese SMEs (Newman *et al.*, 2012; Du *et al.*, 2015). Being older means that the firm has accumulated experience and the tools to survive in the market environment and it is therefore more trustworthy than a younger company. This is thus a feature that enhances the amount of short-term leverage that a private firm is likely to obtain from formal institutions. The lack of significance for AGE_i for foreign companies could be due to the fact these firms do not need to be older to show their reputation, but rely on other tools to obtain formal finance. The unexpected positive sign shown instead by SOEs and collective firms could be due to the mixed nature of this group. It does includes SOEs but also collective enterprises

[143] Note that in our investigation foreign firms are larger than SOE plus collective firms. Yet, as clearly indicated by Li *et al*. (2009, p. 479-480) state ownership is positively associated with firms' access to long-term debt, but a negative association is instead recorded for foreign owned companies.

[144] It is worth reminding here that private firms make up 64% of the entire sample and their behaviour is, to some extent, similar to what we record for the full sample itself.

whose management slowly started to respond to market forces and to operate more efficiently (Fu and Balasubramanyam, 2003) which may justify the relevance of being older to obtain debt. We observe a negative and significant association between $COLL_{it}$ and $SHORTDEBT_{it}$ for private firms only (Column 1). This result is consistent with the outcomes on largely private unlisted firms by Li *et al*. (2009). Moreover, it is in line with previous studies explicitly looking at short-term debt for Chinese unlisted firms, despite being SMEs (Du *et al.*, 2015; Newman *et al.*, 2012). This is also consistent with the fact that firms in countries characterized by a poorly developed financial system, such as the Chinese one, rely on lending through family members and social networks that do not require fixed assets to be pledged as collateral (Newman *et al.*, 2012). This is not the case of foreign companies and the SOEs plus collective firms. The former, despite being to some extent financially constrained in the access to the domestic financial system (Guariglia *et al*., 2011), do not need to provide guarantees in the forms of fixed assets. In fact, they might be considered, *a priori*, more reliable, than private firms (Chen *et al*., 2014) or they may rely on internal flows of funds (Desai *et al*., 2004). Despite the relatively heterogeneous nature of the group that includes SOEs and collective firms, centrally state-controlled firms are in majority. They benefit from soft budget constraints (e.g. Ding *et al*., 2013) and no warranties are required to obtain debt. ROA_{it} is negatively related to $SHORTDEBT_{it}$ for private firms (Column 1) and foreign companies (Column 2).

The negative relationship between ROA_{it} and leverage for private firms is consistent with prior studies on the capital structure of private Chinese firms (Huang and Song, 2006, Chen and Strange, 2005, Chen, 2004). This outcome is also consistent with Zhang *et al.* (2015) and Du *et al.* (2015) who disentangle short-term from long-term debt, despite looking at listed and unlisted SMEs, respectively. Foreign firms mimic the behavior of private firms,

as their profitability levels are very close (7.8% vs 7.2%) and they both face constraints in the access to bank credit. Consistently with the POT, both types of companies will first resort to retained earnings and only when they have exhausted internal sources of finance will they look for external providers (e.g. Frank and Goyal, 2009). There is also a negative and significant relationship between our measure of growth, $INTANG_{it}$, and $SHORTDEBT_{it}$, for private and foreign firms. This association is in line with the agency theory of Harris and Raviv (1990) as private and foreign firms with more intangible assets are more likely to borrow less to avoid excessive monitoring costs.[145]

3.7.2.1. Controlling for ownership across provinces with different levels of marketization

In order to take into account the effect net trade credit has on leverage for firms owned by different agents, and located in provinces with different levels of marketization, we estimate Equation (3.4). The results are reported in Columns 1, 2 and 3 of Table 3.8. All regressions include industry, year and province dummies.

The only interactions showing a significant value are those for private and foreign firms located in provinces with high levels of marketization (Columns 1 and 2). The economic effect of net trade credit on short-term debt in the most developed areas shows different magnitudes for private and foreign firms. If we first focus on private firms, we notice that a one standard deviation increase in $NETTC_{it}$ * $NERIDUMHIGH_{it}$ leads to a 12.94**%** increase in $SHORTDEBT_{it}$ for private firms in provinces with high levels of

[145] This is consistent with the prevalence of tangible over intangible assets in the structure of private and foreign companies. These are the two ownership groups likely to face monitoring costs from institutions granting formal finance, whilst this is not the case for SOEs and collective firms.

marketization.[146] If we focus on foreign firms, we notice that a one standard deviation increase in in $NETTC_{it}$ * $NERIDUMHIGH_{it}$ leads to a 9.38% increase in $SHORTDEBT_{it}$ for foreign firms in provinces with high levels of marketization.[147,148] The larger economic effect that net trade credit has on short-term debt for private firms in provinces with high NERI levels compared to the results of Equation (3.3) confirms that the signalling effect is reinforced by the high marketization level. The message of reliability and trustworthiness that comes with higher net trade credit is more important in the provinces with higher economic and institutional development. In these areas, a more advanced rule of law coupled with larger transparency in financial markets allows for a complete unbiased transmission of the message carried by net trade credit.

These findings provide support to hypothesis H3b as net trade credit is positively associated with short-term leverage for private and foreign firms only in provinces with high level of marketization. Contrary to the findings of Li *et al*. (2009), no significant association is detected, instead, for SOEs and collective firms, regardless of their location.[149] This

[146] More specifically, we we notice that the coefficient of $NETTC_{it}$ * $NERIDUMHIGH_{it}$ reported in Column 1 of Table 3.8 is 0.311059. Column 2 of Table 3.1C shows that the standard deviation for $NETTC_{it}$ for private firms in the provinces with high marketization is 0.168. Hence, a one standard deviation increase in $NETTC_{it}$ * $NERIDUMHIGH_{it}$ leads to a (0.311059*0.168) = 0.052257912 increase in $SHORTDEBT_{it}$. Column 2 of Table 3.1C shows that the mean value for $SHORTDEBT_{it}$ for private firms in provinces with high marketization is 0.404. Thus a one standard deviation increase in $NETTC_{it}$ * $NERIDUMHIGH_{it}$ creates a (0.052257912/0.404) = 12.94**%** increase in $SHORTDEBT_{it}$ for private firms in provinces with high levels of marketization.

[147] More precisely, if we focus on foreign firms we observe that that the coefficient of $NETTC_{it}$ * $NERIDUMHIGH_{it}$ reported in Column 2 of Table 3.8 is 0.141050. Column 2 of Table 3.2C shows that the standard deviation for $NETTC_{it}$ for foreign firms in the provinces with high marketization is 0.165. Hence, a one standard deviation increase in $NETTC_{it}$ * $NERIDUMHIGH_{it}$ leads to a (0.141050*0.165) = 0.02327325 increase in $SHORTDEBT_{it}$. Column 2 of Table 3.2C shows that the mean value for $SHORTDEBT_{it}$ for foreign firms in the provinces with high marketization is 0.248 thus a one standard deviation increase in $NETTC_{it}$ * $NERIDUMHIGH_{it}$ implies a (0.02327325/0.248) = 9.38% increase in $SHORTDEBT_{it}$ for foreign firms in provinces with high levels of marketization.

[148] A t-test performed on the coefficients of pairs of interactions shows that there is never statistical difference amongst them. This points to an allegedly small or negligible effect of marketization when looking at diverse ownership types, in line with the weak statistical difference recorded in Table 3.7. The effect of net trade credit across diverse ownership types in provinces with different levels of marketization is thus not particularly robust.

[149] Yet, also Li *et al*. (2009, p. 480) find an insignificant relationship between state ownership and leverage when they make use of a fixed-effect estimation. However, this result does not seem to alter their perception that ownership plays a role.

difference may have three possible explanations. First, Li *et al*. (2009) observe the years 2000-2004, whereas we look at a more recent period, i.e. 2004-2007. There thus might be in place a smooth transition process in the behaviour of the controlling government stakeholder of SOEs. These firms may not be exclusively perceived as a mere tool to achieve employment and social stability, but they may start gradually to act as a profit maximizing entity, whose access to credit is still soft, but organized through better regulations. Second, Li *et al*. (2009) do not tackle the role of trade credit in obtaining leverage, but look at how ownership affects the composition of leverage, of which accounts payable is a part. Third, Li *et al*. (2009) look at SOEs only, whereas we merge into a single category SOEs and collective firms. The coefficients reported in Table 3.8 for all the control variables are, to a great extent, similar to those reported in the previous Section.

3.8. Conclusions

The bulk of the literature on capital structure does not pay attention to the role played by trade credit in shaping the leverage decisions of Chinese unlisted companies. We fill this gap by providing a bridge between two streams of literature, one dealing with how trade credit affects financing decisions of firms in any country, and the other studying the capital structure of Chinese firms.

Making use of a large firm-level dataset for the years 2004-2007 and controlling for a range of determinants which have been shown in the literature to affect capital structure (size, age, collateral, profitability, expected growth, tax and non-debt tax shields), we document a threefold effect of net trade credit on total, short- and long-term leverage. First, we show that a signaling effect leads to a positive association between trade credit and both total and short-

term debt. Second, we observe a positive association between net trade credit and both total and short-term debt only for firms located in the provinces with the highest level of marketization. In this respect, we detect a remarkable amplification of the economic effect of trade credit through the high levels of NERI. Third, we document that net trade credit is positively associated with short-term debt for private and foreign firms only. This relationship is only observed if these firms are located in the provinces with the highest level of marketization. Moreover, the magnitude of the quality signal embedded in net trade credit is strengthened for private firms that are located in the provinces with the highest levels of marketization. In fact, a one standard deviation increase in net trade credit for these firms leads to an 11.84% increase in short-term leverage but to a 12.94% rise when considering highly marketized provinces.

Our paper contributes to the corporate finance literature by explicitly addressing the role played by trade credit in the capital structure of unlisted companies in a large transitional economy. It also contributes to the entrepreneurial finance literature by examining the signalling effect of ownership attributes on debt financing, highlighting the relevant heterogeneity associated with an uneven institutional development.

Our findings have a number of policy implications. Specifically, the Chinese government should try to promote policies targeted at improving the levels of economic and institutional development in the provinces with medium and low degrees of marketization. This could be achieved by taking some actions aimed at fostering the legal framework, helping develop higher degrees of transparency between business peers, and between firms in need of finance and both formal and informal providers of credit. This will hopefully foster confidence and increase trustworthiness amongst private and foreign firms and thus limit the presence of information asymmetry between potential borrowers and the banking system. Net

trade credit should not only be a reliable source of external finance, but also a strong complement to funds that companies obtain from the formal credit system. In this respect, a more efficient banking structure should be able to precisely recognize the reliability of firms requiring credit and thus identify those with a better credit standing, regardless their ownership type.

Our findings highlight how the reliability signal embedded in net trade credit does not lead to an increase in the level of formal finance in less marketized provinces. It seems thus desirable for the State to implement actions aimed at changing the relationship between governments and markets, the first building block of the NERI index. More precisely, it is advisable to reduce the role of government in business and to reduce the size of government.[150] This will help to reduce the frictions associated with the nature of state related actions, such as the lack of transparency that direct and indirect political affiliation may bring about.

Political authorities should also limit the number and dimensions of financial interventions in favour of SOEs and foster the process of reform and modernization in their corporate governance style. This implies a gradual reduction in the presence of soft budget constraints through the definition of standards of efficiency and performance that are not now in place. This may require a slow and partial process of privatization, and it could be the first step to smooth the large differences in the access to formal finance between SOEs and any other company in China. In the long run these actions will possibly limit the inefficiencies affecting SOEs and expose these firms to the competition with more profitable business peers, such as private and foreign companies. During this slow transition process it would be

[150] The former is measured as the ratio of total hours firm managers spend dealing with government and government officials to their total working hours (point 1c), whereas the latter is proxied by the ratio of employment by the central and local government and various social organizations to population (point 1e) (Li *et al.*, 2009, p. 488).

interesting to observe if, and to what extent, net trade credit employed by SOEs, affects their leverage composition.

Our study suffers from two main limitations. The first is the use of a short sample size. The second derives from the absence of transaction specific data on trade credit, such as duration and implicit tax rate, deriving from discounts for early payments and penalties for late payments. This information, especially if available for firms located in provinces with diverse levels of marketization and owned by different agents, would help better describe the role of trade credit in the capital structure of the firms. More precisely, it may allow to identify which firms, in terms of location and ownership, are not paying in time and are thus rolling over. In this case it would be useful to compare overdue and long-term accounts payable with the extension of accounts receivable, choices maybe driven by financial distress. This will thus shed some light on the hidden nature and complex structure of net trade credit and enrich its explanatory power in leverage composition.

Further research needs to be undertaken in the following directions. First, it would be interesting to test if the results hold for the service industries. Compared to the manufacturing and mining sectors, services include less mature activities, with a possible more limited role for informal means of finance, such as trade credit. Second, one could test if our findings also apply to SMEs for which social capital is likely to affect the use of trade credit (Du *et al*., 2015, p. 609). Third, it would be interesting to see if our results still hold when disentangling debt structures into senior secured, subordinated, and mezzanine loans (Cummings and Fleming, forthcoming). This will provide a more complete picture of how net trade credit affects a set of modern tools widely employed in the current business environment, thus overcoming the stale division between short- and long-term debt.

Table 3.1. Summary statistics for the full sample

Variable	**n**	**Mean**	**S.D.**	**Min**	**1st Quartile**	**Median**	**3rd Quartile**	**Max**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TOTALDEBT	119,148	0.400	0.217	0.000	0.230	0.398	0.562	0.970
LONGDEBT	119,148	0.036	0.086	0.000	0.000	0.000	0.013	0.681
SHORTDEBT	119,148	0.357	0.215	0.000	0.185	0.345	0.512	0.919
SIZE	119,148	0.808	1.654	0.017	0.116	0.259	0.699	16.646
AGE	119,148	12.213	10.614	2.000	6.000	9.000	13.000	110.000
COLL	119,148	0.327	0.171	0.047	0.193	0.303	0.440	0.843
ROA	119,148	0.074	0.112	-0.118	0.009	0.041	0.104	0.776
INTANG	119,148	0.020	0.045	0.000	0.000	0.000	0.014	0.302
TAX	119,148	0.159	0.178	-0.417	0.000	0.122	0.310	1.029
DEPREC	119,148	0.034	0.026	0.000	0.016	0.028	0.044	0.182
FOWNS	119,148	0.227	0.386	0.000	0.000	0.000	0.320	1.000
NETTC	119,148	-0.054	0.164	-0.573	-0.148	-0.041	0.035	0.490

Notes: The first three variables are the dependent variables. *TOTALDEBT*, is the ratio of total debt (net of accounts payable) over total assets, *LONGDEBT* is the ratio of long-term debt (net of accounts payable) to total assets, *SHORTDEBT* is the ratio between short-term debt (net of accounts payable) and total assets.

The remaining set of variables includes the explanatory variables. *SIZE* is measured by total assets. *AGE* is measured by the number of years since the establishment of the firm, *COLL* is the ratio between tangible fixed assets and total assets, *INTANG* is measured by the ratio of intangible fixed assets over total assets. *ROA* is the ratio of profit before taxes and extraordinary items over total assets. *TAX* is computed as the ratio of income tax to the amount of profit before taxes and extraordinary items, *DEPREC* is the ratio between depreciation and total assets. *FOWNS* is the percentage of shares owned by foreign investors.

The key variable of interest is *NETTC*, measured as the ratio of accounts payable minus accounts receivable over total assets.

Also see Appendix 3B for precise definitions of all variables.

Table 3.2. Correlation matrix

	TOTALDEBT	*LONGDEBT*	*SHORTDEBT*	*SIZE*	*AGE*	*COLL*	*ROA*	*INTANG*	*TAX*	*DEPREC*	*FOWNS*	*NETTC*
TOTALDEBT	1											
LONGDEBT	0.2525*	1										
SHORTDEBT	0.8788*	-0.1621*	1									
SIZE	0.0439*	0.0973*	0.0079*	1								
AGE	0.1109*	0.1210*	0.0638*	0.1515*	1							
COLL	-0.0436*	0.1598*	-0.1209*	-0.0080*	0,0057	1						
ROA	-0.1945*	-0.0455*	-0.1867*	-0.0365*	-0.1125*	0.0465*	1					
INTANG	0.0555*	0.0711*	0.0339*	0.0306*	-0.0081*	-0.0239*	-0.1089*	1				
TAX	-0,0038	-0.0362*	0.0210*	-0.0323*	-0.0326*	-0.0871*	0.0443*	-0,0003	1			
DEPREC	-0.1066*	0.0173*	-0.1123*	-0.0207*	-0.0566*	0.3018*	0.0574*	-0.0302*	-0.0189*	1		
FOWNS	-0.2688*	-0.0905*	-0.2264*	0.1140*	-0.1327*	-0.0642*	-0.0237*	-0.0048*	-0.1676*	0.1063*	1	
NETTC	-0.1263*	0.0341*	-0.1361*	0.0615*	0,0011	0.2143*	-0.0580*	0.0521*	-0.0902*	0.0634*	0.0521*	1

Notes: This table reports Pearson correlation coefficients. * denotes significance at the 5% level. See note on Table 3.1 for complete definitions of all variables.

Table 3.3. Summary statistics for firms located in Chinese provinces with HIGH, MEDIUM, and LOW levels of the NERI marketization index

Variables	Full sample (1)		HIGH NERI (2)		MEDIUM NERI (3)		LOW NERI (4)	
	n	Mean (S.E.)	n	Mean (S.E.)	n	Mean (S.E.)	n	Mean (S.E.)
TOTALDEBT	119,148	0.400 (0.217)	91,525	0.394 (0.218)	19,937	0,.414 (0.214)	7,686	0.436 (0.211)
LONGDEBT	119,101	0.036 (0.086)	91,497	0.030 (0.078)	19,922	0.057 (0.105)	7,682	0.066 (0.108)
SHORTDEBT	119,148	0.357 (0.215)	91,525	0.359 (0.216)	19,937	0.343 (0.212)	7,686	0.363 (0.206)
SIZE	119,148	0.808 (1.654)	91,525	0.794 (1.627)	19,937	0.803 (1.677)	7,686	0.989 (1.890)
AGE	119,148	12.213 (10.614)	91,525	11.557 (9.431)	19,937	13.422 (12.793)	7,686	16.882 (15.232)
COLL	119,148	0.327 (0.171)	91,525	0.306 (0.159)	19,937	0.390 (0.186)	7,686	0.420 (0.196)
ROA	119,148	0.074 (0.112)	91,525	0.074 (0.106)	19,937	0.086 (0.138)	7,686	0.051 (0.106)
INTANG	119,148	0.020 (0.045)	91,525	0.019 (0.042)	19,937	0.025 (0.053)	7,686	0.019 (0.046)
TAX	119148	0.159 (0.178)	91,525	0.168 (0.178)	19,937	0.129 (0.172)	7,686	0.128 (0.177)
DEPREC	119,148	0.034 (0.026)	91,525	0.034 (0.026)	19,937	0.032 (0.028)	7,686	0.029 (0.025)
FOWNS	119,148	0,227 (0.386)	91,525	0.272 (0.410)	19,937	0.083 (0.242)	7,686	0.060 (0.206)
NETTC	119,148	-0.054 (0.164)	91,525	-0.062 (0.167)	19,937	-0.034 (0.149)	7,686	-0.021 (0.148)

Notes: See note on Table 3.1 for complete definitions of all variables.

Table 3.4. Summary statistics for firms owned by different agents

Variables	Full sample (1)		Private firms (2)		Foreign firms (3)		SOE and collective (4)	
	n	Mean (S.E.)	n	Mean (S.E.)	n	Mean (S.E.)	n	Mean (S.E.)
TOTALDEBT	119,148	0.400 (0.217)	76,414	0.435 (0.209)	25,478	0.275 (0.199)	13,013	0.440 (0.212)
LONGDEBT	119,101	0.036 (0.086)	76,392	0.038 (0.088)	25,471	0.023 (0.068)	12,997	0.055 (0.103)
SHORTDEBT	119,148	0.357 (0.215)	76,414	0.389 (0.212)	25,478	0.249 (0.193)	13,013	0.378 (0.206)
SIZE	119,148	0.808 (1.654)	76,414	0.654 (1.430)	25,478	1.152 (1.963)	13,013	0.982 (2.013)
AGE	119,148	12.213 (10.614)	76,414	10.865 (9.566)	25,478	9.776 (3.836)	13,013	23.924 (16.224)
COLL	119,148	0.327 (0.171)	76,414	0.329 (0.172)	25,478	0.311 (0.159)	13,013	0.354 (0.189)
ROA	119,148	0.074 (0.112)	76,414	0.078 (0.114)	25,478	0.072 (0.106)	13,013	0.056 (0.114)
INTANG	119,148	0.020 (0.045)	76,414	0.021 (0.047)	25,478	0.019 (0.037)	13,013	0.013 (0.040)
TAX	119148	0.159 (0.178)	76,414	0.182 (0.183)	25,478	0.104 (0.136)	13,013	0.139 (0.193)
DEPREC	119,148	0.034 (0.026)	76,414	0.032 (0.026)	25,478	0.039 (0.027)	13,013	0.030 (0.026)
FOWNS	119,148	0,227 (0.386)	76,414	0.035 (0.123)	n.a. n.a.	n.a. n.a.	13,013	0.020 (0.093)
NETTC	119,148	-0.054 (0.164)	76,414	-0.059 (0.164)	25,478	-0.043 (0.164)	13,013	-0.054 (0.157)

Notes: See note on Table 3.1 for complete definitions of all variables.

Table 3.5. Determinants of the capital structure of Chinese unlisted firms: full sample

	Full sample		
VARIABLES	(1) $TOTALDEBT_{it}$	(2) $LONGDEBT_{it}$	(3) $SHORTDEBT_{it}$
Lagged Dependent	0.432007***	0.369595***	0.397134***
	(0.009928)	(0.014751)	(0.009672)
$SIZE_{it}$	0.004043***	0.002599***	0.003255***
	(0.000862)	(0.000403)	(0.000868)
AGE_i	0.000605***	0.000353***	0.000320***
	(0.000074)	(0.000036)	(0.000074)
$COLL_{it}$	-0.000718***	0.000195*	-0.000849***
	(0.000252)	(0.000108)	(0.000256)
ROA_{it}	-0.099788***	-0.019916**	-0.116586***
	(0.025467)	(0.009349)	(0.025273)
$INTANG_{it}$	-0.059813***	-0.001345	-0.058635***
	(0.021291)	(0.010121)	(0.022096)
TAX_{it}	-0.007084	-0.002014	-0.007165
	(0.032117)	(0.013258)	(0.032748)
$DEPREC_{it}$	-0.173780	-0.074357	-0.053873
	(0.182976)	(0.078482)	(0.185611)
$FOWNS_{it}$	0.030530	-0.015094	0.054265**
	(0.025009)	(0.009177)	(0.025192)
$NETTC_{it}$	0.317232***	0.002803	0.260236***
	(0.030788)	(0.010996)	(0.030817)
Industry dummies	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Ownership dummies	Yes	Yes	Yes
Constant	0.252179***	0.016017***	0.242955***
	(0.015449)	(0.006059)	(0.015449)
Observations	119,148	119,310	119,381
Number of id	53,271	53,324	53,338
Hansen *J* statistics	166.3	88.96	148.2
Hansen degrees of freedom	31	31	31
Hansen test (*p*-value)	0	1.66e-07	0
m1 statistics	-46.92	-27.72	-49.76
m1 statistics (*p*-value)	0	0	0
Model degrees of freedom	54	54	54
Wald chi-squared statistic	22,539	5,718	18,784
Estimated variance of the e_it	0.0171	0.00285	0.0175

Notes: All specifications were estimated using a system GMM (Blundell and Bond, 1998) estimator. The figures reported in parentheses are asymptotic standard errors. Standard errors and test statistics are asymptotically robust to heteroscedasticity. *m1* is a test for first-order serial correlation of the differenced residuals, asymptotically distributed as *N* (0,1) under the

null of no serial correlation. The Hansen *J* test of over-identifying restrictions is distributed as *Chi*-square under the null of instrument validity. We treat all regressors, except for AGE_i. as potentially endogenous variables. Levels of these variables dated $t - 2$ are used as instruments in the first-differenced equations, and first-differences of these same variables lagged once are used as additional instruments in the levels equations. Also see Notes to Table 3.1 for complete definitions of all variables.

* indicates significance at the 10% level.

** indicates significance at the 5% level.

*** indicates significance at the 1% level.

Table 3.6. Determinants of the capital structure of Chinese unlisted firms: interaction with dummies for the marketization index

	Neri index		
	(1)	(2)	(3)
VARIABLES	$TOTALDEBT_{it}$	$LONGDEBT_{it}$	$SHORTDEBT_{it}$
Lagged Dependent	0.427829***	0.367813***	0.394697***
	(0.011346)	(0.015089)	(0.010543)
$SIZE_{it}$	0.004204***	0.002733***	0.003344***
	(0.000977)	(0.000433)	(0.000981)
AGE_i	0.000601***	0.000345***	0.000314***
	(0.000083)	(0.000037)	(0.000084)
$COLL_{it}$	-0.000773***	0.000227**	-0.000917***
	(0.000268)	(0.000113)	(0.000275)
ROA_{it}	-0.103222***	-0.022265**	-0.119398***
	(0.028051)	(0.010050)	(0.028127)
$INTANG_{it}$	-0.047907**	-0.005990	-0.043864*
	(0.023652)	(0.010737)	(0.024516)
TAX_{it}	-0.014020	-0.007631	-0.011756
	(0.036181)	(0.014023)	(0.036802)
$DEPREC_{it}$	-0.192545	-0.112990	-0.060000
	(0.205227)	(0.085505)	(0.208834)
$FOWNS_{it}$	0.025041	-0.019171*	0.049397*
	(0.028220)	(0.010421)	(0.028500)
$NETTC_{it} * NERIDUMLOW_{it}$	-1.313513	-0.065164	-1.479100
	(0.915181)	(0.372543)	(0.930847)
$NETTC_{it} * NERIDUMMEDIUM_{it}$	0.292487	-0.262704	0.326076
	(0.510709)	(0.226327)	(0.513402)
$NETTC_{it} * NERIDUMHIGH_{it}$	0.420688***	0.051929	0.357461***
	(0.130048)	(0.058660)	(0.134025)
$NETTC_{it} * NERIDUMLOW_{it} = NETTC_{it} * NERIDUMMEDIUM_{it}$ (p-value)	0.0257**	0.4809	0.0141**
$NETTC_{it} * NERIDUMLOW_{it} = NETTC_{it} * NERIDUMHIGH_{it}$ (p-value)	0.09*	0.7818	0.0779*
$NETTC_{it} * NERIDUMMEDIUM_{it} = NETTC_{it} * NERIDUMHIGH_{it}$ (p-value)	0.8387	0.2635	0.9607
Industry dummies	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Ownership dummies	Yes	Yes	Yes
Constant	0.197372***	0.014752	0.182872***
	(0.034697)	(0.014050)	(0.036472)
Observations	119,148	119,310	119,381
Number of id	53,271	53,324	53,338
Hansen *J* statistics	136.0	77.42	119.1

Hansen degrees of freedom	29	29	29
Hansen test (*p*-value)	0	2.75e-06	0
m1 statistics	-29.41	-22.12	-28.00
m1 statistics (*p*-value)	0	0	0
Model degrees of freedom	56	56	56
Wald chi-squared statistic	19,678	5,303	16,678
Estimated variance of the e_it	0.0185	0.00298	0.0192

Notes: All specifications were estimated using a system GMM (Blundell and Bond, 1998) estimator. The figures reported in parentheses are asymptotic standard errors. Standard errors and test statistics are asymptotically robust to heteroscedasticity. *m1* is a test for first-order serial correlation of the differenced residuals, asymptotically distributed as $N(0,1)$ under the null of no serial correlation. The Hansen *J* test of over-identifying restrictions is distributed as *Chi*-square under the null of instrument validity. We treat all regressors, except AGE_i. as potentially endogenous variables. Levels of these variables dated $t - 2$ are used as instruments in the first-differenced equations, and first-differences of these same variables lagged once are used as additional instruments in the levels equations.

$NERIDUMLOW_{it}$ is a dummy that takes value one at time *t* if firm *i* is located in a province with NERI index ranked below the 33th percentile of the distribution of the NERI indexes of all provinces in that same year, and zero otherwise. $NERIDUMMEDIUM_{it}$ is a dummy that takes value of 1 if firm *i* is located in a province placed between the 33th and the 66th percentile of the distribution of the NERI index for the provinces at time *t*, and zero otherwise. $NERIDUMHIGH_{it}$ is a dummy that takes value one at time *t* if firm *i* is located in a province with NERI index ranked above the 66th percentile of the distribution of the NERI indexes of all provinces in that same year, and zero otherwise. $NETTC_{it}$*$NERIDUMLOW_{it}$ is the interaction between the ratio of accounts payable minus accounts receivable over total assets and a dummy that takes value of one if firm *i* at time *t* is located in a province placed below the 33th percentile of the distribution of the NERI index for the provinces and zero otherwise. $NETTC_{it}$*$NERIDUMMEDIUM_{it}$ is the interaction between the ratio of accounts payable minus accounts receivable over total assets and a dummy that takes value of one if the firm *i* at time *t* is located in a province placed between the 33th and the 66th percentile of the distribution of the NERI index for the provinces, and zero otherwise. $NETTC_{it}$*$NERIDUMHIGH_{it}$, is the interaction between the ratio of accounts payable minus accounts receivable over total assets and dummy that takes value of one if the firm *i* at time *t* is located in a province placed above the 66th percentile of the distribution of the NERI index for the provinces, and zero otherwise The numbers in the rows testing whether the impact of $NETTC_{it}$ is the same across various provinces with different levels of marketization are the *p*-values associated with χ^2tests for general restrictions. Also see notes to Table 3.1 for complete definitions of all variables.

* indicates significance at the 10% level.

** indicates significance at the 5% level.

*** indicates significance at the 1% level.

Table 3.7. Determinants of the short-term debt for firms owned by different agents: no interactions

	No interactions		
	(1)	(2)	(3)
VARIABLES	Private firms	Foreign firms	SOEs and collective firms
$SHORTDEBT_{i(t-1)}$	0.392031***	0.362320***	0.457987***
	(0.011347)	(0.023575)	(0.035732)
$SIZE_{it}$	0.001151	0.008850***	0.002066
	(0.001143)	(0.001768)	(0.002839)
AGE_i	0.000198**	-0.000413	0.000470**
	(0.000090)	(0.000556)	(0.000195)
$COLL_{it}$	-0.001417***	0.000633	0.000054
	(0.000321)	(0.000521)	(0.000658)
ROA_{it}	-0.127207***	-0.104141*	-0.020893
	(0.031031)	(0.058724)	(0.075434)
$INTANG_{it}$	-0.049352*	-0.089480*	-0.051898
	(0.026565)	(0.053718)	(0.068693)
TAX_{it}	0.006442	-0.029433	-0.066552
	(0.040820)	(0.091699)	(0.067113)
$DEPREC_{it}$	-0.099959	0.329929	-0.629546
	(0.225324)	(0.389575)	(0.533425)
$FOWNS_{it}$	0.046085		0.034378
	(0.041992)		(0.066703)
$NETTC_{it}$	0.280807***	0.206164***	0.046910
	(0.040215)	(0.051545)	(0.091548)
Industry dummies	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Ownership dummies	No	No	No
Constant	0.288101***	0.162912***	0.246196***
	(0.018944)	(0.040693)	(0.042811)
Observations	76,591	25,545	13,027
Number of id	33,716	11,525	6,200
Hansen *J* statistics	107.9	38.16	50.03
Hansen degrees of freedom	31	27	31
Hansen test (*p*-value)	1.98e-10	0.0754	0.0167
m1 statistics	-41.08	-22.30	-14.60
m1 statistics (*p*-value)	0	0	0
Model degrees of freedom	50	49	50
Wald chi-squared statistic	6,487	1,511	961.0
Estimated variance of the e_it	0.0195	0.0131	0.0135

Notes: All specifications were estimated using a system GMM (Blundell and Bond, 1998) estimator. The figures reported in parentheses are asymptotic standard errors. Standard errors and test statistics are asymptotically robust to heteroscedasticity. *m1* is a test for first-order serial correlation of the differenced residuals, asymptotically distributed as $N(0,1)$ under the null of

no serial correlation. The Hansen *J* test of over-identifying restrictions is distributed as *Chi*-square under the null of instrument validity. We treat all regressors, except for AGE_i. as potentially endogenous variables. Levels of these variables dated $t - 2$ are used as instruments in the first-differenced equations, and first-differences of these same variables lagged once are used as additional instruments in the levels equations. Also See Notes to Table 3.1 for complete definition of all variables.
* indicates significance at the 10% level.
** indicates significance at the 5% level.
*** indicates significance at the 1% level.

Table 3.8. Determinants of the short-term debt for firms owned by different agents: interaction with dummies for the marketization index

	Neri index		
	(1)	(2)	(3)
VARIABLES	Private firms	Foreign firms	SOEs and collective firms
$SHORTDEBT_{i(t-1)}$	0.391284***	0.356705***	0.445423***
	(0.011664)	(0.025339)	(0.041046)
$SIZE_{it}$	0.001109	0.009167***	0.001995
	(0.001213)	(0.001833)	(0.002903)
AGE_i	0.000192**	-0.000484	0.000388
	(0.000095)	(0.000625)	(0.000252)
$COLL_{it}$	-0.001447***	0.000440	-0.000107
	(0.000332)	(0.000558)	(0.000754)
ROA_{it}	-0.123491***	-0.105025	-0.037940
	(0.032479)	(0.064445)	(0.084968)
$INTANG_{it}$	-0.036933	-0.107493*	-0.063611
	(0.028615)	(0.059072)	(0.072392)
TAX_{it}	0.014369	0.011361	-0.072717
	(0.046093)	(0.100994)	(0.070781)
$DEPREC_{it}$	-0.090438	0.338762	-0.844390
	(0.232757)	(0.423010)	(0.641144)
$FOWNS_{it}$	0.042480		0.020026
	(0.044582)		(0.076891)
$NETTC_{it} * NERIDUMLOW_{it}$	-0.709405	2.749466	-0.312103
	(0.802262)	(2.087264)	(0.729188)
$NETTC_{it} * NERIDUMMEDIUM_{it}$	0.472290	1.113449	-0.168154
	(0.475156)	(1.031243)	(0.365012)
$NETTC_{it} * NERIDUMHIGH_{it}$	0.311059**	0.141050*	0.199142
	(0.131422)	(0.077166)	(0.269853)
$NETTC_{it} * NERIDUMLOW_{it} = NETTC_{it} * NERIDUMMEDIUM_{it}$ (p-value)	0.1144	0.4711	0.8121
$NETTC_{it} * NERIDUMLOW_{it} = NETTC_{it} * NERIDUMHIGH_{it}$ (p-value)	0.2545	0.2152	0.5909
$NETTC_{it} * NERIDUMMEDIUM_{it} = NETTC_{it} * NERIDUMHIGH_{it}$ (p-value)	0.7849	0.3694	0.5328
Industry dummies	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Ownership dummies	No	No	No
Constant	0.251978***	0.302505**	0.253086***
	(0.034813)	(0.144852)	(0.045230)
Observations	76,591	25,545	13,027
Number of id	33,716	11,525	6,200
Hansen J statistics	98.29	33.59	46.52
Hansen degrees of freedom	29	25	29

Hansen test (*p*-value)	1.83e-09	0.117	0.0208
m1 statistics	-33.02	-12.35	-13.38
m1 (*p*-value)	0	0	0
Model degrees of freedom	52	51	52
Wald chi-squared statistic	6,040	1,406	910.0
Estimated variance of the e_it	0.0202	0.0145	0.0137

Notes: All specifications were estimated using a system GMM (Blundell and Bond, 1998) estimator. The figures reported in parentheses are asymptotic standard errors. Standard errors and test statistics are asymptotically robust to heteroscedasticity. *m1* is a test for first-order serial correlation of the differenced residuals, asymptotically distributed as *N* (0,1) under the null of no serial correlation. The Hansen *J* test of over-identifying restrictions is distributed as *Chi*-square under the null of instrument validity. We treat all regressors, except for AGE_i. as potentially endogenous variables. Levels of these variables dated *t* - 2 are used as instruments in the first-differenced equations, and first-differences of these same variables lagged once are used as additional instruments in the levels equations. $NERIDUMLOW_{it}$ is a dummy that takes value one at time *t* if firm *i* is located in a province with NERI index ranked below the 33th percentile of the distribution of the NERI indexes of all provinces in that same year, and zero otherwise. $NERIDUMMEDIUM_{it}$ is a dummy that takes value of 1 if firm *i* is located in a province placed between the 33th and the 66th percentile of the distribution of the NERI index for the provinces at time *t*, and zero otherwise. $NERIDUMHIGH_{it}$ is a dummy that takes value one at time *t* if firm *i* is located in a province with NERI index ranked above the 66th percentile of the distribution of the NERI indexes of all provinces in that same year, and zero otherwise. $NETTC_{it}$*$NERIDUMLOW_{it}$ is the interaction between the ratio of accounts payable minus accounts receivable over total assets and a dummy that takes value of one if the firm *i* at time *t* is located in a province placed below the 33th percentile of the distribution of the NERI index for the provinces and zero otherwise. $NETTC_{it}$*$NERIDUMMEDIUM_{it}$ is the interaction between the ratio of accounts payable minus accounts receivable over total assets and a dummy that takes value of one if the firm *i* at time *t* is located in a province placed between the 33th and the 66th percentile of the distribution of the NERI index for the provinces, and zero otherwise. $NETTC_{it}$*$NERIDUMHIGH_{it}$, is the interaction between the ratio of accounts payable minus accounts receivable over total assets and dummy that takes value of one if the firm *i* at time *t* is located in a province placed above the 66th percentile of the distribution of the NERI index for the provinces, and zero otherwise The numbers in the rows testing whether the impact of $NETTC_{it}$ is the same across various provinces with different levels of marketization are the *p*-values associated with χ^2tests for general restrictions. Also see notes to Table 3.1 for complete definitions of all variables.

* indicates significance at the 10% level.

** indicates significance at the 5% level.

*** indicates significance at the 1% level.

Appendix 3

Appendix 3A

List of provinces according to their level of marketization, for each year of the time span

Table 3.1A. Distribution of the provinces in the year 2004 according to the recorded NERI level

Distribution of the provinces in the year 2004 according to the recorded NERI level											
High level of NERI				**Medium level of NERI**				**Low level of NERI**			
Province	**Freq.**	**Percent**	**Cum.**	**Province**	**Freq.**	**Percent**	**Cum.**	**Province**	**Freq.**	**Percent**	**Cum.**
Beijing	1,847	3.10	3.10	Anhui	1,705	10.64	10.64	Gansu	369	6.19	6.19
Chongqing	1,064	1.78	4.88	Guangxi	911	5.69	16.33	Guizhou	668	11.20	17.38
Fujian	4,725	7.92	12.81	Hainan	183	1.14	17.47	Heilongjiang	716	12.00	29.39
Guangdong	9,603	16.11	28.91	Hebei	3,000	18.73	36.20	Neimenggu	550	9.22	38.61
Jiangsu	10,946	18.36	47.27	Henan	2,366	14.77	50.97	Ningxia	192	3.22	41.83
Liaoning	2,914	4.89	52.16	Hubei	1,563	9.76	60.73	Qinghai	105	1.76	43.59
Shandong	6,676	11.20	63.36	Hunan	2,084	13.01	73.74	Shaanxi	931	15.61	59.20
Shanghai	5,744	9.63	72.99	Jiangxi	933	5.82	79.57	Shanxi	1,216	20.39	79.58
Tianjin	1,599	2.68	75.67	Jilin	757	4.73	84.29	Xinjiang	435	7.29	86.87
Zhejiang	14,504	24.33	100.00	Sichuan	2,516	15.71	100.00	Yunnan	783	13.13	100.00
Total	**59,622**	**100.00**		**Total**	**16,018**	**100.00**		**Total**	**5,965**	**100.00**	

Notes: our elaboration from NBS data and Fan *et al*.'s (2010) data

Table 3.2A. Distribution of the provinces in the year 2005 according to the recorded NERI level

Distribution of the provinces in the year 2005 according to the recorded NERI level											
High level of NERI				**Medium level of NERI**				**Low level of NERI**			
Province	**Freq.**	**Percent**	**Cum.**	**Province**	**Freq.**	**Percent**	**Cum.**	**Province**	**Freq.**	**Percent**	**Cum.**
Beijing	1,704	2.97	2.97	Anhui	1,671	10.72	10.72	Gansu	344	6.32	6.32
Chongqing	1,060	1.85	4.81	Guangxi	875	5.62	16.34	Guizhou	605	11.11	17.43
Fujian	4,500	7.84	12.65	Hainan	166	1.07	17.41	Heilongjiang	662	12.16	29.59
Guangdong	9,229	16.07	28.72	Hebei	2,735	17.55	34.96	Neimenggu	486	8.93	38.52
Jiangsu	10,85	18.89	47.61	Henan	2,184	14.02	48.98	Ningxia	180	3.31	41.83
Liaoning	2,812	4.90	52.51	Hubei	1,694	10.87	59.85	Qinghai	101	1.86	43.68
Shandong	6,215	10.82	63.33	Hunan	2,02	12.96	72.81	Shaanxi	838	15.39	59.07
Shanghai	5,399	9.40	72.73	Jiangxi	929	5.96	78.78	Shanxi	1,1	20.19	79.26
Tianjin	1,634	2.85	75.58	Jilin	730	4.69	83.46	Xinjiang	381	7.00	86.26
Zhejiang	14,02	24.42	100.00	Sichuan	2,577	16.54	100.00	Yunnan	748	13.74	100.00
Total	**57,420**	**100.00**		**Total**	**15,581**	**100.00**		**Total**	**5,44**	**100.00**	

Notes: our elaboration from NBS data and Fan *et al*.'s (2010) data

Table 3.3A. Distribution of the provinces in the year 2006 according to the recorded NERI level

Distribution of the provinces in the year 2006 according to the recorded NERI level											
High level of NERI				**Medium level of NERI**				**Low level of NERI**			
Province	**Freq.**	**Percent**	**Cum.**	**Province**	**Freq.**	**Percent**	**Cum.**	**Province**	**Freq.**	**Percent**	**Cum.**
Beijing	1,595	2.90	2.90	Anhui	1,541	10.48	10.48	Gansu	328	6.85	6.85
Chongqing	1,002	1.82	4.72	Guangxi	812	5.52	16.00	Guizhou	548	11.45	18.30
Fujian	4,15	7.54	12.26	Hebei	2,509	17.06	33.06	Hainan	155	3.24	21.53
Guangdong	8,931	16.23	28.48	Henan	1,952	13.27	46.34	Heilongjiang	621	12.97	34.50
Jiangsu	10,473	19.03	47.51	Hubei	1,677	11.40	57.74	Ningxia	164	3.43	37.93
Liaoning	2,695	4.90	52.41	Hunan	1,83	12.44	70.19	Qinghai	92	1.92	39.85
Shandong	5,898	10.72	63.12	Jiangxi	865	5.88	76.07	Shaanxi	769	16.06	55.91
Shanghai	5,076	9.22	72.34	Jilin	718	4.88	80.95	Shanxi	1,032	21.55	77.46
Tianjin	1,509	2.74	75.08	Neimenggu	448	3.05	84.00	Xinjiang	348	7.27	84.73
Zhejiang	13,714	24.92	100.00	Sichuan	2,353	16.00	100.00	Yunnan	731	15.27	100.00
Total	**55,043**	**100.00**		**Total**	**14,705**	**100.00**		**Total**	**4,788**	**100.00**	

Notes: our elaboration from NBS data and Fan *et al*.'s (2010) data

Table 3.4A. Distribution of the provinces in the year 2007 according to the recorded NERI level

Distribution of the provinces in the year 2007 according to the recorded NERI level											
High level of NERI				**Medium level of NERI**				**Low level of NERI**			
Province	**Freq.**	**Percent**	**Cum.**	**Province**	**Freq.**	**Percent**	**Cum.**	**Province**	**Freq.**	**Percent**	**Cum.**
Anhui	1,527	2.94	2.94	Chongqing	1,016	8.46	8.46	Gansu	294	5.42	5.42
Beijing	1,390	2.68	5.62	Hainan	115	0.96	9.42	Guangxi	762	14.04	19.45
Fujian	3,995	7.70	13.32	Hebei	2,217	18.47	27.89	Guizhou	514	9.47	28.92
Guangdong	8,444	16.28	29.60	Henan	1,754	14.61	42.50	Heilongjiang	558	10.28	39.20
Jiangsu	9,820	18.93	48.53	Hubei	1,619	13.48	55.98	Neimenggu	395	7.28	46.47
Liaoning	2,432	4.69	53.22	Hunan	1,665	13.87	69.85	Ningxia	145	2.67	49.14
Shandong	5,512	10.62	63.84	Jiangxi	788	6.56	76.41	Qinghai	80	1.47	50.62
Shanghai	4,574	8.82	72.66	Jilin	637	5.31	81.72	Shaanxi	751	13.83	64.45
Tianjin	1,301	2.51	75.17	Sichuan	2,195	18.28	100.00	Shanxi	932	17.17	81.62
Zhejiang	12,880	24.83	100.00					Xinjiang	314	5.78	87.40
								Yunnan	684	12.60	100.00
Total	**51,880**	**100.00**		**Total**	**12,006**	**100.00**		**Total**	**5,429**	**100.00**	

Notes: our elaboration from NBS data and Fan *et al*.'s (2010) data

Appendix 3B

Variable definitions

TOTALDEBT is the ratio of total debt (net of accounts payable) to total assets.

LONGDEBT is the ratio of long-term debt (net of accounts payable) to total assets.

SHORTDEBT is the ratio of short-term debt (net of accounts payable) to total assets.

SIZE is measured by real total assets (millions of Yuan).

AGE is measured by the number of years since the establishment of the firm.

COLL is the ratio between tangible fixed assets and total assets.

INTANG is measured by the ratio of intangible fixed assets to total assets.

ROA is the ratio of profit before taxes and extraordinary items to total assets.

TAX is the ratio of income tax to the amount of profit before taxes and extraordinary items.

DEPREC is the ratio between depreciation and total assets.

FOWNS is the percentage of shares owned by foreign investors.

NETTC is the ratio of accounts payable minus accounts receivable over total assets.

$NERIDUMHIGH_{it}$ is a dummy that takes value one at time *t* if firm *i* is located in a province with NERI index ranked above the 66^{th} percentile of the distribution of the NERI indexes of all provinces in that same year, and zero otherwise.

$NERIDUMMEDIUM_{it}$ is a dummy that takes value of 1 if firm *i* is located in a province placed between the 33^{th} and the 66^{th} percentile of the distribution of the NERI index for the provinces at time *t*, and zero otherwise.

$NERIDUMLOW_{it}$ is a dummy that takes value one at time *t* if firm *i* is located in a province with NERI index ranked below the 33^{th} percentile of the distribution of the NERI indexes of all provinces in that same year, and zero otherwise.

Appendix 3C

Table 3.1C. Summary statistics for private firms located in Chinese provinces with HIGH, MEDIUM, and LOW levels of the NERI marketization index

Variables	Total private firms (1)		HIGH NERI (2)		MEDIUM NERI (3)		LOW NERI (4)	
	n	Mean (S.E.)	n	Mean (S.E.)	n	Mean (S.E.)	n	Mean (S.E.)
TOTALDEBT	76,414	0.435 (0.209)	57,240	0.441 (0.208)	14,430	0.414 (0.211)	4,744	0.427 (0.210)
LONGDEBT	76,392	0.038 (0.088)	57,224	0.031 (0.080)	14,425	0.055 (0.103)	4,743	0.063 (0.108)
SHORTDEBT	76,414	0.389 (0.212)	57,240	0.404 (0.210)	14,430	0.342 (0.212)	4,744	0.357 (0.207)
SIZE	76,414	0.654 (1.430)	57,240	0.622 (1.378)	14,430	0.689 (1.478)	4,744	0.927 (1.816)
AGE	76,414	10.865 (9.566)	57,240	10.746 (9.097)	14,430	10.840 (10.336)	4,744	12.381 (12.172)
COLL	76,414	0.329 (0.172)	57,240	0.307 (0.160)	14,430	0.389 (0.185)	4,744	0.415 (0.196)
ROA	76,414	0.078 (0.114)	57,240	0.077 (0.106)	14,430	0.092 (0.141)	4,744	0.054 (0.106)
INTANG	76,414	0.021 (0.047)	57,240	0.020 (0.045)	14,430	0.027 (0.055)	4,744	0.021 (0.048)
TAX	76,414	0.182 (0.183)	57,240	0.197 (0.1839	14,430	0.137 (0.174)	4,744	0.135 (0.181)
DEPREC	76,414	0.032 (0.026)	57,240	0.033 (0.025)	14,430	0.033 (0.029)	4,744	0.029 (0.024)
FOWNS	76,414	0.035 (0.123)	57,240	0.040 (0.131)	14,430	0.020 (0.097)	4,744	0.016 (0.090)
NETTC	76,414	-0.059 (0.164)	57,240	-0.068 (0.168)	14,430	-0.032 (0.150)	4,744	-0.022 (0.153)

Notes: See note on Table 3.1 for a complete definition of all variables.

Table 3.2C. Summary statistics for foreign firms located in Chinese provinces with HIGH, MEDIUM, and LOW levels of the NERI marketization index

Variables	Total foreign firms (1)		HIGH NERI (2)		MEDIUM NERI (3)		LOW NERI (4)	
	n	Mean (S.E.)	n	Mean (S.E.)	n	Mean (S.E.)	n	Mean (S.E.)
TOTALDEBT	25,478	0.275 (0.199)	23,694	0.272 (0.198)	1,404	0.309 (0.200)	380	0.344 (0.2049
LONGDEBT	25,471	0.023 (0.068)	23,687	0.021 (0.066)	1,404	0.037 (0.086)	380	0.044 (0.096)
SHORTDEBT	25,478	0.249 (0.193)	23,694	0.248 (0.193)	1,404	0.263 (0.190)	380	0.298 (0.196)
SIZE	25,478	1.152 (1.963)	23,694	1.148 (1.962)	1,404	1.217 (2.055)	380	1.161 (1.623)
AGE	25,478	9.776 (3.836)	23,694	9.833 (3.819)	1,404	8.934 (4.054)	380	9.342 (3.707)
COLL	25,478	0.311 (0.159)	23,694	0.304 (0.156)	1,404	0.386 (0.182)	380	0.419 (0.191)
ROA	25,478	0.072 (0.106)	23,694	0.072 (0.105)	1,404	0.084 (0.118)	380	0.080 (0.119)
INTANG	25,478	0.019 (0.037)	23,694	0.019 (0.037)	1,404	0.026 (0.046)	380	0.019 (0.036)
TAX	25,478	0.104 (0.136)	23,694	0.106 (0.137)	1,404	0.084 (0.125)	380	0.077 (0.101)
DEPREC	25,478	0.039 (0.027)	23,694	0.039 (0.027)	1,404	0.037 (0.028)	380	0.038 (0.026)
NETTC	25,478	-0.043 (0.164)	23,694	-0.043 (0.165)	1,404	-0.049 (0.156)	380	-0.032 (0.144)

Notes: See note on Table 3.1 for a complete definition of all variables.

Table 3.3C. Summary statistics for SOEs and collective firms located in Chinese provinces with HIGH, MEDIUM, and LOW levels of the NERI marketization index

Variables	Total SOE and collective (1)		HIGH NERI (2)		MEDIUM NERI (3)		LOW NERI (4)	
	n	Mean (S.E.)	n	Mean (S.E.)	n	Mean (S.E.)	n	Mean (S.E.)
TOTALDEBT	13,013	0.440 (0.212)	7,450	0.421 (0.210)	3,357	0.461 (0.215)	2,206	0.475 (0.2069
LONGDEBT	12,997	0.055 (0.103)	7,445	0.042 (0.090)	3,349	0.072 (0.117)	2,203	0.076 (0.112)
SHORTDEBT	13,013	0.378 (0.206)	7,450	0.375 (0.205)	3,357	0.377 (0.210)	2,206	0.390 (0.201)
SIZE	13,013	0.982 (2.013)	7,450	0.886 (1.874)	3,357	1.109 (2.214)	2,206	1.116 (2.125)
AGE	13,013	23.924 (16.224)	7,450	21.945 (15.475)	3,357	25.698 (16.651)	2,206	27.908 (16.982)
COLL	13,013	0.354 (0.189)	7,450	0.310 (0.172)	3,357	0.401 (0.193)	2,206	0.431 (0.196)
ROA	13,013	0.056 (0.114)	7,450	0.057 (0.109)	3,357	0.062 (0.130)	2,206	0.042 (0.102)
INTANG	13,013	0.013 (0.040)	7,450	0.012 (0.037)	3,357	0.017 (0.046)	2,206	0.014 (0.042)
TAX	13,013	0.139 (0.193)	7,450	0.152 (0.200)	3,357	0.119 (0.183)	2,206	0.123 (0.182)
DEPREC	13,013	0.030 (0.026)	7,450	0.032 (0.026)	3,357	0.028 (0.027)	2,206	0.027 (0.025)
FOWNS	13,013	0.020 (0.093)	7,450	0.029 (0.108)	3,357	0.012 (0.072)	2,206	0.007 (0.055)
NETTC	13,013	-0.054 (0.157)	7,450	-0.073 (0.165)	3,357	-0.035 (0.142)	2,206	-0.016 (0.137)

Notes: See note on Table 3.1 for a complete definition of all variables.

CHAPTER FOUR

TRADE CREDIT AND EXPORT BEHAVIOUR: MICROECONOMETRIC EVIDENCE FOR CHINESE FIRMS

4.1. Introduction

Despite its poorly developed financial system, China has emerged in the last three decades as the fastest growing economy in the world, driven in part by the large increase in its exports (Jarreau and Poncet, 2012). The cornerstone of the Chinese financial system is the banking system, which is dominated by four large state owned banks (the Industrial and Commercial Bank of China, the Agricultural Bank of China, the Bank of China and the China Construction Bank). Historically these banks have favored state-owned enterprises (SOEs) in the allocation of funds, and neglected private firms which have been facing significant credit constraints. Private firms have partially overcome these constraints thanks to four key factors: the ability to generate large amounts of internal finance, the ability to manage working capital efficiently, the ability to establish political connections and to build joint ventures with foreign partners (Guariglia *et al.*, 2011; Ding *et al.*, 2013; Du *et al.*, 2015; Guariglia and Poncet, 2008).

Accounts payable represent an important source of finance for firms around the world. Rajan and Zingales (1995) argue that the volume of accounts payable made up almost 18% of total assets of American firms at the beginning of the '90s. Similarly, accounts payable represented more than a quarter of total corporate assets in Germany, France and Italy, and on average 55% of total credit in the United Kingdom between 1983 and 1995 (Kohler *et al.*, 2000; Guariglia and Mateut, 2006). In the case of developing economies such as China, trade credit also plays a role, as indicated by Ge and Qiu (2007), who report that the averages of accounts receivable and payable represent 13% and 14% of firms' total assets, whilst the ratios of accounts receivable and payable to total sales are respectively 27% and 23% between 1994 and 1999. These figures are similar to those found by Cull *et al.* (2009). Focusing on listed firms, Wu *et al.* (2012) underline that from 1999 to 2009, the ratio of accounts receivable and payable to total assets were 14.5% and 10.9% respectively, while the ratios of accounts receivable and payable to total sales were 34% and 20% respectively. These facts clearly underline the non-negligible role of trade credit on the balance sheet of Chinese firms, in terms of both assets and sales structure.

As limited access to finance hinders the ability of Chinese firms to pay the sunk costs needed to export, it is interesting to find out whether being able to receive trade credit enhances firms' probability of exporting. Moreover it seems even more important to look at the effect of trade credit extended on the likelihood of exporting, taking stock of the results obtained by Lu (2013), who demonstrates that the yearly growth of accounts receivable has no effect in promoting access to foreign markets. He makes use of a matched dataset of firm accounting and export information. One dataset is the annual accounting statements of industrial firms compiled by the National Bureau of Statistics of China, which records the accounting data for all firms with annual sales over five million RMB during 1998-2008. The

other dataset is from China's General Administration of Customs, which records firms' exports at shipment level from 2000 to 2006. Yet, the information on accounts payable are available from 2003 till 2006 therefore the author carries out his analysis on four years only. He argues that the yearly difference between accounts payable and accounts receivable (net trade credit) better captures the net amount of short-term financing that firms obtain from their suppliers, and such a measure has a positive effect on export growth.

This Chapter aims to fill at three gaps recorded in the literature on trade credit and export engagement.

First, to the best of our knowledge, the literature on the interplay between trade credit and international trade concentrates only on a developed country, namely Germany. This is the case studied by Eck *et al*. (2012) who make use of different proxies of trade credit to show that its increase improves both the extensive and intensive margin of both exports and imports.[151] The first contribution of this Chapter is to separately analyse the effects of both accounts payable and accounts receivable on the extensive margin of exports, for a large transition economy.

Second, the literature on the relationship between trade credit and exports for Chinese unlisted firms has so far neglected how both accounts payable and accounts receivable, separately, affect the probability of exporting for a large sample of unlisted companies. In fact Lu (2013) investigates how the growth in accounts payable, accounts receivable or net trade credit affects only the intensive margin of exports. In a similar fashion, van Biesebroeck (2014), shows that outstanding accounts receivable represent a burden for firms operating domestically, and it is once companies have entered export markets that trade credit extended fosters sales growth. He thus provides an additional insight on the effect of accounts

[151] As we will also pinpoint later on, an analysis on the factors only affecting exports is supplied by Eck *et al*. (2015).

receivable only on the intensive margin of trade. Conversely, we look at the impact of both accounts payable and accounts receivable, separately, on the extensive margin of exports for Chinese unlisted firms. Moreover, by taking into account the initial condition problem and the solution devised by Wooldridge (2005) we are also able to tackle the sunk costs of exporting neglected by the two abovementioned contributions. This is the second contribution of this Chapter.

Third, we place particular emphasis on the heterogeneous effect of trade credit on firms' export propensity when the enterprise is owned by different agents. This is relevant given the credit constraints suffered by private and foreign companies and the preferential access to finance for SOEs and collective enterprises (e.g. Allen *et al*., 2005; Guariglia *et al*., 2011). Lu (2013) addresses the role of ownership heterogeneity, but only for the intensive margin of exports.

Of particular importance is our intention to take into account the possible nonlinear effect of accounts payable and accounts receivable on the extensive margin of exports. We argue that the extension of trade credit might not be always an indicator of financial health as advocated by some literature (i.e. Biais and Gollier, 1997). In fact, firms whose "sales are declining may extend more accounts receivable than an average firm in its industry" (Niskanen and Niskanen, 2006, p. 91), a situation that private Chinese firms may face as a consequence of their constrained access to formal credit.

Taking stock of these indications and making use of a large firm-level dataset for the years 2004-2007, we show that trade credit affects the likelihood of becoming an exporter through an inverted U-shaped relationship. When looking at different ownership types, we observe that only for private firms the non-linear behavior is detected for both accounts payable and accounts receivable, on one hand, and the likelihood of exporting, on the other

hand. Conversely, for foreign companies, SOEs and collective firms, the inverted U-shaped relationship is detected only between accounts payable and the probability of exporting. For these ownership type, the overextension of trade credit does not affect the likelihood of exporting as they can either access to an internal capital market, or to a preferential credit supply.

The remainder of this paper is organized as follows. Section 4.2 provides a review of the relevant literature. Section 4.3 reports the threefold contribution of the paper. Section 4.4 describes the hypotheses we intend to test. Section 4.5. presents the baseline specification and the estimation methodology. Section 4.6 describes the data used and shows summary statistics, whilst Section 4.7 provides our empirical results. Section 4.8 concludes, and provides policy recommendations and paths for future research.

4.2. Literature review

This paper bridges two streams of recent literature: the first one dealing with financial constraints and trade credit, the second one with trade credit and export engagement.

4.2.1. The role of trade credit

4.2.1.1. Studies on countries other than China

Trade credit represents a major financing source for companies across the world. Since the mid-1990s, there has been a growing interest in studying the determinants of trade credit and its effects on various aspects of corporate behavior. One of the first articles is by Petersen and

Rajan (1997) who support the idea that trade credit represents the main source of finance for American firms, where suppliers are inclined to provide constrained buyers with accounts payables for several reasons. First, suppliers might be in a better position than banks to evaluate their partners' risk. Second, trade credit may allow suppliers to use it as a discrimination tool, when price discrimination is not legally accepted. Third, trade credit might be a tool to reduce transaction costs as firms who receive trade credit are previously controlled and monitored by the lender and, in addition, it provides assurance on the quality of suppliers' products. The development of a tight relationship between the buyer and the seller allows to build trust and reciprocity and the capability of the lender to exert a form of control over the activities of the borrower. Firms that have more access to credit through institutional channels tend also to be more prone to offer trade credit to the firms they work with.

More recent contributions include Burkart and Ellingsen (2007) who develop a model in which trade credit and bank credit may be either substitutes or complements. Buyers can benefit from obtaining accounts payable by their suppliers, either in the case of tight monetary conditions or when the cost of credit is high. A substitution of accounts payable and bank credit may thus take place, but this is not always the case. Suppliers that grant accounts receivable may in fact use the credit as collateral to obtain credit from banks, implying that accounts receivable and bank credit are likely to be complements.

Trade credit is granted between counterparts for a limited amount of time. It is widely adopted in less developed financial markets, where firms do not trust banking institution because funds are not allocated on the bases of credit standing (McMillan and Woodruff, 1999).

Ferrando and Mulier (2013) analyze the role of trade credit on firms' growth by considering its two components, namely accounts receivable and accounts payable. In the first case, a firm is analyzed as a supplier and accounts receivable represent a form of lending to a customer. In the second case, the firm is analyzed as a buyer, and accounts payables are the borrowings it receives from a supplier. It is therefore more likely that a firm which receives trade credit from its own suppliers might be in the position to provide trade credit to its customers. The use of trade credit, in both of its forms, is more likely to occur in developed countries between SMEs, because they usually have smaller amounts of collateral than larger firms and experience difficulties in accessing formal credit. Ferrando and Mulier (2013) argue that both accounts payable and accounts receivable are important to define firms' performance at least from two different aspects. First, because firms manage accounts payable and accounts receivable to maximize their performance. Second, because they assume there is an interaction between the degree of financial market development and the use of trade credit, where the latter is more employed when the former does not provide sufficient intermediation. The authors make use of data on more than 10 million public and private companies, operating in non-financial sectors in eight Euro Area countries, namely France, Belgium, Spain, Italy, Portugal, Germany, Finland and the Netherlands between 1993 and 2009. From an empirical standpoint they develop a dynamic growth model where the dependent variable is the growth of value added recorded at time *t*, and computed as the difference between the real added value and lagged real added value, divided by the lagged real added value. The explanatory variables include the lagged dependent variable (thus recorded at time *t-1*) and all the others independent regressors are lagged to reduce possible endogeneity problems. These include the trade credit channel, measured as the sum of accounts payable and accounts receivable, scaled by total sales, a proxy of the access to bank loans, measured as the sum of

short-term and long-term bank loans scaled by total sales, sales growth, which is the growth rate of real total sales, and the logarithm of age and size. This baseline estimation together with all others specifications are estimated through a first-difference Generalized Methods of Moments (GMM), as developed by Arellano and Bond (1991). Results show that economic impact of the trade credit channel is relevant, especially for those countries where the trade credit channel is more established. The methodology allows to take into account country- and firm-level heterogeneity. Focusing on the first aspect, they find that in those countries where the supply of bank loans is larger, the sensitivity of firm growth to the trade credit channel is smaller. Focusing on the second aspect, they notice that firms that are more vulnerable to financial market frictions rely more on the trade credit channel to grow.

4.2.1.2. Studies on China

Wu *et al.* (2012) start from the assumption that trade credit has an effect on cash holdings. Firms offering trade credit may accept accounts receivable as a cash substitute using them to secure loans, whilst companies obtaining trade credit have to increase cash holdings in order to be able to cope with forthcoming trade credit obligations. The authors therefore investigate the effect of financial deepening on the relationship between trade credit and cash holdings by looking at Chinese listed firms from 1999 to 2009. They first show that there is an asymmetric effect of accounts payable and accounts receivable on cash holdings as firms hold an extra 0.71$ of cash for every 1$ extra of accounts payable, but employ $1 of receivables as a substitute for only $0.15 of cash. They also find that companies located in provinces with more efficient financial markets use accounts payable as a reliable source or short-term borrowing and thus need less cash to cover the upfront debits with suppliers. It is argued that

this holds because a higher level of financial deepening endows sectors with better financial services, including easier access to finance, shorter times to obtain funds, and lower financing costs. All these benefits help firms to decrease the cost of cash shortages in paying for credit. Moreover, in 2007 China issued a new receivable pledge policy that officially allowed firms to use trade credit as a collateral for bank borrowings. This new framework led to an increase in the ratio at which receivables are substituted for cash.

Wu *et al.* (2014) focus on non-state firms as the Chinese private sector has been suffering from discrimination in borrowing from banks for more than a decade. Their data are drawn from the China Stock Market and Accounting Research (CSMAR) database and include information on Chinese non-state listed firms between 2003 and 2008. Wu *et al.* (2014) use the ratio of accounts payables to total assets and the ratio of accounts receivables to total assets, taking also into account the duration of the credit (within one year or outstanding for more than one year). The authors make use of two proxies for social trust. The first one is taken from a survey of enterprises, that captures the degree of trustworthiness of others, whereas the second one is taken from a survey of residents aimed at catching the overall degree to which people in a province trust each other. The results show that firms located in regions with higher social trust receive more trade credit from their suppliers and extend more accounts receivables to their customers. Moreover, when looking at the interaction effect between social trust and the quality of legal institutions on trade credit, it emerges that the effect of social trust is stronger in regions with a weaker protection for property rights.

4.2.2. Financial constraints and export engagement

4.2.2.1. Countries other than China

The probability of exporting and the degree of export engagement is affected by numerous factors, most notably the level of corporate productivity. Yet, a further dimension of firm heterogeneity has been recently added, namely a financial one. A rising number of papers have looked at this aspect, both from a purely theoretical point of view (Chaney, 2013; Manova, 2012) and from an empirical perspective (Greenaway *et al.*, 2007; Bellone *et al.*, 2010; Minetti and Zhu, 2011; Berman and Héricourt, 2010; Jerreau and Poncet, 2011; Héricourt and Poncet, 2012; Manova and Yu, 2016).

The first empirical contribution which analysed this relationship is provided by Greenaway *et al.* (2007). The authors make use of information provided by the Financial Analysis Made Easy (FAME) database for 9,292 UK manufacturing companies over the period 1993–2003. Of the 9,292 companies, the largest part (i.e. 5,461) is made up by continuous exporters; 2,798 never exported, and the residual 434 are starters. Greenaway *et al.* (2007) employ some selected variables applied in the literature as measures of export engagement and financial health. Within the former group of regressors, dummy variables are employed to distinguish companies that export throughout the entire time span, and companies that never export. Within the latter group of explanatories, two measures are used, namely the liquidity and the leverage ratio. A proxy of the company's riskiness, labelled Quiscore, is also added in the empirical specification in order to explain the likelihood of exporting, together with firm age, total factor productivity, real sales, real assets, the number of employees and the wage ratio. The authors also add dummy variables to check if the company is foreign owned and if it has subsidiaries. The outcomes indicate that exporters have better financial health than non-exporters. However, a better financial health is not a

condition to entry into a foreign market. It is instead a consequence of the engagement of trade relationship with foreign firms.

An interesting contribution on the association between financial constraints and exports for the French experience is provided by Bellone *et al.* (2010). The authors analyse both the self-selection effects connected with sunk costs of entry, as well as with the post-entry outcome. The authors follow a double investigation trajectory. On the one hand, they develop two indicators of financial frictions that enhance the proxies supplied by the existing literature. They make use of information coming from seven variables: size, profitability, liquidity, cash flow, solvency, trade credit, and repaying ability. For each regressor, they scale each firm/year observation for the relevant industry average and then allocate to it a number corresponding to the quintiles of the distribution to which it belongs. The information obtained through this process for each of the seven regressors is then united into a single index in two different ways. The first is the simple summation of the seven numbers, whereas the second is a count of the number of regressors for which the firm/year lies in the first or second quintiles. On the other hand, the authors demonstrate how the access to external finance influences both the extensive and intensive margins of trade. Their outcomes indicate that export starters are in better financial shape than their non-exporting peers, but no proof is found that being export engaged leads to a stronger financial health. Such an outcome is opposite to what obtained by Greenaway *et al.* (2007). The different results recorded by the two papers may be attributable to the diverse set of proxies employed to measure the existence and extent of financial constraints, but also to the dissimilar features of the countries under scrutiny. As far as the policy reccomendations are concerned, the authors thus suggest the need for interventions to soften the existence of financial constraints, *ex ante*, in order to foster companies' probability to enter export markets.

Another relevant analsys on a European developed country is supplied by Minetti and Zhu (2011) who analyse the effects of limited access to finance on the exports of Italian firms. The authors elaborate two hypotheses to be verified. According to the first one, companies that face financial constraints have a lower probability to export. According to the second one, financial constraints also affect firms' export intensity. The authors use a survey undertaken in Italy in 2001, which contains all companies with more than 500 employees together with a layered group composed by firms of a smaller size. The survey supplies information on important characteristics of each company, although only for the year 2000. More precisely, it supplies information on whether the company has exported, and, if so, to which destination, and for which amount. It also provides evidence on whether the firm would have liked to receive more credit at the market interest rate and, if this is the case, if the firm itself obtained less funds than the amount it required. An affirmative answer to the first but not to the second question shows that the company faces limited credit constraints. Conversely, an affirmative answer to both questions indicates that the firm has to cope with substantial credit contraints. Additional regressors to describe firms' financial constraints are employed and include the ratio between cash flow and total assets, the ratio between total liabilities and equity and the ratio between current current assets less current liabilities over total assets.

The outcomes indicate that the existence of credit rationing determines a likelihood of exporting that is 39% lower than the corresponding value expressed by unconstrained firms, as well as a decrease in the intensive margin of exports by 38%. Companies operating in sectors with large external financial dependence are those showing the largest fall in exports sales. Moreover, exports of companies in high-tech industries are the most exposed to the

presence of financial constraints. Unexpectedly, these firms are those that suffer the least from the competitive pressure of fast-growing countries.[152]

4.2.2.2. Studies on China

An important contribution on the effect of financial constraints on Chinese exports at the firm-level is provided by Egger and Kesina (2013). The authors contribute to the literature on the role of finance in the heterogeneous trade theory by explicitly taking into account the effects of financial health on both the extensive and the intensive margins of trade.

They make use of a large Chinese data set comprising all firms with an annual turnover above than $700,000 within the period of 2001-2005, which are clearly large firms. The data contain information on the export volume and on balance sheet variables including sales, profit, employment, assets and debt, as well as foreign ownership.

In order to test the effect of financial health on the propensity to export and on the extent of exporting as a percentage of a firm's total sales, four different measures of financial credit are employed. These are the long-run debt-capital ratio, the financial cost-liquid funds ratio, the liquid asset-capital ratio, and the ratio of the surplus of profits over long-run debt to total assets.

[152] Additional work on the role of trade credit from a purely corporate finance perspective is recently provided by Kling *et al.* (2014) who use a panel vector autoregressive model to analyse the dynamics between cash holding and its substitutes, namely trade credit and bank finance, in order to explain the increase in cash holding by UK firms since 1988. The authors show that firms suffering from liquidity shocks resort to cash or trade credit but not to bank finance and, that cash holding improves access to bank credit. Bougheas *et al.* (2009) start from the idea that a firm is in the middle of a credit chain, manufactures goods for sales, holds inventories, and extends trade credit to its financially constrained customers to expand its sales. The authors develop a model to identify the response of accounts payable and accounts receivable to variations in the costs of inventories, liquidity, profitability and risk. These effects operate through a production channel and provide the first evidence of an inventory channel of trade credit.

Three regression models are employed. The first one looks at the extensive margin of exports and focuses on a binary outcome model explaining the likelihood of a firm to become an exporter. The second one looks at the export-sales ratio as dependent variable. A one-part fractional response model is applied in place of a linear one, which may lead to predictions outside the support region and to consequent heteroskedasticity (Papke and Wooldridge, 1996). The third one takes into account the possibility that both control and core variables may affect in a different way the decision to export and the export-sales ratio. Therefore, a two-part model is applied where models for the two different types of margins are estimated independently. More precisely, the authors follow a two-parts econometric strategy. The first addresses the binary decision about export participation through a logit model, whereas the second deals with export intensity by making use of a fractional response model, where only firms with positive export intensity are included.

Results show that any measure of financial constraint has a negative impact on both the extensive and the intensive margin of trade. More precisely a one standard deviation increase in financial constraints leads to a decrease in the probability of exporting of about two percentage points. Similar effects are recorded for how financial constraints reduce the intensive margin of trade.

A slightly different analysis is conducted by Egger and Kesina (2014) who look at the effect of financial constraints on the extensive and intensive margins of exports for Chinese firms. The authors expand the years of interest to the period between 2001 and 2007, observing both cross-sectional and panel data on Chinese enterprises, with annual turnover greater than 700,000$. There are 56,810 observations, and only 36% of firm-year observations show a positive value of exports, thus the export propensity is clearly skewed towards zero. Once again, the data include export volume and balance sheet information such

as sales, profit, employment, asset and debt positions, plus information on public and foreign ownership. This allows them to concentrate on two measures of financial constraints, namely the ratio of liquid debt to sales and the ratio of liquid assets to total assets. The former is positively related with financial constraints whereas the latter is instead negatively associated.

As far as the empirical strategy is concerned, there are no striking differences in how the extensive and the intensive margins of trade are defined compared to their previous contribution. The first is specified by a binary outcome model. The second is again computed through a two-fractional response model, where models for the two export margins are estimated separately. The first part addresses the extensive margin and only those firms with positive exports are retained for the second part that studies the conditional mean of the export-sales ratio.

Results on a cross-sectional regression for an average year in the 2001-2007 period indicate that financial constraints, measured by both indexes, negatively affect both the extensive and intensive margins of exports. Results on the panel data estimation, instead, suggest that the impact of financial constraints is negative on the extensive margin of trade when all possible time-invariant factors are taken into account, but no effect is found on the intensive margin, due to omitted time-invariant variables. Therefore the lack of significance at the intensive margin should not be attributed to a general lack of variation in the data due to a likely endogeneity bias affecting the cross-sectional specification.

An analysis on the association between financial constraints and exports is also provided by Chen and Guariglia (2013), although it is not the main aim of their paper. The authors look at the relationship between internal financial constraints and firm productivity, where liquidity and export behaviour play a key role. They make use of a panel of 130,840 Chinese manufacturing firms over the period 2001–2007.

One of their main contributions is to show how firms characterized by different levels of liquidity and different export behavior present diverse sensitivities of productivity to the availability of internal finance. In this respect, the authors recall that the heterogeneous trade theory implies both “self-selection” and “learning-by-exporting”. Financially healthier firms are more likely to enter export markets, but, at the same time, exporting firms are more likely to show a better financial status as they can diversify their source of credit and related risks. One of the specifications they estimate describes total factor productivity as a function of a set of regressors, including the interaction between cash flow and an export dummy taking value of one for exporters and zero otherwise, to check if firms’ productivity is influenced by its export engagement.

Results of this specific regression, estimated through a Generalized Method of Moments (GMM) methodology, show that, despite the widespread policies that aim at fostering exports, both domestic private and foreign firms display that experience financial constraints have limited increases in productivity. Both for private and foreign firms, cash flow carries a positive coefficient, while its interaction with liquidity shows a negative and significant coefficient. Therefore, the higher the liquidity held by a firm, the lower its sensitivity of TFP to cash flow, thus indicating that having high liquidity is associated with a lower dependence of foreign firms’ productivity on internal finance.

More recently in a study of China, Feenstra *et al.* (2014) take into account how financial constraints may diversely affect domestic and exporting firms when banks do not have the possibility to observe companies’ productivity. They rely on the Amiti and Weinstein (2011) contribution which argues that credit is allocated in a different way for domestic and for exporting firms, as in the latter case two aspects are worth considering. First, there is a longer time from production to the receipt of sales revenue, and, second, there is a

higher risk associated with international transactions. In order to take into account the first aspect, Feenstra *et al.* (2014) develop a theoretical model that incorporates the time-to-ship into a model of heterogeneous firms which receive working capital loans from a bank. The aim is to check whether exports are indeed treated in a different way to domestic sales.

The key feature of the model lies in the asymmetric information that affects banks, which takes two different forms. First, banks are not able to observe firms' productivity, especially in developing countries such as China. Second, banks do not know if the requested finance will be used for domestic operations or for exporting. It is therefore more likely to provide funds to cover the costs of current production in the form of working capital. Moreover, because exports take longer to ship, exporting firms face tighter credit constraints, on both the domestic and the foreign market, than purely domestic companies. More precisely, such credit constraints derive from the longer time lag that exists from the production and the sales revenue, leading to a reduction in both the extensive and the intensive margins of exports.

The authors make use of a rich Chinese firm-level panel dataset that covers more than 160,000 manufacturing firms per year over the period 2000-2008. The data are taken from the National Bureau of Statistics and it covers two types of firms: state-owned enterprises and non-state-owned enterprises whose annual sales are more than 5 million Renminbi. More than 100 financial variables are available in the dataset. In addition to this data, the authors also rely on highly disaggregated product-level trade data obtained from the Chinese customs, with information on the modes of shipment and their export values. Balance sheet information and customs data are merged to understand the role of financial constraints on exports.

The empirical strategy applied aims to provide results on the effects of credit constraints, through an OLS estimation, a bivariate selection model and a 2SLS strategy.

Results show that the credit constraint raises as a firm's export share grows and as the time needed to deliver the goods increases. Banks suffers from a lack of knowledge with respect to firms on two aspects. They cannot observe firms' productivity and cannot verify whether the loan is used to cover the costs of production for domestic sales or for exports. The outcomes show that the greater is the dispersion of firms' productivities, the more incomplete information banks face.

With the aim of studying the Chinese firms' global engagement in a relatively underdeveloped capital market, Jerreau and Poncet (2011), stress how the ownership structure is an appropriate measure to isolate the amount of finance required by a single company to embark in imports and exports. Indeed, firms with full or partial foreign ownership should rely on internal capital markets thanks to the linkages with their mother company, thus alleviating the effects of possible financial constraints. The authors apply the same approach followed by Manova, Wei and Zhang (2011), who assert that ownership status represents a good proxy to determine the finance needed to access foreign markets through exports, but they do not use firm-level data, but data aggregated by firm type. Their aim is to look at the distribution of province-level exports across sectors, which is feasible only by summing province level exports by industry and firm type.

Jerreau and Poncet (2011) examine the years between 1997 to 2004, being thus able to observe the process of liberalization in the financial sector that occured along that time span. They are in a position to identify any outcome of this policy action across different ownership types and different industries.

The authors make use of export flow data aggregated by province, year, product and destination. They also employ information on the ownership structure of the companies with the aim of distinguishing SOEs, private firms, fully foreign-owned enterprises and joint

ventures. Data needed to calculate indicators of liquidity requirements, financial dependency and R&D are also added, but on the basis of US information. This is for the presence of a clear benefit, and not for the lack of comparable data for other nations. Rajan and Zingales (1998) stress that the level of sophistication of the US capital markets allows to incorporate in companies' value the contribution of technology-driven financial requirements. Conversely, the calculation of the abovementioned indicators in an environment affected by credit constraints, like the Chinese one, could determine biased results given the possible presence of endogeneity, an issue which is instead unlikely to affect US data.

Indicators of financial liberalization and measures of external finance dependence by industry are employed. In the first set of indicators, the market share of four fully state-controlled banks is employed as a measure of financial constraints because these institutions usually supply soft credit to politically affiliated companies. Financial liberalization is thus calculated as a decline in the aforementioned degree of government interventionism. In the second set, three measures are employed. First an indicator of liquidity requirements, computed as the ratio of stocks over sales; second, a measure of industries' external finance dependency, measured as the share of capital expenditures not financed out of cash flows from operations; third, the proportion of R&D expenditure over sales.

A set of regressions is employed to build the empirical strategy. The regressand is the logarithm of exports for each ownership type for a selected province, partner country, industry, and year. Conversely, the regressors are, in turn, one of the three indicators of financial dependence, together with the dichotomous variables, that take the value of 1 for the chosen ownership category, and 0 otherwise. Industry fixed effects, firm-fixed effects and province-country-year fixed effects are also added to the specifications.

Additional tests are performed to shed light on the influence of ownership on financial restraints. The extra regressions make use of further explanatories that entail not only the ownership type but also the interaction between the ownership type and the aforementioned indicators of financial dependence as well as measures of capital and human intensity.

The outcomes indicate that joint ventures and foreign owned firms have an advantage over private companies when they cope with financial constraints and operate in financially vulnerable industries, a distance which is only marginally narrowed with financial liberalization. The observation of aggregate exports shows that an easier access to credit by joint ventures and foreign owned companies help them to be engaged in exports, but their outcome is not able to offset the poor result recorded by companies owned by other types of agents. Therefore, Jerreau and Poncet (2011) suggest that financial liberalization should go hand in hand with the foreign presence to reduce the influence of financial constraints on the export engagement of Chinese firms.

In consideration of the relative underdevelopment of the Chinese financial system, Héricourt and Poncet (2012) provide insights on the interplay between financial frictions and exchange rate volatility, employing firm-level export data over the period 2000-2006. The authors justify their research effort with three different reasons. First, the Chinese engagement in the world trade system could require recurrent corrections of the exchange rate at some point in the future. Second, the substantial growth in exports may expose the economy to potential exchange rate oscillations. Third, the presence of relevant differences across Chinese provinces in their degree of financial development may influence companies' reactions to credit constraints, especially when firms decide to internationalize via trade and/or FDI.

The authors elaborate three hypotheses to be verified. First, an increase in exchange rate instability leads to a decline in export performance, (at the intensive and extensive

margin). Second, companies that have to cope with financial constraints are the most negatively affected by the exchange rate volatility. Third, the impact of exchange rate vulnerability on companies' performance is reduced by financial development, especially for those firms suffering from financial constraints.

To test the abovementioned hypotheses, Héricourt and Poncet (2012) make use of two sources of data. The International Financial Statistics supply the information needed to calculate exchange rate volatility, whereas the Chinese Customes Offices provide firm-level trade data at the HS-6 product disaggregation for more than 100,000 companies.

The authors' strategy unfolds through the construction of an indicator of financial vulnerability at the firm-level, calculated as the weighted average of financial vulnerability of its activities where the weight is the sector's share in company's export in the year 2000.

Three different proxies are employed to capture financial vulnerability: 1) a measure for companies' assets tangibility, computed as the ratio of intangible assets to total assets, 2) a measure of financial development calculated as the portion of capital expenses not financed out of cash flows from operations, 3) an additional proxy of reliance on external finance, measured by the percentage of R&D expenditure on total sales.

In order to measure export performance, the authors look at both the intensive and the extensive margins of trade, measured, respectively, by the logarithm of the total export sales, and by the logarithm of the number of exported items, in a selected year.

The econometric strategy aims at describing the export performance of a given company for a given export destination in a given year for a given province. Two regressors are employed. The first is real exchange rate volatility, which is computed as the yearly standard deviation of monthly logarithm differences in the real exchange rate. The second is the interaction between real exchange rate volatility and financial vulnerability, and it is

included to test if real exchange rate volatility mostly afflicts companies that are financially weak. Moreover, a set of firm-country fixed effects, year dummies, and a vector of destination-year specific dummies are also included.

The outcomes show that firms decrease their international engagement when financial volatility rises, a relationship that becomes stronger for companies that have to cope with financial constraints. Moreover, the less mature is the financial system, the greater is the negative impact on the number of products exported. These results indicate that choosing a full flexible exchange rate regime may represent a risky option for emerging and developing nations with a poorly developed financial system, and suggest the use of a pegged exchange rate system as a plausible alternative.

Manova and Yu (2016) argue that China represents the ideal country to look at the association between financial constraints and international trade, given the interplay between a heterogeneous set of trade regimes, the non-negligible size of processing trade and the relative underdevelopment of the credit system. Since the mid 1980s Chinese firms have benefited from a processing trade regime that exempts those materials imported for further processing, and to be re-exported, from the imposition of import duties.[153] Within this processing trade regime there are two additional schemes. The first one requires a minimum managerial effort and up-front costs, it is labelled pure assembly, and implies the receipt of inputs from the foreign trade partner at no cost, with the commitment to re-export the final product once the manufacturing process is completed. The second one is processing with imports, and labelled as import-and-assembly. It implies the company to autonomously source and bear the cost of imported components, thus requiring a larger managerial effort and larger sunk costs than the previous trade scheme. A separate, further category, entails ordinary exports which indicates

[153] This type of trade regime is of significant size as, in the year 2005, 32.7% of Chinese exporters were engaged in processing trade and contributed to 54.6% of total exports (Manova and Yu, 2016, p. 121).

that the Chinese firm has to bear the import tariff on any intermediate part it purchases from a foreign partner. In this case, the firm has control on all steps of value chain.

The authors claim that there is a pecking order in the choice of trade regime according to firms' financial health. Given the largest costs needed to embark in ordinary trade, this organizational choice can be pursued only by firms with the largest liquidity endowment. In a similar fashion, the pecking order should also apply to firms' profits as companies that engage in ordinary trade are able to reap the benefits connected to the highest value-added stages of the production process.

The authors rely on two distinct databases for the year 2005, which they eventually merge. The first supplies balance sheet information for all state-owned enterprises and private firms with sales greater than 5 million Yuan. The second provides data on import and exports for 243 destination countries and 7,526 products.

The authors build an empirical strategy that unfolds through three different steps.

The first step leads to the construction of a model that explains changes in firms' profitability on the basis of the chosen trade regime. The dependent variable is measured as the log total profits or profit-to-sales ratio. The explanatory variables include trade regime (measured either as the share of processing exports on total exports or as the share of pure assembly on the total amount of processing exports), company size, industry and country fixed effects, plus ownership dummies.

The second step implies to look at the interplay between financial health and export activity. The model tries to explain, in turn, the aforementioned trade regimes through a measure of financial health, which takes in turn the form of firm's liquidity or leverage,

together with province and industry fixed effects, ownership dummies and a vector of firm's characteristics.[154]

The third step aims at explaining the percentage of a selected trade regime on the total exports of a selected firm in a selected industry, through an indicator of sector's financial vulnerability. This measure takes in turn the form of the inventories to sales ratio, the share of capital expenses not financed with internal cash flow, R&D expenditure on total sales, and asset tangibility. Firm fixed effects, destination fixed effects and a vector of sector characteristics are also added to the regression.[155]

A number of robustness checks are performed for all the models and allow the authors to obtain a fourfold set of results. First, it is confirmed that the wider the set of production stages controlled by the firm (i.e. ordinary export) the higher the profitability (value added, profits or the profit-to-sales ratio). Second, the better the financial health the larger the portion of the value chain managed by the company.[156] Third, across industries within firms, exporters choose a more complex trade regime the lower the financial vulnerability of the industry under scrutiny. Fourth, provinces with weaker financial systems suffer more from the effect of firms' financial health and industries' financial vulnerability.

[154] Taking stock of the heterogeneity of export destinations within their sample, the authors susbsequently modify the abovementioned model, building exporters' trade share by destination and adding country fixed effects. Moreover, given the presence of multiple products and industries per company, the authors wish to explain the two forms of trade regimes, now computed for each combination of company-destination-industry, by making use of the same set of explanatory variables adopted in the baseline specification, but adding destination fixed effects. Manova and Yu (2016) also observe the interplay between financial health and exports in a dynamic fashion employing panel customs data for the period 2002-2006. They analyse how modifications in financial frictions influence firms' decision to start, to continue and to stop exporting.

[155] The authors take into account the large heterogeneity in financial development across different Chinese provinces. They enrich the second and the third step by interacting the measures of financial health and the measure of financial vulnerability with a dummy variable that takes the value of one for the provinces with financial development above the median, and zero otherwise.

[156] This is true in the cross-section analysis, but it also explains the shift towards more value added functions for continuous exporters when their financial health improves. It also explains the type of trade scheme that an export starter will embrace.

4.2.3. Trade credit and export engagement

4.2.3.1. Countries other than China

Although the previous group of papers did not look at the effect of trade credit on a transnational dimension, more recently a number of papers have analysed the links between trade credit and firms' internationalization activities. Among these, Schmidt-Eisenlohr (2013) starts from the well-known fact that shipping goods abroad and maintaining trade relationships with a foreign counterpart might be risky and time consuming. Hence, a specific type of contract is employed to manage risk and the time between production and sale. The optimal choice of contract is determined by the characteristics of the financial markets under scrutiny and by the contract enforcement in both the source and destination country. The model developed by the author predicts that the volume of trade is higher the better the contract enforcement, and is lower when financing costs rise. First, the author tests if not only the source, but also the destination market conditions affect trade flows. Second, he tests whether the effect of financing costs on trade is proportional to the time needed for trade. In order to do so the author makes use of bilateral trade flows data, together with information on financing costs, measures of financial market development, contract enforcement, geographical distance and GDP data, amongst others, for 150 countries between 1980 and 2004 .

From an empirical standpoint, the baseline regression explains bilateral exports through a set of explanatory variables which include financing costs, proxied by the net interest margin, time to trade, measured by the geographical distance between the main cities

of two countries, and contract enforcement, proxied by rule of law. The author controls for the log of GDP per capita, population and GATT status for exporter and importer, respectively. The regression not only studies the direct effect of financing costs on bilateral exports but also the indirect effect of their interactions with geographical distance.

The findings suggest that a one percent increase in the financing costs of a country is associated with 2.0% lower exports and 2.3% lower imports. This is a useful contribution as yet no attention has been previously devoted on studying how the interplay between financing costs and the contracting environment influence the selection of the most appropriate means to finance trade transactions.

Eck *et al.* (2012) demonstrate how trade credit may alleviate the presence of information asymmetries, serving as a quality signal especially in international transactions, both for the exporting and importing activities of German firms.[157] The authors build a model of financially constrained firms, whose limited access to finance is derived from the presence of asymmetric information that deters less productive firms to trade if banking finance is not available. The development of trade credit, instead, allows for the creation of trust and reciprocity, i.e. it improves the quality of business relationship and fosters trade both at the extensive and intensive margin.[158]

The authors make use of data from the Business Environment and Enterprise Performance Survey (BEEPS) on 1,196 German firms in 2004, which supplies four relevant measures of trade credit used by firms, i.e. cash in advance given, cash in advance received,

[157] In a later version of this paper, but published as an article, Eck *et al.* (2015) focus only on the extensive margin of trade. We decided to provide here a larger space to the working paper version as it addresses a comprehensive set of relationship on the likelihood of exporting and importing that we claim to be relevant for the purposes of our investigation.

[158] Biais and Gollier (1997) document the relevance of trade credit amongst firms in the presence of information asymmetries between banks and enterprises, especially in the case of limited access to finance for small and medium enterprises.

supplier credit given, supplier credit received. The first refers to the share of firms' purchases of material inputs or services they pay for before delivery, the second indicates the percentage of their own sales revenues they obtain before delivery, the third what percentage of these purchases they pay late, whereas the fourth what percentage of their own sales revenues they receive late. These indicators are then complemented by additional two measures. One is composed of the export shares of total sales and import shares of total material inputs purchased, thus allowing the author to study both the exporting and importing behavior of firms. Another is a self-reported measure of financial constraints, whereby companies are asked whether access to financing is no impediment, a minor impediment, a moderate impediment, or a major impediment for the operations and growth of their activity.

Descriptive statistics show that exporters display a higher use of trade credit than non-exporters. Exporters not only receive more cash in advance on sales, but they also provide more supplier credit on sales than non-exporters. The authors propose the following hypotheses:

1) firms receiving a higher amount of cash in advance are more likely to be exporters and to export higher volumes;

2) firms that receive supplier credit are more likely to be importers and to import higher volumes.

In a first stage the authors explore the decision of a firm to export (import) at all via a linear probability model. In a second step, they only look at exporters (importers) and analyze how trade credits affect the traded volume of these companies using an OLS regression.

The results show that companies that receive a positive share of cash in advance have an 8% higher likelihood of exporting than companies that do not receive it, and have a 48% higher export volume than companies that do not receive cash in advance. Furthermore, the

probability of importing declines by about 15% for firms that do not receive supplier credit, whilst firms that provide cash in advance have a 63% to 83% higher import volume than companies that do not extend cash in advance to their business counterparts.[159]

4.2.3.2. Studies on China

Trade credit makes up 28.48% of the total liabilities of Chinese industrial firms over the period 1998-2007 (Lu, 2013). Exports make up about 40% of China's GDP, providing a relevant contribution to the fast economic growth that has characterized the country in recent years. Chinese exporters are mainly engaged in the manufacturing of labour intensive goods whose capital cycles are short. Working capital financing is therefore important for their production.

The motives behind the provision of trade credit in China seem to be tightly connected to the nature and the underdevelopment of both financial and credit markets. A deeper investigation on the role of trade credit, with special emphasis to the case of China is provided by Lu (2013). The author formulates three different hypotheses. First, the growth of trade credit has a positive effect on the growth of export volume in the product/destination market. Second, the effect of trade credit is larger for the exports with a higher reliance on working capital. Third, the effect of trade credit is independent of the financial development of destination countries.

The author employs a matched dataset of firm accounting and export information. Data at the firm level are taken from the National Bureau of Statistics of China, covering the

[159] In Eck *et al*. (2015) the authors focus only on the effect of cash in advance on the extensive margin of exports and drop the the analysis on the role of supplier credit received. Their puslished contribution addresses potential endogeneity issues by making use of an IV approach. The newer version confirms the positive association between cash in advance and the likelihood of exporting.

period 1998-2008, whereas data on exports are taken from China's General Administration of Customs for the period 2000-2006.

To test his hypotheses, Lu (2013) estimates a regression where the dependent variable is a measure of export growth, and the explanatory variables include trade credit, measured as the ratio between the difference of trade credit received between time *t-1* and *t-2* and total liabilities at time *t-2*.

He shows that trade credit has a positive effect on the export volume of Chinese firms, which increases with the working capital cycle. The positive effect of trade credit in fostering Chinese exports becomes larger for exports to more distant destinations, when no air transportation is employed, but it is not affected by the financial degree of development of the destination country.

More precisely, the coefficients on trade credit growth in the export growth equations are positive and statistically significant at the one percent level, and a one standard deviation increase of trade credit leads to a two percentage point increase in the export volume growth rate. Lu (2013) also notices that bank finance growth is positively associated with export volume growth, while internal finance does not have any effect on exports when different sets of fixed effects are included. When the author checks for his second hypothesis, he notices that trade credit has a larger effect for the exports to more distant markets, as it can reduce credit constraints by providing working capital to exporters. The marginal effect of trade credit is decreasing with the share of exports shipped by air, although with a small significance level. Finally, the author notices that the marginal effect of trade credit is

independent of the market size of the destination country, on the nationality of suppliers and also on the types of export, i.e. domestic or foreign.[160]

To the best of our knowledge only Lu (2013) has looked into the relationship between trade credit (payables and receivables) and exports focusing on the intensive margin, whereas the relationship between accounts receivable and the extensive margin has been studied by Van Biesebroeck (2014). He finds that in the Chinese context, which is affected by an underdeveloped financial and banking system, firms need to grant credit to increase sales. More precisely, the domestic expansion implies extending risky trade credit to less-reliable counterparties and the bargaining power of large firms further shifts the balance against small firms. Therefore SMEs selling only at the domestic level will grant much more trade credit to their clients than the amount they receive from their suppliers. As a consequence many small firms operate at a sub optimal output and they do not reach the scale economies the production technology allows. Yet, when these SMEs access foreign markets they will benefit from the advantages that derive from both the better financial status of foreign suppliers and the presence of specific institutions set up to reduce transaction costs and all risks associated with international trade. Once abroad they can also increase their economies of scale and thus produce more output from their inputs.

Van Biesebroeck (2014, p. 28) states that "…small firms that only sell domestically tend to award a lot of trade credit to their clients as a fraction of sales". This point is of particular importance for our investigation as we wish to prove that different levels of accounts receivable may have a different effect on the likelihood of a firm becoming an

[160] As mentioned in the introduction of this Chapter, Lu (2013) extends his analysis by looking at the effect of two additional measures of trade credit on the intensive margin of trade. First, he looks at the ratio between the difference of trade credit granted between time *t-1* and *t-2* and total liabilities at time *t-2*, but he finds to have no significant effect on export growth. Second, he looks at net trade credit growth, measured as the increase of accounts payable minus accounts receivable from period *t-1* to *t-2* over the total liabilities in *t-2* and he observes that it has a positive effect on the intensive margin of exports.

exporter. More precisely, the extension of trade credit may indicate that the firm under investigation is financially healthy and thus reliable. Yet, at the same time, an excess of accounts receivable may also hinder that the company is facing economic distress and looks to enlarge its market share by indiscriminately expanding the amount of trade credit granted. This will maybe jeopardize the firm's financial structure and deplete resources that could have been more profitably directed to embark on export promotion.

4.3. Our contribution

Our paper contributes to the literature in two ways. First, we investigate the extent to which accounts payable affect the likelihood of becoming an exporter taking non linearities into account. So far the literature has only concentrated on the effect of the growth in accounts payable on the intensive margin of trade (Lu, 2013, p. 35).[161] No contribution focused on the possible presence of an optimal amount of both accounts payable and accounts receivable to maximize the probability of exporting. In this respect our approach allows us to clearly identify also the detrimental effects of an excessive trade credit granted and received in shaping the extensive margin of exports. This aspect clearly points to the elaboration of wise managerial practices to avoid financial choices that may jeopardize the financial structure of the firm.

Second, most of the studies on trade credit surveyed in the literature review neglect the role of firm heterogeneity. Our research fills this gap as we explicitly investigate how different degrees of accounts payable and accounts receivable, together with a set of control variables, affect the extensive margin of trade among firms owned by different agents. It is

[161] Please also see the previous footnote for Lu (2013)'s use of the yearly growth of accounts receivable and net trade credit as two additional explanatories for export growth.

indeed well known that private and foreign firms suffer from financial constraints as the Chinese underdeveloped credit market favors state-owned enterprises and collective firms in the allocation of funds. Both kinds of companies may, however, partially overcome the presence of financial constraints. Although private firms may use internally generated finance (Guariglia *et al.*, 2011), and foreign companies may rely on funds received from other affiliates or the mother company, this has been shown to only partially ease their credit constraints (Ding *et al*., 2013; Guariglia and Yang, forthcoming, Firth *et al*., 2009) Therefore, for both types of firms, the availability of an additional source of finance, such as accounts payable, is likely to loosen the financial constraints, making it easier for the firms to pay the sunk costs necessary to enter export markets.

4.4. Development of hypotheses

In the previous Section we acknowledge the presence of a scant but relevant literature focusing on the relationship between trade credit and export engagement (Schmidt-Eisenlohr, 2013; Eck *et al*., 2012).

Among these Eck *et al.* (2012) argue that trade credit decreases information asymmetry and serves as a quality signal in international transactions. It fosters trade, both at the extensive and intensive margin, for both exporting and importing activities of German firms.[162] Eck *et al*. (2012, p. 23) also state that the provision of supplier credit from input suppliers enhances the financial situation of potential exporters since it provides companies

[162] More precisely, they argue that firms that received a positive share of cash in advance have a higher likelihood of exporting than companies that do not obtain it Although we do not have information on cash-in-advance as Eck *et al*. (2012) do, we argue that accounts receivable is a plausible correspondent proxy.

with extra liquidity and decreases the uncertainty associated with an unknown vendor.[163] This is a relevant factor in fostering exports by Chinese firms given their constrained access to bank credit.

Despite Lu (2013) finds no significant effect of the growth in accounts receivable on the intensive margin of trade for Chinese unlisted firms, we claim that it is useful observing if firms show accounts receivable, *per se*, in their balance sheet. We posit that being able to grant trade credit is a plausible indicator of financial health as companies that provide delayed payments to their business peers, especially in the Chinese context, may do so because they do not suffer from financial constraints (Petersen and Rajan, 1997).

These premises lead us to formulate the following first hypothesis.

H1) Firms with a positive value of either accounts payable or accounts receivable, or both, are more likely to export than companies without any form of trade credit.

Yet, further investigation is needed to shed proper light on the role of both accounts payable and accounts receivable on the extensive margin of exports.

We argue that the positive signaling effect that comes with accounts payable may vanish and bring instead a decrease in the likelihood of exporting for two main reasons. First, firms that over accumulate accounts payable may do so because they suffer from a constrained access to bank credit or might not be able to internally generate funds. Second, a mounting size of accounts payable is associated with a non-negligible implicit interest rate.

Consistently with Niskanen and Niskanen (2006, p. 91), accounts receivable could be a tool that firms in financial distress employ to increase their sluggish sales.[164] Over extending

[163] Supplier credit is a plausible proxy for accounts payable.

trade credit may reduce the likelihood of exporting as it exposes firms to at least three problems. First, a reduction in the availability of income directed to other firms' operations with non-negligible opportunity costs. Second, an increase in the costs associated with the screening of a potential increased number of buyers. Third, a risk to suffer from late payments and consequent liquidity shortages.[165]

We thus formulate the following hypothesis.

H2) There is an inverted U-shaped relationship between accounts payable and accounts receivable and the probability of exporting.

Next, we wish to take into account if the non-linearity of trade credit is detected for companies owned by different agents, namely private firms, foreign companies, state-owned enterprises and collective firms.

We argue that the over accumulation of accounts payable is detrimental to the likelihood of exporting of private firms. Since these companies are the most financially constrained (Guariglia *et al*., 2011), they are also those that suffer the most from the burden of the implicit rate that accounts payable bring about. In a similar fashion, we claim that the negative effects associated with an over extension of trade credit (reduced disposal income, high monitoring costs and bankruptcy risks) are likely to affect private firms the most, and reduce the available funds needed to export. Such prediction finds support on the arguments put forward by van Biesebroeck (2014) who also claims that small private companies that sell only domestically do so because they are constrained by the trade credit they have to provide.

[164] We did not cover this article in our literature review as it does not deal with firms' export engagement.
[165] Martínez-Sola *et al*. (2013) show the presence of an inverted U-shaped relationship between accounts receivable and firm value for a sample of Spanish listed firms. We rely on their contribution to complement our explanation, but their work is not reviewed in the Chapter as it is not associated with firms' internationalization.

If domestic firms must extend trade credit due to their limited contractual power it is plausible to assume that a further excessive extension of trade credit depletes companies' resources and reduces their likelihood of exporting.

Given these premises, we formulate the following hypothesis.

H3) The relationship between accounts payable and accounts receivable and the likelihood of exporting will be stronger for privately owned firms compared to firms owned by different agents.

4.5. Baseline specifications

We observe that for those firms having accounts receivable but not accounts payable in their balance sheets, the probability of exporting is 22.67%, and for those having accounts payable but not accounts receivable, the percentage rises to 31.75%. Firms that have both forms of trade credit, show, on average, a 34.94% probability of exporting. These percentages clearly testify to the relevance of both measures of trade credit in the functioning of the firms, and in particular, in their export activities.[166]

Our baseline model is built on the premise that internationalization decisions are affected by financial factors and firm characteristics. Since previous studies provide strong evidence that exporting activity is characterized by high persistence due to the sunk start-up cost a company has to pay to enter export markets (Roberts and Tybout, 1997; Bernard and

[166] A two sample Welch t-test with unequal variances shows that the probability of exporting for firms having accounts payable only is statistically different at the 1% level to the probability to become an exporter for firms having accounts receivable only. Moreover, the probability of exporting for firms having both accounts payable and accounts receivable is statistically different at the 1% level from both the probability of exporting for firms having accounts payable only and from the probability of exporting for firms having accounts receivable only.

Jensen, 1999, 2004; Campa, 2004) the following dynamic baseline model specification is provided, based on Huang *et al*. (2011):

$$EXPDUM_{it} = \beta_0 + \beta_1 EXPDUM_{i(t-1)} + \beta_2 AGE_i + \beta_3 PROD_{i(t-1)} + \beta_4 COLL_{i(t-1)} + \beta_5 SIZE_{i(t-1)} + \beta_6 FOWNS_{i(t-1)} + \beta_7 CASHFLOW_{i(t-1)} + \beta_8 LEV_{i(t-1)} + \beta_9 APDUM_{i(t-1)} \text{ and/or } \beta_{10} ARDUM_{i(t-1)} + v_j + v_t + v_p + v_o + e_{it} \quad (4.1)$$

where $EXPDUM_{it}$ is a dummy variable taking the value of one if firm *i* is an exporter and zero otherwise at time *t.*

In Equation (4.1), the key variables of interest are $APDUM_{i(t-1)}$ and $ARDUM_{i(t-1)}$. The first one is a dummy taking a value of one if firm *i* has a non-zero value of accounts payable in its balance sheet at time *t-1*, and zero otherwise. The second one is a dummy taking a value of one if firm *i* has a non-zero value of accounts receivable in its balance sheet at time *t-1*, and zero otherwise. We expect that having either accounts payable or accounts receivable, or both, enhances the likelihood of exporting. More precisely, in order for our hypothesis H1 to hold we expect either β_9, β_{10} or both to bear a positive and significant sign.

Control variables include *AGE*, the number of years since the establishment of the firm; $PROD_{i(t-1)}$ which is the real operating revenue per worker; $COLL_{i(t-1)}$, defined as the ratio between fixed assets and total assets; $SIZE_{i(t-1)}$, i.e. real total assets; and $FOWNS_{i(t-1)}$, the percentage of shares owned by foreign investors.

$CASHFLOW_{i(t-1)}$ is an indicator of cash flow measured according to Fazzari *et al.* (1998) as the ratio between (net profit+ depreciation of fixed assets) and total assets, whereas $LEV_{i(t-1)}$ is measured as the ratio between current and non-current liabilities (net of accounts payables) and total assets.

The majority of studies of heterogeneous firms show a positive relationship between age and size and the probability of exporting. Older firms have accumulated extensive experience on the domestic market that can be usefully applied in the access to the foreign markets. Bigger firms, both in terms of number of employees and total assets, are more likely to have the capability and the resources to face the sunk costs needed to start exporting (Mayer and Ottaviano, 2007; Bernard *et al.*, 2007). A positive and significant sign is therefore expected for both variables. Further, we follow the intuition by Dixon *et al*. (2015) who hypothesize that the likelihood of becoming an exporter depends positively on cash flow, but negatively on leverage. Companies with higher cash flow are endowed with resources that can be fruitfully employed to set up the needed actions to start exporting. Conversely, companies with higher levels of leverage have limited possibility to resort to formal finance as banks will have limited propensity to face a possible risk of default. However, there is no clear-cut indication that this is always the case, as firms may use banking and non-banking sources to finance their domestic activities and, as we shall notice, their international expansion.

Guariglia and Mateut (2006) indicate that firms with a low value of collateralizable resources will find it harder to access bank credit, as banks will be reluctant to offer credit to companies whose assets are not perceived as a valuable guarantee. Therefore, we expect that the higher the collateral the higher the likelihood for the firms to have access to sufficient funds to embark in foreign trade.

Dixon *et al*. (2015) find that firms with a higher level of foreign ownership are more likely to become exporters. We therefore expect a positive relationship between the share of foreign investment in the firm's capital and the probability of exporting. This derives from the expertise that the foreign company brings along and to the likely access to sources of funds from the participating company.

The error term in Equation (4.1) is made up of five components. v_j is an industry-specific effect, which we take into account by adding two-digit industry dummies, which control for industry-specific characteristics. v_t is a time-specific effect, which we control for by incorporating time dummies that capture business cycle effects in all our specifications, v_p is a province-specific effect, which we control for by incorporating a full-set of provincial dummies, v_o is a ownership-specific effect which we control for by adding ownership dummies for private, foreign, state-owned enterprises and collective firms. $e_{it;}$ is the idiosyncratic error term.

However, a sketchy analysis shows that firms that have accounts receivable above the 50th percentile are younger, but more importantly, considerably smaller than other firms. The picture is similar when looking at firms that have accounts payable above the 50th percentile (Tables 4.1 to 4.4). On the basis of these indications we formulate the following specification.

$$EXPDUM_{it} = \beta_0 + \beta_1 EXPDUM_{i(t-1)} + \beta_2 AGE_i + \beta_3 PROD_{i(t-1)} + \beta_4 COLL_{i(t-1)} + \beta_5 SIZE_{i(t-1)} + \beta_6 FOWNS_{i(t-1)} + \beta_7 CASHFLOW_{i(t-1)} + \beta_8 LEV_{i(t-1)} + (\beta_9 HIGHAP_{i(t-1)} + \beta_{10} LOWAP_{i(t-1)}) \text{ and/or } (\beta_{11} HIGHAR_{i(t-1)} + \beta_{12} LOWAR_{i(t-1)}) + v_j + v_t + v_p + v_o + e_{it} \quad (4.2)$$

In Equation (4.2), the key variables of interest are the following four: $HIGHAP_{i(t-1)}$, $LOWAP_{i(t-1)}$, $HIGHAR_{i(t-1)}$ and $LOWAR_{i(t-1)}$. The first is a dummy which takes the value of one if firm *i* has a value of accounts payable above the 50th percentile of the distribution of the accounts payable of all firms operating in its same industry at time *t-1*, and zero otherwise. The second one is a dummy which takes the value of one if firm *i* presents a value of accounts payable below the 50th percentile of the distribution of the accounts payable of all firms operating in its same industry at time *t-1*, and zero otherwise. The third is a dummy which takes the value

of one if firm *i* has a value of accounts receivable above the 50th percentile of the distribution of the accounts payable of all firms operating in its same industry at time *t-1,* and zero otherwise. The fourth is a dummy which takes the value of one if firm *i* presents a value of accounts receivable below the 50th percentile of the distribution of the accounts payable of all firms operating in its same industry at time *t-1,* and zero otherwise.

We next consider the possible presence of a curvilinear relationship between both measures of trade credit and the likelihood of exporting. Receiving a far too high amount of accounts payable will increase the amount of debt in the firm's balance sheet and eventually lead to an excessive amount of short-term liabilities the firm hardly is able to cope with. At the same time, a mounting size of accounts payable may provide a negative signalling effect both to suppliers and to financial institutions, leading to a reduced likelihood to obtain additional credit. Conversely, firms granting accounts receivable are assumed be financial healthy, but, this is not always the case and firms in financial distress may try to extend trade credit in order to obtain an increase in their sluggish sales. In addition, granting a too high amount of accounts receivable, may expose firms to a deterioration of their financial balance sheet, thus leaving few resources to be used to embark in the sunk costs needed to start exporting.

Therefore the following specification is provided.

$$EXPDUM_{it} = \beta_0 + \beta_1 EXPDUM_{i(t-1)} + \beta_2 AGE_i + \beta_3 PROD_{i(t-1)} + \beta_4 COLL_{i(t-1)} + \beta_5 SIZE_{i(t-1)} + \beta_6 FOWNS_{i(t-1)} + \beta_7 CASHFLOW_{i(t-1)} + \beta_8 LEV_{i(t-1)} + \beta_9 AP_{i(t-1)} + \beta_{10} AP^2_{i(t-1)} + \beta_{11} AR_{i(t-1)} + \beta_{12} AR^2_{i(t-1)} + v_j + v_t + v_p + v_o + e_{it} \quad (4.3)$$

In specification (4.3) the key variables of interest are $AP_{i(t-1)}$, which is the ratio between accounts payable and total assets for firm *i* at time *t-1*, and $AR_{i(t-1)}$, the ratio between the accounts receivable and total assets firm *i* at time *t-1*. In order for our hypothesis H2 to hold we expect both β_9 and β_{11} to bear a positive and significant sign, and we expect β_{10} and β_{12} to show a negative and signficant sign. This will indicate the presence of a non-linear behaviour in both accounts payable and accounts receivable.

As our dependent variable is dichotomous, we initially estimate Equations (4.1), (4.2) and (4.3) using a pooled probit estimator that corrects for clustering. Although clustering takes into account the fact that observations within the same firm are not independent, unobserved heterogeneity is in fact not fully controlled for in our pooled probit models.[167]

4.6. Data and descriptive statistics

Information on unlisted companies is drawn from the annual accounting reports filed by industrial firms with the Chinese National Bureau of Statistics (NBS) over the period 2004-2007. All state-owned enterprises and other types of enterprises with annual sales of five million yuan (about $650,000) or more are covered. These firms operate in the manufacturing and mining sectors and come from 31 provinces or province-equivalent municipal cities. We drop observations with negative sales; as well as observations with negative total assets minus total fixed assets; total assets minus liquid assets; and accumulated depreciation minus current depreciation. We also drop firms that did not have complete records on our main regression variables. To control for the potential influence of outliers, we excluded observations in the

[167] Estimates obtained using a random effects probit model were identical to those obtained using the pooled probit model. This can be explained considering the lack of any significant within-firm variation within the short time span covered by our data. In particular, the percentage of firms switching from non-exporters to exporters and vice versa is approximatively only 16%.

one percent tails of cash flow, account receivable, size and leverage, whilst we deleted only the right tail of the distribution for labour productivity and accounts payable, after proving the presence of extreme values only on such extremes of their distribution. This process is meant to remove the potential bias that may arise in the regression if abnormal values of the variables of interest are not appropriately deleted. Through such a process we obtain an unbalanced panel with 121,237 firms and a 380,540 observations.

The NBS data contains a continuous measure of ownership, which is based on the fraction of paid-in-capital by four different types of investors through a majority rule. This allows us to identify four different ownership types, namely private, foreign, state owned, and collective companies. Following Guariglia *et al*. (2011), we group investors from Hong Kong, Macao and Taiwan and other countries in the category of foreign companies.[168]

Table 4.5 presents descriptive statistics and indicates that the difference in the mean values of all reported variables for exporters and non-exporters is always statistically significant.[169] 33.2% of the firms in the panel are exporters. Exporters are, on average, younger than non-exporters: age is in fact 11.74 for the former and 12.05 for the latter. This is a preliminary indication that Chinese unlisted companies behave in a different way than predicted by the heterogeneous firms' theory. Exporters show lower levels of labour productivity than non-exporters: labour productivity is in fact 0.31 million RMB for the former and 0.33 million RMB for the latter. This outcome is likely to be connected with the widespread presence of public support to pure exporting firms (Defever and Riaño, 2016; 2012), which account for more than 30% of total Chinese exports.

[168] The characteristics of the firms belonging to the four different ownership groups are precisely described in Ding *et al.* (2013), which we follow in the present investigation.
[169] For the sake of brevity we do not discuss here the results of the Pairwise correlation reported in Table 4.6. Yet, we acknowledge the absence of any problems of multicollinearity.

As far as size is concerned, exporters are far larger (0.996 million of Yuan) than non-exporters (0.523 million of Yuan). This supports the idea widely described in the New New Trade Theory (e.g. Mayer and Ottaviano, 2007) that larger firms are more likely to enter the export markets or embark in FDI.

Collateral, measured as the ratio of fixed assets over total assets, is lower for exporters (30.7%) than for non-exporters (35.6%), a feature that is tightly connected to firm size, as it seems reasonable to expect that exporting firms might present a smaller proportion of fixed assets than their domestic peers. This can be explained considering that firms with a high proportion of fixed assets are less likely to invest in R&D and to develop product and process innovation necessary to be competitive in the international arena.

Exporters have an average of 38.5% share of foreign participation compared to the mere 8.3% of non-exporters This is in line with the results of Dixon *et al*. (2015) who find that firms with a higher level of foreign ownership are more likely to become exporters. Moreover, foreign institutional investors, with their superior monitoring abilities, are more likely to push firms in emerging markets to invest in risky ventures such as internationalization (Filatotchev *et al.*, 2007).

Cash flow is slightly lower for exporting (9.0%) than for non-exporting companies (9.8%). Such a difference describes how domestic firms face higher financial constraints than exporting firms and thus must accumulate higher internal funds to carry out operation. At the same time, non-exporting firms often show higher levels of efficiency and profitability than exporting firms that receive public support. Leverage is higher for non-exporting firms (42.9%) than for their exporting counterparts (37.7%), a result consistent with the literature on financial health and exporting. As described in Greenaway *et al*. (2007), exporting firms are more likely to be financially healthier than their domestic counterparts, and, as such, they can

bear the sunk costs required to enter a foreign market, without the need to resort to external finance.

We now turn to the two measures of trade credit, i.e. accounts payable and accounts receivable. Accounts payable are higher for exporters than for non-exporters with values of 16% and 13% respectively for the two groups, whereas accounts receivable are slightly higher for exporters (18.1%) than for non-exporters (17.5%). When looking at net trade credit we notice that the average value is negative for the full sample (-3.7%) and remains negative for both exporters and non-exporters, although the former presents a higher value (-2.1%) than the latter (-4.5%). This might be a preliminary indication that non-exporters suffer less from the presence of financial constraints and are thus able to extend credit to business partners more than their exporting peers. This is consistent with the fact that exporting firms are *ex ante* financially healthier than their domestic peers and are thus not only able to embark in the costs necessary to enter into a foreign market, but also capable to allow commercial credit to business partners when needed.

Given the summary statistics described above it is worthwhile to concentrate not only on the beneficial effects of receiving trade credit, but also on the outcome of providing trade credit. In this respect it seems reasonable to assume that accounts payable and accounts receivable may play different roles in shaping the extensive margin of trade.

We next distinguish firms showing values of accounts payable and accounts receivable above the median from those having lower values. The descriptive statistics show that firms granting more (less) than the median value of accounts receivable are, on average, smaller (larger) (Table 4.1 and 4.2). When looking at such a threshold for accounts payables we observe that firms receiving more (less) accounts receivable are smaller (larger). (Table 4.3

and Table 4.4).[170] In other words we acknowledge that small firms are those making the most use of accounts payable, due to their constrained access to bank finance and accounts receivable in order to expand their market shares.

These findings are in line with the empirical findings provided by Van Biesebroeck (2014) for Chinese firms serving only the domestic market. It thus seems that the smallest and youngest Chinese firms are likely to receive a significant amount of trade credit, due to their constrained access to finance, but, at the same time, are also those granting the highest level of trade credit. The latter argument can be explained following García-Teruel and Martínez-Solano (2010a), who state that firms that wish to grow could use accounts receivable as a mechanism to improve their sales by extending more credit to their customers.

4.7. Evaluation of the results: probability of exporting

In order to determine the effect of trade credit on the probability of exporting we estimate Equations (4.1), (4.2) and (4.3), using a dynamic pooled probit model, providing a discussion of the marginal effects of each explanatory variable on the regressand.

The estimates of Equation (4.1) describing the relationship between the probability of exporting and having granted or received trade credit are presented in Columns 1 to 3 of Table 4.7.

The coefficients on the lagged dependent variable and on the control regressors are similar for the three Equations thus a unique discussion is provided below.

[170] A Welch two-sample t test with unequal variances shows that the size of the firms that grant more than the median value of accounts receivable is statistically different at the 1% level from the size of the firm that grant less than the median value of accounts receivable. Also performing a Welch two-sample t test with unequal variances shows that the size of the firms that receive more than the median value of accounts payable is statistically different at the 1% level from the size of the firm that receive less than the median value of accounts payable

The lagged export status has a strong positive effect on the probability of exporting, suggesting that having exported last year increases the probability of exporting in the current year. In other words, having established a commercial presence abroad makes it easier to maintain the relationship with the business partner abroad as the firm has already incurred the sunk costs needed to enter into the foreign market.

The estimation shows that the presence of trade credit granted and trade credit received enhances the probability of exporting. Being able to grant trade credit might be an indicator of financial health, and thus indicate a higher likelihood for the firm to be able to pay the sunk costs needed to enter the export market. At the same time, the capability to obtain commercial credit from business peers might also enable the firm to pay the abovementioned sunk costs, especially if it faces financial constraints. These results thus provide strong confirmation of hypothesis H1. However, in both cases, further and deeper investigation is required because the proposed explanations may not hold when looking at the different levels of credit granted and received.

Age shows a positive coefficient, but the marginal effect on the probability of exporting is substantially zero, whereas the marginal effect of size is always positive. This evidence is partially consistent with the theory of heterogeneous firms (Melitz, 2003; Mayer and Ottaviano, 2007; Bernard *et al.*, 2007), as larger firms are more likely to enter international markets, being it is easier for them to pay the sunk costs needed to embark in exports.

The marginal effects of productivity is negative and significant, a result that may seem at odds with the abovementioned theoretical framework, but consistent with the fact that the large part of exporting firms are pure exporters that, irrespective of their ownership type, benefit from public support and thus show low efficiency.

Collateral carries a negative and significant sign. This finding may be driven by the presence of large companies endowed with abundant fixed assets and pertaining to heavy industries, possibly in strategic sectors. These are likely to invest less in R&D and in process and product innovation, being therefore not able to cope with the competition that characterizes international markets.

As far as the role of foreign shares in firms' capital is concerned, a positive and significant effect is identified. The literature has traditionally claimed that in emerging economies, the participation of foreign capital in domestic firms can increase the likelihood of embarking in exports or FDI. In this respect, our results are consistent with the outcome obtained by Fu *et al*. (2010), who find that the presence of wholly-owned firms and joint ventures with foreign control has a positive effect on both the extensive and the intensive margin of exports.

Leverage exerts a negative and significant effect on the probability of exporting. The greater the leverage, the higher the perceived risk of the firm status. Hence, a detrimental effect on the likelihood of exporting is expected (Greenaway *et al*., 2007; Ding *et al.*, 2013; Manova and Yu, 2016). No significant effect is instead shown by cash flow.

The abovementioned outcomes represent only a first step towards a satisfactory interpretation of the relationship between the probability of exporting and trade credit. It is in fact important to assess the effect on the extensive margin of trade of the levels of accounts payable and accounts receivable. Estimates of Equation (4.2) allow us to analyze the effects of trade credit which are above or below the median for each industry between the years 2004 and 2007.

The results of the pooled probit estimation of Equation (4.2) are reported in Columns 4 to 6 of Table 4.7 and do not provide evidence supporting the presence of a statistically

different value between high and low values of accounts payable. At this stage, having received trade credit does imply that the firm provided a signal of reliability to the banking system and it is thus likely to receive formal finance from the banking system. The picture is instead quite different for accounts receivable, as the difference between high and low levels of trade credit granted is significant. More precisely, firms that grant trade credit for an amount higher than the 50th percentile have a lower probability of exporting than those offering trade credit of value below the median[171] As previously anticipated, such a difference may suggest that firms use accounts receivable as a means to increase their market share by providing customers with extensive credit. This practice, if not conducted with a cautious managerial practice, could lead to a disruption in firms' balance sheet with fewer internal resources remaining available to pay the sunk costs necessary to enter export markets. As a consequence, there will thus be a decline in the probability of exporting.

We next look for the exact threshold that leads to a detrimental effect of obtaining and granting trade credit. This is why we investigate whether the relationship between trade credit and exports is nonlinear as described in Equation (4.3). The results are reported in Columns 7 to 9 of Table 4.7.

If we concentrate first on the links between accounts payable and the probability of exporting, we observe that the coefficient associated with accounts payable is always positive and significant, whereas its square is negative and significant. This gives evidence of a curvilinear relationship between trade credit received and the likelihood of becoming an exporter, or more specifically, an inverted U-shaped relationship between the two. At lower levels of accounts payable the probability of exporting increases, but when the turning point is

[171] As we will pinpoint in the analysis of results of Equation (4.2), the absence of statistical difference between values of accounts payable below and above the median for a selected firm in a given year is probably associated with the level of the turning point, the mean of the variable and the value of the 75th percentile, which is only seldom reached by the firms under investigation.

reached the negative effect prevails. The average turning point for accounts payable is 30.20% (Column 7 of Table 4.7). Therefore a 10 percentage point increase in accounts payable before the turning point leads to a 0.09% increase in the probability of exporting. Conversely, a 10 percentage point increase after the turning point decreases the probability of exporting by 0.15%. It is however worth emphasizing that the inflection point is largely higher than the average value of the variable, equal to 14% and also greater than the 75th percentile which is 20.96%, thus only a reduced number of firms suffer the negative effects on the probability of exporting due to an over accumulation of accounts payable.[172]

If we concentrate on the behaviour of accounts receivable, we observe that the relevant coefficient is positive and significant, whereas its correspondent squared term is negative and significant. This is again evidence of a curvilinear relationship between trade credit granted and the likelihood of becoming an exporter. The average turning point is 18.88% (Column 8 of Table 4.7) which is slightly greater than the average value of the variable, equal to 17.7% and well below the 75th percentile which is 26.78%. These digits indicate that the turning point, although greater than the mean, is far below the 75th percentile and it thus plays a role for a number of firms. Focusing on marginal effects before the turning point, a 10 percentage points increase in accounts receivable increases the probability of exporting by 0.09%. However, for levels of accounts receivable greater than the turning point, a 10 percentage point increase in accounts receivable leads to a decline in the probability of exporting by 0.24%.

A higher inflection point is recorded for accounts payable (36.11%) but lower for account receivable (16.81%), when the two variables are placed in the same regression

[172] The lack of statistical difference between the coefficients of $HIGHAP_{i(t-1)}$ and $LOWAP_{i(t-1)}$ in Equation (4.2) and the presence of a turning point for the values of accounts payable in Equation (4.3) is probably due to the fact that the inflection point is only seldom reached as stressed in the text.

(Column 9 of Table 4.7), but the marginal effects are similar. There is thus an even weaker relevance for the turning point for accounts payable which moves farther away from the mean and the 75th percentile. Conversely, the mean value of accounts receivable is higher than the inflection point, thus the detrimental effect on the extensive margin of exports of an excessive amount of trade credit granted is valid for a large number of firms.

These entire set of results thus provide confirmation of hypothesis H2, although the proportion of firms that suffer from a negative effect of an excess of trade credit changes if looking at either accounts payable or accounts receivable.

4.7.1. Controlling for initial conditions

It is extensively documented that exporting requires large sunk entry costs (Bernard and Jensen, 2004; Manova, 2013; Roberts and Tybout, 1997; Vogel and Wagner, 2010)

In previous literature, lagged export status has been employed to capture the sunk costs associated with exporting. Yet, most of these studies have not dealt with the initial conditions problem (Arnold and Hussinger, 2005; Bellone *et al.*, 2010; Bernard and Wagner, 2001; Greenaway *et al.*, 2007; Yi and Wang, 2012). On the contrary, the majority of studies on dynamic binary choice models employing a standard random-effects probit specification postulate that the initial observation values are independent of unobserved firm-specific effects. Yet, the initial conditions can be assumed to be exogenous only if the observation period for each company starts from the origin of the generating process.

Yet, in the majority of microeconometric studies employing panel datasets, the start of the sample does not correspond with the beginning of the exporting process and the hypothesis of exogenous initial conditions is thus inappropriate. This is because the

unobserved time-invariant firm heterogeneity, such as executive skills and financial characteristics which affect present export engagement, may also affect the export behaviour in the initial period. Put in a different way, these features are likely to overestimate the role played by sunk costs in entering a foreign market. Only a limited number of contributions have tried to address the issue, but they postulated the presence of zero correlation between unobserved firm heterogeneity and other observable features of the firms (Lawless, 2009; Das *et al.*, 2007; Campa, 2004).

Failing to take into account the endogeneity of the initial conditions will hence determine a biased estimation, leading to an overestimation of the state dependence, i.e., the influence of past export experience on the current decision to export.

Wooldridge (2005) suggests a simple approach, based on a conditional maximum likelihood function, which is very similar to a standard random effect probit model. This is the method we will use, including a vector of means of time varying covariates for each individual firm and thus deal with the possible correlation between exogenous variables and unobserved individual-effects. The results are reported in columns 1 to 3 of Table 4.8.

If we compare signs and coefficients of control and key variables of the pooled probit model (Columns 7 to 9 of Table 4.7) with the estimation accounting for initial conditions (Columns 1 to 3 of Table 4.8), we observe some relevant differences. The coefficient on the lagged dependent variable is still positive and significant across all the specifications when the measures of trade credit are considered separately and together in the same regression. However, the magnitude of the marginal effects is almost eight times smaller than the coefficient reported in the pooled probit specification. This result is clearly connected to relevance shown by $EXPDUM_{i(2004)}$ whose coefficient captures the large part of the effects of sunk costs of exporting which are instead fully proxied by the lagged dependent variable in

the pooled probit specification. Productivity maintains a significant negative sign, although its impact on the probability of exporting, measured by the marginal effects, is half across the three specifications of trade credit. Collateral has a significant and negative sign, that indicates how firms endowed with a higher ratio of fixed assets over total assets are less likely to become exporters, but the marginal effects are much smaller than those detected in the pooled probit. This is the case of non-dynamic firms who invest little in R&D and thus face more difficulties to enter foreign markets. In line with our expectation, the share of foreign ownership in firms' capital maintains the same sign but the size of marginal effects are three times smaller than the digits recorded in the pooled probit.

If we first look at accounts payable, the turning point is now 26.67%. A 10 percentage points increase in accounts payable increases the likelihood of exporting before the inflection point by 0.03%, but leads to its decline by 0.06% after the peak (Column 1). However, we notice that the inflection point is higher than the average value of the variable, equal to 14% and also larger than the 75^{th} percentile, 20.96%, thus the negative effects of this type of debt affect only a minority of firms in the sample.

The turning point for accounts receivable is 18.13%. A 10 percentage points increase in accounts receivable before the inflection increases the probability of exporting by 0.03%, but it leads to a decline of 0.09% after the turning point (Column 2 of Table 4.8). The inflection point is greater than the average value of the variable, equal to 17.7% and below the 75^{th} percentile which is 26.78%, providing an additional confirmation that an excessive amount of trade credit granted negatively affects the extensive margin of exports for a large part of companies under investigation.

Focusing on the case when both measures of trade credit are used in the same regression, the inflection point for accounts payable rises to 31%, but the turning point for

accounts receivable slightly declines to 16.67%, whilst the marginal effects do not show large changes (Column 3 of Table 4.8).

There is here an even smaller share of firms interested by the inverted U-shaped relationship of accounts payable, whose inflection point moves farther from both the mean and the 75th percentile. A greater number of firms is instead interested by the negative effects of over extending trade credit, as the turning point is smaller than both the mean and the 75th percentile. This result points to the widening of companies whose market strategy through accounts receivable leads to a deterioration of the balance sheets and to a reduced amount of resources directed to start exporting.

Turning now the attention on the mean values of our regressors, we observe that the mean values of accounts payable, accounts receivable and their squared terms are all statistically significant and an inverted U-shaped relationship is still present. Focusing on the mean values of the control variables, only size and foreign ownership show significant signs. This indicates that the correlation between firms' unobserved heterogeneity and the observed characteristics is not particularly strong. If we consider the behaviour of the variables of interest, i.e. accounts payable and accounts receivable and their squared terms, first in separate regressions, and then together in the same specification, we observe that the values of turning points are always higher than those recorded in the pooled probit specifications reported in Columns from 7 to 9 of Table 4.7.

More precisely, when we consider the average value of the key regressors, and we first look at accounts payable, the average turning point is now 36.49%. A 10 percentage points increase in accounts payable increases the likelihood of exporting before the inflection point by 0.05%, but leads to its decline by 0.07% after the peak (Column 2). However, we notice that the inflection point is higher than the average value of the variable, equal to 14% and also

larger than the 75th percentile, circa 21%, thus only a limited number of firms face the negative effects on the probability of exporting due to an over-accumulation on this type of informal finance.

When considering, instead, accounts receivable, the average turning point is 24.32%. A 10 percentage points increase in accounts receivable before the inflection increases the probability of exporting by 0.05%, but it leads to a decline of 0.11% after the turning point (Column 2 of Table 4.8). The inflection point is greater than the average value of the variable, equal to 17.7% but it is lower than the value of the 75th percentile which is around 27%. Therefore, these digits prove that the negative effects of an excessive amount of trade credit granted affect a large part of the firms under scrutiny.

If accounts payable and accounts receivable are placed together in the same regression, then the average inflection point for accounts payable rises to 40.15%, whereas it decreases to 21.70% for accounts receivable, whilst the marginal effects remain practically unaltered (Column 3). There is here an even smaller number of firms which shows a reduced probability of exporting as the average turning point for accounts payable moves farther from both the mean and the 75th percentile. A large number of companies suffer from the negative effects of over extending trade credit, as the average turning point is greater than the mean, but still smaller than the 75th percentile.[173]

Once again, the results obtained through this econometric techniques broadly confirm the claims put forward in hypothesis H2, although the negative effect on the extensive margin of trade is different when looking at accounts payable and accounts receivable.

[173] It is worth to emphasize here that the use of average values for the variables of interest and, therefore, of their turning points may not be universally accepted. In a conversation with Jeffrey Wooldridge, he points to the better explanatory power of the values of turning points when the variables are not in their means, although he was not completely sure of such a statement. Therefore we decided to place here the results of both approaches.

4.7.2. Controlling for different ownership types

We next provide estimates of Equation (4.3) for firms owned by different agents. The regression is estimated through a pool probit technique and the results are reported in Table 4.9.

If we concentrate first on the behavior of accounts payable, we observe that it is always positive and significant, whereas the squared term is negative and significant for all ownership groups. This provides evidence of a curvilinear relationship between trade credit received and the likelihood of becoming an exporter or, more specifically, an inverted U-shaped relationship between the two as obtained for the full sample. At lower levels of accounts payable the probability of exporting increases, but when the turning point is reached the negative effect prevails.

Such an inversion occurs at different levels when looking at different ownership types. If looking at private firms the average turning point is 31.85% (Column 1). Before this level a 10 percentage point increase in accounts payable leads to an increase in the likelihood of becoming an exporter by 0.08%, whilst after the threshold the likelihood decreases by 0.13%. The inflection point is higher than the mean value of the variable, equal to 13.4%, and much higher than the 75^{th} percentile which is equal to 19.97%, thus the negative effect of accumulating accounts payable affects only a small proportion of private firms. The inflection point is higher and reaches 39.9%, when considering the two measures of trade credit in the same regression, and the marginal effect we record after the turning point is slightly higher (Column 3). Therefore the proportion of firms that are suffering from a reduction in the extensive margin of trade due to an increase in trade credit received is limited.

Moving from private to foreign firms the inflection point rises and reaches an average of 35.53% (Column 4 of Table 4.9). In this case, a 10 percentage points rise in accounts payable increases the likelihood of becoming an exporter by 0.14%, whereas a 10 percentage points increase in trade credit received diminishes the probability of exporting by 0.20%. Similarly to what recorded for private firms, the inflection point is also here higher than the mean value, equal to 35.53%, and much larger than the 75th percentile, which is 27.04%. Therefore the reduction in the probability of exporting due to an excessive accumulation of accounts payable interests a limited number of firms. The inflection point is higher when considering the two measures of trade credit in the same regression, and the marginal effects we record after the turning point are both slightly higher (Column 6). Therefore the share of companies that face a contraction in the extensive margin of trade is even smaller in this specification.

The behaviour of SOEs and collective enterprises does not seem, at a first glance, particularly different from that of private and foreign firms, although a reduction in the level of significance of coefficients of accounts payable is detected.

As far as SOEs are concerned, the inflection point is at 18.48% of accounts payable (Column 7). Before the turning point, a 10 percentage point increase in accounts payable increases the probability of exporting by 0.11%, but after the turning point it decreases by 0.29%. The turning point is higher than the mean value, equal to 10.6%, and also greater than the 75th percentile, which is 15.22%. Again, in a similar fashion to what is recorded for the previous two ownership types, although in a more limited extent, the share of firms suffering from a reduction in the probability of exporting due to an increase in accounts payable, is limited. If trade credit granted and received are placed together in the same regression the turning point rises to 19.67%, thus reinforcing the abovementioned argument.

As far as collective enterprises are concerned, the coefficient associated with accounts payable is significant only at the 10% level, but an inverted U-shaped behaviour is still detected with an inflection point at a 21.90% value (Column 10). Before the turning point, a 10 percentage point increase in accounts payable increases the probability of exporting by 0.07%, but after the turning point, it decreases it by 0.15%. The turning point is largely higher than the mean value of the variable, equal to 13.8%, but only slightly higher than the 75th percentile, equal to 21.01%, thus pointing to a limited relevance of the inverted U-shape relationship also for this ownership group. Very similar values are recorded if accounts payable and accounts receivable are placed in the same regression (Column 12),with an inflection point of 24.33% and a small amount of firms involved in the inverted U-shaped relationship between trade credit received and the extensive margin of trade.

Such results confirm our predictions that accounts payable, *per se*, are positively associated with the probability of exporting. This implies indeed that if a selected company is receiving credit from its suppliers, it is, *ceteris paribus*, more likely to be able to divert other internal sources to finance its export operations. Yet, receiving a far too high amount of trade credit will increase the amount of debt in the firm's balance sheet and possibly lead to an excessive amount of short-term liabilities that the firm may find difficult to repay, although this is true for a limited share of companies across the specified ownership groups.

Looking instead at accounts receivable, we observe that the linear term is positive and significant for private firms only (Column 2 and 3 of Table 4.9), whereas the squared term is negative and significant for both private firms and foreign enterprises (Columns 2, 3 and 5, 6 of Table 4.9). This provides evidence of a curvilinear relationship between trade credit granted and the likelihood of becoming an exporter only for private enterprises. The inflection point for accounts receivable is 20.40% (Column 5). A 10 percentage points increase in trade

credit granted leads to an increase in the probability of exporting by 0.11% before the turning point. After the peak, a 10 percentage points increase leads to a decrease in the probability of exporting by 0.27%. Yet, the inflection point is higher than the mean value of the variable, equal to 17.8%, but it is lower than the 75th percentile, which is equal to 26.90%, thus pointing to the fact that a notable share of firms suffer from a reduction in the probability of exporting when exceeding in granting trade credit. When considering both accounts payable and accounts receivable together in the same regression the turning point decreases to 18.73%. Given both the mean value and the threshold of the 75th percentile of accounts payable, we can firmly re-state the presence of a non-negligible share of private firms that are facing a decrease in their extensive margin of exports due to an excess in the amount of trade credit granted. The marginal effects for accounts receivable remain practically unaltered to those expressed by trade credit granted and received taken separately (Column 6).

The positive relationship between accounts receivable and the probability of exporting can be explained considering that only firms with a good financial health are in a position to grant trade credit to their counterparts. However, this is not always the case and, as anticipated, we may expect that firms in financial distress try to extend trade credit in order to obtain an increase in their sluggish sales. Granting an excessive amount of account receivable, may expose firms to an even worse disruption of their financial balance sheet and hence to a lower likelihood of exporting (Greenaway *et al*., 2007). This phenomenon affects private firms only, as these firms are more likely to resort to accounts receivable as a tool to increase their sales and revenues, by adopting an aggressive sales policy. By contrast, foreign enterprises may rely on internal capital markets and on a possible reduction of risk deriving from their presence on different markets, whereas both SOEs and collective firms can enter into export market regardless their financial status, because they can enjoy from a privileged

access to bank finance. Moreover, state-controlled companies are driven by management practices not aimed at efficiency maximization, but rather, on accomplishing government tasks which are not necessarily related to cost minimization and internationalization.

This set of results partially supports H3. Reduced disposal income, high monitoring costs and bankruptcy risk associated with the over extension of trade credit determine a non-linear relationship between accounts receivable and the probability of exporting only for private firms, affecting a non-marginal share of such companies. Conversely, an inverted U-shaped relationship between accounts payable and the likelihood of exporting is detected for all ownership type. We claim that a possible different impact of accounts payable across companies owned by different agents could be in place given the diverse duration that trade credit contracts may have. Having access to such information may help us to disentangle the implicit interest rate for short-term and long-term accounts payable and shed light on possible differences across private firms, foreign companies, SOEs and collective forms that are not visible through the available data.

Turning our attention to the set of control variables, we observe that age has a small but negligible positive effect on the probability of exporting only for foreign enterprises, whereas it is practically nil for all other ownership types. Size, instead is always positive and significant for all ownership groups, but has a larger effect for private and collective firms. The results on size, and to a limited extent on age, are consistent with the theory of heterogeneous firms (Mayer and Ottaviano, 2007; Bernard *et al.*, 2007), according to which older and larger firms are likely to generate higher profits and to be financially healthier.

Productivity displays a negative and significant sign for private and foreign firms. This result that may seem at odds with the abovementioned theoretical framework of firms' heterogeneity, but could be consistent with the widespread presence of pure exporters given

the fact that the two ownership types resemble the largest number of firms. The coefficients are not significant for SOEs and collective companies, a result in line with the widespread wisdom that management practices in publicly controlled firms are not driven by efficiency and profit maximization motives.

As far as the role of foreign shares in firms' capital is concerned, a positive and significant effect is detected for all ownership groups, which is in line with the findings of Jackson and Strange (2008) who argue that in emerging economies, the participation of foreign capital in domestic firms increases the likelihood of exporting.

Collateral carries a negative and significant sign for private firms and for SOEs. Companies endowed with more fixed assets are less likely to invest in R&D, develop new products and new process and thus will be less dynamic and less competitive on the international markets. Such a behaviour clearly depicts the typical features of SOEs, but it is instead unexpected for private firms, which nevertheless show a smaller, negative (marginal) effect of fixed assets on the probability of exporting.

Leverage is used to capture the effect of the capital structure. Since a greater level of leverage entails a higher level of risk and thus financial distress, firms will be less likely to receive additional funds from banking institution to be used to start exporting, We find confirmation of a negative and significant relationship between leverage and export market participation decisions for foreign owned firms only, those that behave in a similar fashion of companies located in developed countries (Greenaway *et al*., 2007).

4.8. Conclusions

The bulk of the literature on financial constraints and export engagement does not take into account the role played by trade credit in the internationalisation of Chinese unlisted firms. We fill this gap by providing a bridge between two streams of literature, one dealing with financial constraints and export engagement and the other studying trade credit, distinguishing the different role played by accounts payable and accounts receivable.

Making use of a large firm-level dataset for the years 2004-2007 and controlling for a range of financial factors which have been shown in the literature to affect export behavior (such as cash flow, leverage and collateral), we document a significant effect of trade credit on the likelihood of exporting. In particular, we show that accounts payable and accounts receivable enhance the probability of exporting, but only up to a certain threshold. There is, in fact, evidence of an inverted U-shaped relationship between both measures of trade credit and the probability of exporting. The estimation is carried out for the whole sample and for four different ownership types, i.e. private firms, foreign firms, state-owned enterprises and collective firms. The results are robust to using initial conditions. Focusing on different ownership groups, we show that accounts payable and exporting are linked by an inverted U-shaped relationship for all ownership groups. Conversely, the inverted U-shaped relationship between accounts receivable and exporting is detected only for private firms.

Our paper contributes to the trade literature by including trade credit as a new element of firms' heterogeneity, with the aim of better explaining the determinants of the extensive margin of trade. It also contributes to the corporate finance literature, which has looked at the different forms of financing for domestic operations and opening up of international trade.

Our findings have policy implications. For example, the Chinese government should ease the access to finance for private domestic enterprises, allowing the use of trade credit as an additional tool to be employed in business relations but not as a needed alternative to the

absence of bank credit. A better financial system will allow firms to use trade credit within the boundaries of a healthy financial administration, avoiding the accumulation of an excessive debt burden (accounts payable) and especially credit outstanding (accounts receivable), both as a result of managerial malpractices. This will also hopefully avoid hazardous behaviour from small and medium size enterprises in tough economic conditions and financial distress that might be tempted to extend trade credit beyond a sustainable threshold.

At the same time, a more efficient banking system should be able to precisely recognize the reliability of firms in need of finance, thus identifying those with a better credit standing. This will probably lead to a condition whereby firms suffering from financial constraints do not need to rely extensively on accounts payables, thus reducing their probability of exporting based on the access to trade credit.

Moreover, an improvement in government quality is desired as it is associated with a better legal and administrative system, which improves trust amongst firms and a better perception of contract enforcement, with a consequent increase in the use of both accounts payable and accounts receivable (Chen *et al.*, 2014). This is a desired evolution of the Chinese business environment where the use of trade credit does not stem from the malfunctioning of the banking system, but rather emerges as a complement tool to be used as a result of mutual trust and reciprocity amongst business peers. Political authorities should also limit the number and dimensions of financial interventions in favour of enterprises controlled by governmental bodies, at any territorial level. These actions will likely reduce the inefficiencies affecting SOEs and promote a fairer competition with private and foreign firms, allowing a more appropriate allocation of market shares. In order to promote the international presence of Chinese firms, the government should encourage a rise in the presence of foreign capital in all

types of enterprises to incentive the cross-country contamination of managerial practices allowing domestic firms to benefit from the expertise of foreign investors. A possible revision in tax discounts to selected exporters, such as processing firms, is also expected to guarantee a more equitable access to China's comparative advantage for firms that act on the international markets with different types of outputs.

Our study suffers from two of limitations. The first one is the use of a short sample size as a comparison between accounts payable and accounts receivable is possible only between 2004 and 2007 due to data constraints. The second one derives from not considering the types of products exported and the destination markets.

Further research needs to be undertaken in the following directions. First, it would be interesting to test if the results hold for listed firms. Second, one could test if our findings also apply to pure exporters, i.e. firms exporting more than 90% of their sales, which account for almost one third of total Chinese exports (Defever and Riaño, 2012).

Table 4.1. Summary statistics for firms with high accounts receivable (more than the 50th percentile)

Variable	n	Mean	S.D.	Min	0.25	Mdn	0.75	Max
EXPDUM	190254	0.340	0.470	0.000	0.000	0.000	1.000	1.000
AP	190254	0.180	0.160	0.000	0.050	0.140	0.260	0.740
AR	190254	0.290	0.130	0.060	0.190	0.270	0.370	0.700
NETTC	190254	-0.120	0.180	-0.530	-0.230	-0.120	-0.020	0.490
AGE	125855	11.430	9.660	1.000	6.000	9.000	13.000	143.000
PROD	190254	0.340	0.380	0.000	0.120	0.210	0.400	2.900
COLL	190254	0.280	0.160	0.000	0.160	0.260	0.380	1.000
SIZE	190254	0.560	1.220	0.020	0.090	0.190	0.480	15.310
FOWNS	189749	0.200	0.370	0.000	0.000	0.000	0.250	1.000
CASHFLOW	190254	0.090	0.110	-0.120	0.030	0.060	0.120	0.810
LEV	190167	0.400	0.240	0.000	0.210	0.390	0.570	1.140

Notes: our elaboration from NBS data. *EXPDUM* is the dependent variable. It is a dummy that takes value of one of the firm is an exporter, and zero otherwise. *AGE* is the number of years since the establishment of the firm; *PROD* measures the real operating revenue per worker, whereas *COLL* is the ratio between fixed assets and total assets. *SIZE* is proxied by real total assets, *FOWNS* represents the percentage of shares owned by foreign investors, *CASHFLOW* is the ratio between (net profit+ depreciation of fixed assets) and total asset, whereas *LEV* is the ratio between the difference of total liabilities and accounts payable and total assets. *AP* is computed as the ratio between accounts payables, whereas *AR* is computed as the ratio between accounts receivable and total assets. *NETTC* is computed as the difference between *AR* and *AP*. See also Appendix 4A for a complete definition of all variables.

Table 4.2. Summary statistics for firms with low accounts receivable (less than the 50th percentile)

Variable	n	Mean	S.D.	Min	0.25	Mdn	0.75	Max
EXPDUM	190286	0.320	0.470	0.000	0.000	0.000	1.000	1.000
AP	190286	0.100	0.120	0.000	0.010	0.060	0.150	0.680
AR	190286	0.060	0.050	0.000	0.020	0.050	0.100	0.210
NETTC	190286	0.040	0.120	-0.210	-0.030	0.010	0.090	0.490
AGE	121087	12.690	12.290	1.000	6.000	9.000	13.000	110.000
PROD	190286	0.310	0.370	0.000	0.100	0.190	0.370	2.900
COLL	190286	0.400	0.210	0.000	0.230	0.380	0.540	1.000
SIZE	190286	0.800	1.650	0.020	0.110	0.250	0.680	15.320
FOWNS	189472	0.170	0.350	0.000	0.000	0.000	0.000	1.000
CASHFLOW	190286	0.100	0.130	-0.120	0.020	0.060	0.130	0.810
LEV	190170	0.430	0.260	0.000	0.220	0.420	0.620	1.140

Notes: our elaboration from NBS data. See Appendix 4A for a complete definition of all variables.

Table 4.3. Summary statistics for firms with high accounts payable (more than the 50th percentile)

Variable	n	Mean	S.D.	Min	0.25	Mdn	0.75	Max
EXPDUM	190258	0.370	0.480	0.000	0.000	0.000	1.000	1.000
AP	190258	0.250	0.140	0.040	0.140	0.210	0.320	0.740
AR	190258	0.220	0.160	0.000	0.080	0.190	0.320	0.700
NETTC	190258	0.030	0.180	-0.530	-0.080	0.030	0.140	0.490
AGE	127159	11.580	10.420	1.000	6.000	9.000	13.000	143.000
PROD	190258	0.330	0.370	0.000	0.110	0.200	0.390	2.900
COLL	190258	0.310	0.180	0.000	0.170	0.280	0.420	1.000
SIZE	190258	0.650	1.390	0.020	0.100	0.210	0.540	15.320
FOWNS	189832	0.220	0.380	0.000	0.000	0.000	0.250	1.000
CASHFLOW	190258	0.090	0.110	-0.120	0.030	0.060	0.110	0.810
LEV	190176	0.380	0.230	0.000	0.200	0.370	0.530	1.140

Notes: our elaboration from NBS data. See Appendix 4A for a complete definition of all variables.

Table 4.4. Summary statistics for firms with low accounts payable (less than the 50th percentile)

Variable	n	Mean	S.D.	Min	0.25	Mdn	0.75	Max
EXPDUM	190282	0.300	0.460	0.000	0.000	0.000	1.000	1.000
AP	190282	0.030	0.030	0.000	0.000	0.030	0.060	0.150
AR	190282	0.140	0.130	0.000	0.030	0.100	0.210	0.650
NETTC	190282	-0.100	0.130	-0.530	-0.170	-0.070	-0.010	0.140
AGE	119783	12.550	11.650	1.000	6.000	9.000	13.000	140.000
PROD	190282	0.320	0.370	0.000	0.100	0.190	0.380	2.900
COLL	190282	0.370	0.210	0.000	0.210	0.340	0.500	1.000
SIZE	190282	0.720	1.520	0.020	0.100	0.220	0.610	15.310
FOWNS	189389	0.150	0.330	0.000	0.000	0.000	0.000	1.000
CASHFLOW	190282	0.100	0.130	-0.120	0.030	0.070	0.130	0.810
LEV	190161	0.450	0.270	0.000	0.230	0.450	0.650	1.140

Notes: our elaboration from NBS data. See Appendix 4A for a complete definition of all variables.

Table 4.5. Summary statistics

Variable	All firms (1) n	All firms (1) Mean (S.E.)	Exporters (2) n	Exporters (2) Mean (S.E.)	Non exporters (3) n	Non exporters (3) Mean (S.E.)	Mean differences (t statistic) (4)	
EXPDUM	380,540	0.332 (0.001)	126,520	1.000 (0.000)	254,020	0.000 (0.000)	n.a.	
CONTROL VARIABLES								
AGE	246,942	12.049 (0.022)	88,975	11.237 (0.032)	157,967	12.506 (0.030)	1.269***	(28.976)
PROD	380,540	0.324 (0.001)	126,520	0.314 (0.001)	254,020	0.328 (0.001)	0.014***	(11.243)
COLL	380,540	0.340 (0.000)	126,520	0.307 (0.000)	254,020	0.356 (0.000)	0.049***	(77.363)
SIZE	380,540	0.680 (0.002)	126,520	0.996 (0.005)	254,020	0.523 (0.002)	-0.473***	(-81.966)
FOWNS	379,221	0.184 (0.001)	126,289	0.385 (0.001)	252,932	0.083 (0.001)	-0.302***	(-220.000)
CASHFLOW	380,540	0.095 (0.000)	126,520	0.090 (0.000)	254,020	0.098 (0.000)	0.007***	(19.290)
LEV	380,337	0.412 (0.000)	126,467	0.377 (0.001)	253,870	0.429 (0.000)	0.053***	(62.731)
TRADE CREDIT								
AP	380,540	0.140 (0.000)	126,520	0.160 (0.000)	254,020	0.130 (0.000)	-0.030***	(-58.617)
AR	380,540	0.177 (0.000)	126,520	0.181 (0.000)	254,020	0.175 (0.000)	-0.006***	(-11.090)
NETTC	380,540	-0.037 (0.000)	126,520	-0.021 (0.000)	254,020	-0.045 (0.000)	-0.024***	(-41.777)

Notes: ***, **, and* denote, respectively, significance levels of 1%, 5% and 10% for a two-tailed two sample Welch t-test. t-statistics are in parentheses (Column 4). See Appendix 4A for complete definitions of all variables.

Table 4.6. Correlation matrix

	EXPDUM	*AGE*	*PROD*	*COLL*	*SIZE*	*FOWN*	*CASHFLOW*	*LEV*	*AP*	*AR*	*NETTC*
EXPDUM	1										
AGE	-0.0529*	1									
PROD	-0.0005	-0.0051*	1								
COLL	-0.1147*	0.0401*	-0.0038	1							
SIZE	0.0722*	0.0903*	0.0070*	0.0169*	1						
FOWN	0.4044*	-0.1414*	0.0043*	-0.0967*	0.0159*	1					
CASHFLOW	-0.0347*	-0.0696*	0.0045*	0.1189*	-0.0045*	-0.0244*	1				
LEV	-0.1018*	0.1856*	-0.0024	0.0203*	0.0069*	-0.2366*	-0.1479*	1			
AP	0.0960*	-0.0639*	0.0006	-0.2175*	-0.0143*	0.1368*	-0.0871*	-0.2539*	1		
AR	-0.0000	-0.0707*	0.0015	-0.4151*	-0.0441*	0.0374*	-0.0450*	-0.0834*	0.2756*	1	
NETTC	0.0800*	0.0041	-0.0008	0.1624*	0.0245*	0.0829*	-0.0354*	-0.1426*	0.6054*	-0.5982*	1

Notes: This table reports Pearson correlation coefficients. * denotes significance at the 5% level. See Appendix 4A for definitions of all variables.

Table 4.7. Effect of accounts payable and accounts receivable on the probability of exporting

	Equation (4.1)			Equation (4.2)			Equation (4.3)		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$EXPDUM_{i(t-1)}$	2.581***	2.582***	2.581***	2.581***	2.580***	2.577***	2.580***	2.577***	2.573***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
	0.337	0.338	0.337	0.337	0.337	0.337	0.337	0.336	0.336
$AGE_{i(t-1)}$	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$PROD_{i(t-1)}$	-0.154***	-0.154***	-0.154***	-0.155***	-0.151***	-0.153***	-0.155***	-0.152***	-0.154***
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
	-0.020	-0.020	-0.020	-0.020	-0.020	-0.020	-0.020	-0.020	-0.020
$COLL_{i(t-1)}$	-0.158***	-0.163***	-0.155***	-0.146***	-0.232***	-0.215***	-0.146***	-0.225***	-0.207***
	(0.027)	(0.027)	(0.027)	(0.027)	(0.029)	(0.029)	(0.027)	(0.029)	(0.029)
	-0.021	-0.021	-0.020	-0.019	-0.030	-0.028	-0.019	-0.029	-0.027
$SIZE_{i(t-1)}$	0.093***	0.094***	0.092***	0.095***	0.092***	0.093***	0.095***	0.093***	0.093***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
$FOWNS_{i(t-1)}$	0.560***	0.564***	0.561***	0.564***	0.562***	0.562***	0.563***	0.560***	0.559***
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
	0.073	0.074	0.073	0.074	0.074	0.073	0.074	0.073	0.073
$CASHFLOW_{i(t-1)}$	-0.008	-0.037	-0.009	-0.008	-0.036	0.009	-0.010	-0.045	0.001
	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)
	-0.001	-0.005	-0.001	-0.001	-0.005	0.001	-0.001	-0.006	0.000
$LEV_{i(t-1)}$	-0.076***	-0.077***	-0.075***	-0.054**	-0.093***	-0.059***	-0.061***	-0.095***	-0.065***
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
	-0.010	-0.010	-0.010	-0.007	-0.012	-0.008	-0.008	-0.012	-0.008
$APDUM_{i(t-1)}$	0.134***		0.130***						
	(0.016)		(0.016)						
	0.018		0.017						
$ARDUM_{i(t-1)}$		0.074***	0.051**						
		(0.022)	(0.023)						
		0.010	0.007						
$HIGHAP_{i(t-1)}$				0.157***		0.232***			
				(0.036)		(0.038)			
				0.021		0.030			
$LOWAP_{i(t-1)}$				0.397**		0.451**			
				(0.187)		(0.188)			
				0.052		0.059			
$HIGHAR_{i(t-1)}$					-0.179***	-0.238***			
					(0.037)	(0.038)			
					-0.023	-0.031			
$LOWAR_{i(t-1)}$					0.161	0.098			
					(0.126)	(0.127)			
					0.021	0.013			
$HIGHAP_{i(t-1)} = LOWAP_{i(t-1)}$ (p-value)				0.1610					
$HIGHAR_{i(t-1)} = LOWAR_{i(t-1)}$ (p-value)					0.0016				
$HIGHAP_{i(t-1)} = LOWAP_{i(t-1)}$ (p-value)						0.2020			
$HIGHAR_{i(t-1)} = LOWAR_{i(t-1)}$ (p-value)						0.0019			

$AP_{i(t-1)}$							0.690***		0.697***
							(0.090)		(0.091)
							0.090		0.091
$AP^2_{i(t-1)}$							-1.142***		-0.969***
							(0.175)		(0.176)
							-0.149		-0.126
$AR_{i(t-1)}$								0.696***	0.601***
								(0.097)	(0.097)
								0.091	0.078
$AR^2_{i(t-1)}$								-1.844***	-1.780***
								(0.184)	(0.185)
								-0.241	-0.232
Inflection points AP only							30.20%		
Inflection points AR only								18.88%	
Inflection points AP									36.11%
Inflection points AR									16.81%
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ownership dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-2.230***	-2.173***	-2.275***	-2.143***	-2.051***	-2.095***	-2.166***	-2.096***	-2.161***
	(0.091)	(0.092)	(0.093)	(0.090)	(0.090)	(0.090)	(0.090)	(0.090)	(0.090)
Observations	164,490	164,490	164,490	164,490	164,490	164,490	164,490	164,490	164,490
pseudo-R-squared	0.621	0.620	0.621	0.621	0.621	0.621	0.621	0.621	0.621
Log Lik	-40295	-40323	-40293	-40320	-40305	-40288	-40300	-40262	-40229

Notes: All regressions were estimated using a pooled probit model. The dependent variable $EXPDUM_{it}$ is a dummy variable which takes the value of one if the firm *i* exports at time *t*, and zero otherwise. Heteroskedasticity-robust standard-errors are reported in parentheses. ***, ** and * indicate significance at 1, 5 and 10 percentage level respectively. Marginal effects for all variables are reported below standard errors.
See Appendix 4A for a precise definition of all variables.

Table 4.8. Initial conditions – Effect of accounts payable and accounts receivable on the probability of exporting – the inverted U shaped relationship

	Initial conditions		
VARIABLES	(1)	(2)	(3)
$EXPDUM_{i(2004)}$	3.566***	3.543***	3.539***
	(0.081)	(0.080)	(0.081)
	0.169	0.170	0.169
$EXPDUM_{i(t-1)}$	0.894***	0.897***	0.896***
	(0.029)	(0.029)	(0.029)
	0.043	0.043	0.043
$AGE_{i(t-1)}$	0.004***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)
	0.000	0.000	0.000
$PROD_{i(t-1)}$	-0.225***	-0.222***	-0.222***
	(0.041)	(0.041)	(0.030)
	-0.011	-0.011	0.011
$COLL_{i(t-1)}$	-0.250***	-0.326***	-0.307***
	(0.074)	(0.074)	(0.075)
	-0.012	-0.016	-0.015
$SIZE_{i(t-1)}$	0.013	0.011	0.011
	(0.022)	(0.022)	(0.022)
	0.001	0.001	0.001
$FOWNS_{i(t-1)}$	0.505***	0.504***	0.500***
	(0.067)	(0.067)	(0.067)
	0.024	0.024	0.024
$CASHFLOW_{i(t-1)}$	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
	0.000	0.000	0.000
$LEV_{i(t-1)}$	-0.145***	-0.261***	-0.145***
	(0.056)	(0.048)	(0.056)
	-0.007	-0.013	-0.007
$AP_{i(t-1)}$	0.666***		0.648***
	(0.182)		(0.183)
	0.032		0.031
$AP^2_{i(t-1)}$	-1.263***		-1.038***
	(0.339)		(0.340)
	-0.060		-0.050
$AR_{i(t-1)}$		0.687***	0.596***
		(0.197)	(0.197)
		0.033	0.029
$AR^2_{i(t-1)}$		-1.901***	-1.811***
		(0.357)	(0.359)
		-0.091	-0.087
$AvPROD_i$	-0.019	-0.019	-0.019
	(0.037)	(0.037)	(0.037)
	-0.001	-0.0001	-0.0001
$AvCOLL_i$	-0.059	-0.094	-0.092
	(0.074)	(0.075)	(0.075)

	-0.003	-0.005	-0.004
$AvSIZE_i$	0.165***	0.163***	0.163***
	(0.020)	(0.020)	(0.020)
	0.008	0.008	0.008
$AvFOWNS_i$	0.508***	0.508***	0.504***
	(0.062)	(0.062)	(0.062)
	0.024	0.024	0.024
$AvCASHFLOW_i$	-0.000*	-0.000*	-0.000*
	(0.000)	(0.000)	(0.000)
	-0.000	-0.000	-0.000
$AvLEV_i$	0.003	0.168***	-0.003
	(0.056)	(0.049)	(0.056)
	0.000	0.008	-0.000
$AvAP_i$	1.133***		1.107***
	(0.181)		(0.182)
	0.054		0.053
$AvAP^2_i$	-1.568***		-1.375***
	(0.346)		(0.346)
	-0.074		-0.066
$AvAR_i$		1.119***	0.967***
		(0.199)	(0.200)
		0.054	0.046
$AvAR^2_i$		-2.327***	-2.213***
		(0.364)	(0.365)
		-0.111	-0.106
Constant	-3.696***	-3.617***	-3.715***
	(0.212)	(0.212)	(0.213)
Industry dummies	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes
Ownership dummies	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes
Inflection points AP only	**26.67%**		
Inflection points AR only		**18.13%**	
Inflection points AP			**31.00%**
Inflection points AR			**16.67%**
Inflection points AP only (means)	**36.49%**		
Inflection points AR only (means)		**24.32%**	
Inflection points AP (means)			**40.15%**
Inflection points AR (means)			**21.70%**
Observations	164,131	164,131	164,131
Log Lik	-37,491	-37,471	-37,429

Heteroskedasticity-robust standard-errors are reported in parentheses. ***, ** and * indicate significance at 1, 5 and 10 percentage level respectively. Marginal effects for all variables are reported below standard errors. All the variables whose name starts with "Av" refer are the average value computed in line with the methodology suggested by Wooldridge (2005).
See Appendix 4A for a precise definition of all variables.

Table 4.9. Effect of trade credit on the probability of exporting for different ownership types – the inverted U shaped relationship

	Private firms			Foreign firms			SOEs			Collective firms		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
EXPDUM$_{i(t-1)}$	2.609***	2.605***	2.601***	2.479***	2.482***	2.477***	2.644***	2.639***	2.640***	2.588***	2.583***	2.584***
	(0.015)	(0.015)	(0.015)	(0.025)	(0.025)	(0.025)	(0.059)	(0.059)	(0.059)	(0.059)	(0.059)	(0.059)
	0.330	0.329	0.328	0.397	0.397	0.396	0.245	0.245	0.244	0.228	0.228	0.228
AGE$_{i(t-1)}$	0.002***	0.002***	0.002***	0.008***	0.007***	0.008***	0.003**	0.003**	0.003**	0.002	0.002	0.002
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000
PROD$_{i(t-1)}$	-0.146***	-0.145***	-0.145***	-0.204***	-0.194***	-0.200***	-0.007	0.007	-0.002	-0.072	-0.072	-0.069
	(0.021)	(0.021)	(0.021)	(0.026)	(0.026)	(0.026)	(0.101)	(0.102)	(0.102)	(0.084)	(0.084)	(0.084)
	-0.018	-0.018	-0.018	-0.033	-0.031	-0.032	-0.001	0.001	-0.000	-0.006	-0.006	-0.006
COLL$_{i(t-1)}$	-0.145***	-0.214***	-0.199***	0.052	-0.091	-0.040	-0.422***	-0.437***	-0.443***	-0.111	-0.187	-0.179
	(0.035)	(0.037)	(0.037)	(0.058)	(0.061)	(0.062)	(0.126)	(0.130)	(0.131)	(0.127)	(0.132)	(0.133)
	-0.018	-0.027	-0.025	0.008	-0.015	-0.006	-0.039	-0.041	-0.041	-0.010	-0.016	-0.016
SIZE$_{i(t-1)}$	0.104***	0.101***	0.102***	0.081***	0.082***	0.081***	0.073***	0.073***	0.072***	0.133***	0.128***	0.127***
	(0.005)	(0.005)	(0.005)	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)	(0.010)	(0.029)	(0.028)	(0.029)
	0.013	0.013	0.013	0.013	0.013	0.013	0.007	0.007	0.007	0.012	0.011	0.011
FOWNS$_{i(t-1)}$	0.762***	0.752***	0.753***				1.161***	1.189***	1.157***	1.225***	1.214***	1.217***
	(0.050)	(0.050)	(0.050)				(0.251)	(0.250)	(0.252)	(0.227)	(0.229)	(0.227)
	0.096	0.095	0.095				0.107	0.110	0.107	0.108	0.107	0.107
CASHFLOW$_{i(t-1)}$	-0.050	-0.095	-0.043	0.124	0.071	0.154	0.563	0.576*	0.581*	-0.034	-0.049	-0.034
	(0.066)	(0.065)	(0.066)	(0.105)	(0.104)	(0.106)	(0.343)	(0.340)	(0.343)	(0.208)	(0.208)	(0.209)
	-0.006	-0.012	-0.005	0.020	0.011	0.025	0.052	0.053	0.054	-0.003	-0.004	-0.003
LEV$_{i(t-1)}$	0.004	-0.037	0.001	-0.235***	-0.289***	-0.243***	-0.140	-0.128	-0.147	-0.085	-0.091	-0.100
	(0.028)	(0.026)	(0.028)	(0.045)	(0.044)	(0.045)	(0.097)	(0.095)	(0.097)	(0.096)	(0.095)	(0.097)
	0.001	-0.005	0.000	-0.038	-0.046	-0.039	-0.013	-0.012	-0.014	-0.007	-0.008	-0.009
AP$_{i(t-1)}$	**0.629*** **		**0.623*** **	**0.877*** **		**0.933*** **	**1.191** **		**1.153** **	**0.763***		**0.824***
	(0.117)		**(0.118)**	**(0.175)**		**(0.176)**	**(0.537)**		**(0.561)**	**(0.462)**		**(0.477)**
	0.079		**0.079**	**0.140**		**0.149**	**0.110**		**0.107**	**0.067**		**0.073**

$AP^2_{i(t-1)}$	**-0.982*** **		**-0.783*** **	**-1.231*** **		**-1.145*** **	**-3.158** **		**-2.936** **	**-1.730***		**-1.701***
	(0.232)		**(0.233)**	**(0.319)**		**(0.320)**	**(1.281)**		**(1.317)**	**(1.002)**		**(1.033)**
	-0.124		**-0.099**	**-0.197**		**-0.183**	**-0.292**		**-0.272**	**-0.153**		**-0.150**
$AR_{i(t-1)}$		**0.876*** **	**0.792*** **		**0.145**	**0.028**		**0.683**	**0.484**		**0.384**	**0.303**
		(0.126)	**(0.126)**		**(0.190)**	**(0.191)**		**(0.535)**	**(0.561)**		**(0.456)**	**(0.464)**
		0.111	**0.100**		**0.023**	**0.005**		**0.063**	**0.045**		**0.034**	**0.027**
$AR^2_{i(t-1)}$		**-2.156*** **	**-2.120*** **		**-0.815** **	**-0.774** **		**-1.988**	**-1.525**		**-1.336**	**-1.214**
		(0.241)	**(0.242)**		**(0.353)**	**(0.355)**		**(1.227)**	**(1.276)**		**(0.840)**	**(0.850)**
		-0.272	**-0.267**		**-0.130**	**-0.124**		**-0.184**	**-0.141**		**-0.118**	**-0.107**
Constant	-2.141***	-2.080***	-2.150***	-1.814***	-1.644***	-1.758***	-2.732***	-2.720***	-2.732***	-2.151***	-2.038***	-2.078***
	(0.107)	(0.107)	(0.107)	(0.236)	(0.229)	(0.237)	(0.337)	(0.340)	(0.341)	(0.352)	(0.357)	(0.361)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ownership dummies	No	No	No	No	No	No	No	No	No	No	No	No
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Inflection points AP only	**31.85%**			**35.53%**			**18.84%**			**21.90%.**		
Inflection points AR only		**20.40%**			**n.a.**			**n.a.**			**n.a.**	
Inflection points AP			**39.90%**			**40.71%**			**19.67%**			**24.33%**
Inflection points AR			**18.73%**			**n.a.**			**n.a.**			**n.a.**
Observations	104,069	104,069	104,069	34,584	34,584	34,584	9,797	9,797	9,797	10,244	10,244	10,244
pseudo-R-squared	0.593	0.594	0.594	0.520	0.520	0.521	0.611	0.610	0.611	0.578	0.579	0.579
Log Lik	-24668	-24634	-24615	-10259	-10263	-10245	-1718	-1719	-1717	-1729	-1728	-1726

The dependent variable $EXPDUM_{it}$ is a dummy variable which takes the value of one if the firm *i* exports at time *t*, and zero otherwise. Heteroskedasticity-robust standard-errors are reported in parentheses. ***, ** and * indicate significance at 1, 5 and 10 percentage level respectively. Marginal effects for all variables are reported below standard errors.

See Appendix 4A for a precise definition of all variables.

Appendix 4

Appendix 4A

Variable definitions

EXPDUM is a dummy taking a value of one if a given firm has positive exports in a given year, and zero otherwise

AGE is measured by the number of years since the establishment of the firm.

PROD is thereal operating revenue per worker.

COLL is the ratio between fixed assets and total assets.

SIZE is measured by real total assets (millions of Yuan).

FOWNS is the percentage of shares owned by foreign investors.

CASHFLOW is the ratio between (net profit+ depreciation of fixed assets) and total assets.

LEV is the ratio between the difference of total liabilities and accounts payable and total assets.

AP is the ratio between accounts payable and total assets.

AR is the ratio between accounts receivable and total assets.

NETTC is the difference between *AR* and *AP*.

AP^2 is the squared of the ratio between accounts payables and total assets.

AR^2 is the squared of the ratio between accounts receivable and total assets.

APDUM is a dummy taking a value of one if a given firm has non-zero accounts payable in its balance sheet, and zero otherwise.

ARDUM is a dummy taking a value of one if a given firm has non-zero accounts receivable its balance sheet, and zero otherwise.

HIGHAP is a dummy taking the value of one if a given firm has a value of accounts payable above the 50^{th} percentile of the distribution of the accounts payable of all firms operating in its same industry, and zero otherwise.

LOWAP is a dummy taking the value of one if a given firm has a value of accounts payable below the 50^{th} percentile of the distribution of the accounts payable of all firms operating in its same industry, and zero otherwise.

HIGHAR is a dummy taking the value of one if a given firm has a value of accounts receivable above the 50^{th} percentile of the distribution of the accounts receivable of all firms operating in its same industry, and zero otherwise.

LOWAR is a dummy taking the value of one if a given firm has a value of accounts receivable below the 50^{th} percentile of the distribution of the accounts receivable of all firms operating in its same industry, and zero otherwise.

Appendix 4B

Descriptive statistics for different ownership types

Table 4.1B. Summary statistics for private firms

Variables	Full sample (1)		Exporters (2)		Non-exporters (3)		Mean differences (t-statistics) (4)	
	n	Mean (S.E)	n	Mean (S.E)	n	Mean (S.E)		
EXPDUM	248,799	0.270 (0.001)	67,252	1.000 (0.000)	181,547	0.000 (0.000)	n.a.	
CONTROL VARIABLES								
AGE	153,325	10.330 (0.025)	42,630	10.840 (0.050)	110,695	10.133 (0.028)	-0.707***	(-12.224)
PROD	248,799	0.324 (0.001)	67,252	0.292 (0.001)	181,547	0.335 (0.001)	0.043***	(28.636)
COLL	248,799	0.342 (0.000)	67,252	0.308 (0.001)	181,547	0.355 (0.000)	0.047***	(58.004)
SIZE	248,799	0.559 (0.003)	67,252	0.848 (0.007)	181,547	0.452 (0.002)	-0.397***	(-55.504)
FOWNS	248,012	0.027 (0.000)	67,116	0.059 (0.001)	180,896	0.015 (0.000)	-0.044***	(-69.927)
CASHFLOW	248,799	0.099 (0.000)	67,252	0.091 (0.000)	181,547	0.102 (0.000)	0.011***	(22.349)
LEV	248,690	0.435 (0.000)	67,222	0.445 (0.001)	181,468	0.430 (0.001)	-0.015***	(-14.470)
TRADE CREDIT								
AP	248,799	0.134 (0.000)	67,252	0.144 (0.001)	181,547	0.130 (0.000)	-0.014***	(-22.409)
AR	248,799	0.178 (0.000)	67,252	0.178 (0.001)	181,547	0.178 (0.000)	0.001	(1.073)
NETTC	248,799	-0.044 (0.000)	67,252	-0.033 (0.001)	181,547	-0.048 (0.000)	-0.015***	(-20.141)

Notes: ***, **, and* denote, respectively, significance levels of 1%, 5% and 10% for a two-tailed Welch two sample t-test. t-statistics are in parentheses (Column 4). See Appendix 4A for a precise definition of all variables.

Table 4.2B. Summary statistics for foreign firms

Variables	Full sample (1)		Exporters (2)		Non-exporters (3)		Mean differences (t-statistics) (4)	
	n	Mean (S.E)	n	Mean (S.E)	n	Mean (S.E)		
EXPDUM	65,692	0.711 (0.002)	46,712	1.000 (0.000)	18,980	0.000 (0.000)	n.a.	
CONTROL VARIABLES								
AGE	53,232	9.455 (0.017)	38,188	9.619 (0.020)	15,044	9.039 (0.031)	-0.581***	(-15.567)
PROD	65,692	0.381 (0.002)	46,712	0.353 (0.002)	18,980	0.451 (0.003)	0.097***	(24.959)
COLL	65,692	0.306 (0.001)	46,712	0.301 (0.001)	18,980	0.316 (0.001)	0.015***	(9.563)
SIZE	65,692	1.014 (0.007)	46,712	1.080 (0.009)	18,980	0.849 (0.011)	-0.231***	(-17.031)
FOWNS	65,590	0.905 (0.001)	46,658	0.919 (0.001)	18,932	0.873 (0.002)	-0.045***	(-23.282)
CASHFLOW	65,692	0.093 (0.000)	46,712	0.092 (0.000)	18,980	0.097 (0.001)	0.005***	(5.081)
LEV	65,663	0.273 (0.001)	46,697	0.256 (0.001)	18,966	0.314 (0.002)	0.058***	(29.674)
TRADE CREDIT								
AP	65,692	0.179 (0.001)	46,712	0.190 (0.001)	18,980	0.151 (0.001)	-0.040***	(-29.944)
AR	65,692	0.192 (0.001)	46,712	0.192 (0.001)	18,980	0.192 (0.001)	-0.000	(-0.011)
NETTC	65,692	-0.014 (0.001)	46,712	-0.002 (0.001)	18,980	-0.042 (0.001)	-0.040***	(-26.382)

Notes: ***, **, and* denote, respectively, significance levels of 1%, 5% and 10% for a two-tailed Welch two sample t-test. t-statistics are in parentheses (Column 4). See Appendix 4A for a precise definition of all variables.

Table 4.3B. Summary statistics for state-owned enterprises

Variables	Full sample (1)		Exporters (2)		Non-exporters (3)		Mean differences (t-statistics) (4)	
	n	Mean (S.E)	n	Mean (S.E)	n	Mean (S.E)		
EXPDUM	24,433	0.155 (0.002)	3,780	1.000 (0.000)	20653	0.000 (0.000)	n.a.	
CONTROL VARIABLES								
AGE	15,691	30.010 (0.144)	2,481	31.752 (0.392)	13,210	29.683 (0.155)	-2.069***	(-4.907)
PROD	24,433	0.187 (0.002)	3,780	0.232 (0.005)	20,653	0.178 (0.002)	-0.054***	(-10.507)
COLL	24,433	0.418 (0.001)	3,780	0.362 (0.003)	20,653	0.428 (0.002)	0.067***	(20.035)
SIZE	24,433	1.256 (0.015)	3,780	2.715 (0.055)	20,653	0.989 (0.014)	-1.727***	(-30.720)
FOWNS	24,190	0.014 (0.000)	3,764	0.039 (0.002)	20,426	0.010 (0.000)	-0.030***	(-14.537)
CASHFLOW	24,433	0.046 (0.001)	3,780	0.044 (0.001)	20,653	0.046 (0.001)	0.002*	(1.955)
LEV	24,395	0.532 (0.002)	3,773	0.530 (0.004)	20,622	0.533 (0.002)	0.003	(0.6770)
TRADE CREDIT								
AP	24,433	0.106 (0.001)	3,780	0.115 (0.002)	20,653	0.104 (0.001)	-0.011***	(-5.590)
AR	24,433	0.117 (0.001)	3,780	0.128 (0.002)	20,653	0.115 (0.001)	-0.013***	(-6.535)
NETTC	24,433	-0.011 (0.001)	3,780	-0.012 (0.002)	20,653	-0.010 (0.001)	0.002	(0.920)

Notes: ***, **, and* denote, respectively, significance levels of 1%, 5% and 10% for a two-tailed Welch two sample t-test. t-statistics are in parentheses (Column 4). See Appendix 4A for a precise definition of all variables.

Table 4.4B. Summary statistics for collective firms

Variables	Full samples (1)		Exporters (2)		Non-exporters (3)		Mean differences (t-statistics) (4)	
	n	Mean (S.E)	n	Mean (S.E)	n	Mean (S.E)		
EXPDUM	27,869	0.140 (0.002)	3,894	1.000 (0.006)	23,975	0.000 (0.000)	n.a.	
CONTROL VARIABLES								
AGE	15,919	18.064 (0.092)	2,264	19.350 (0.294)	13,655	17.851 (0.096)	-1.450***	(-4.848)
PROD	27,869	0.295 (0.002)	3,894	0.278 (0.005)	23,975	0.297 (0.002)	0.019***	(3.219)
COLL	27,869	0.333 (0.001)	3,894	0.316 (0.003)	23,975	0.336 (0.001)	0.020***	(5.963)
SIZE	27,869	0.396 (0.005)	3,894	0.664 (0.021)	23,975	0.353 (0.005)	-0.042***	(-18.812)
FOWNS	27,753	0.015 (0.000)	3,881	0.052 (0.002)	23,872	0.009 (0.000)	0.012***	(5.239)
CASHFLOW	27,869	0.107 (0.001)	3,894	0.097 (0.002)	23,975	0.109 (0.001)	-0.021***	(-5.065)
LEV	27,849	0.429 (0.002)	3,894	0.448 (0.004)	23,955	0.426 (0.002)	-0.021***	(-5.065)
TRADE CREDIT								
AP	27,869	0.138 (0.001)	3,894	0.143 (0.002)	23,975	0.137 (0.001)	-0.005**	(-2.158)
AR	27,869	0.192 (0.001)	3,894	0.172 (0.002)	23,975	0.196 (0.001)	0.024***	(9.287)
NETTC	27,869	-0.054 (0.001)	3,894	-0.029 (0.003)	23,975	-0.058 (0.001)	-0.029	(-9.919)

Notes: ***, **, and* denote, respectively, significance levels of 1%, 5% and 10% for a two-tailed Welch two sample t-test. t-statistics are in parentheses (Column 4). See Appendix 4A for a precise definition of all variables.

Appendix 4C

Ownership definitions

Private firms: at least 50% of all shares are privately owned. Foreign firms: at least 50% of all shares are foreign owned. SOEs: at least 50% of all shares are state owned. Collective firms: at least 50% of all shares are collectively owned

CHAPTER FIVE

CONCLUSIONS, IMPLICATIONS, LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

5.1. Summary of main findings

The main objective of this thesis is to investigate the determinants of trade credit for Chinese unlisted companies, how it shapes their capital structure and their likelihood to export. Our study focuses on the period 2004-2007.

5.1.1. Chapter two

In Chapter two, we analyse the determinants of trade credit for Chinese unlisted companies over the years 2004-2007. We tackle the presence of possible endogeneity by making use of a system-GMM technique.

First, we show that the decision to grant and receive trade credit follows a model of partial adjustment. Looking at accounts receivable, companies located in those provinces with

the highest level of marketization and foreign enterprises (regardless of their location) show the highest speeds of adjustment. Firms located in regions with higher levels of marketization offer more trade credit and receive more credit. Looking at accounts payable, firms located in provinces with intermediate levels of marketization and private firms (regardless of their location) show the largest speed of convergence.

Second, we show that the extension of trade credit decreases when cash flow and any source of external finance increase. We would have expected that higher availability of either internal or external funds could be associated with a larger extension of trade credit. Yet, the recorded relationship may indicate the need of preserving funds in a context of an underdeveloped credit market. This is especially relevant for private firms as they are more inclined to save for precautionary reasons due to the financial constraints they face. We also observe that the level of accounts receivable for private firms declines with the stock of inventories. In fact, companies are prone to grant accounts receivable to buyers with the scope of promoting sales rather than building up an expensive stock of inventories, especially in the presence of uncertain future demand. The extension of accounts receivable for private firms also increases when the share of capital owned by a foreign investor raises. This supports the idea that the larger the investment by a foreign entity the larger beneficial effect in terms of managerial practices and the capability to extend trade credit despite the presence of financial constraints in the domestic credit system.

Third, we demonstrate that accounts receivable are positively associated with accounts payable. Such relationship becomes economically stronger the lower the level of marketization. This may indicate that the building-up of inter-firm trust associated with the extension of trade credit substantially enhances the volume of trade credit obtained the weaker the institutional environment. When looking at companies owned by different agents, the

association between accounts receivable and accounts payable is largest for SOEs and collective firms, which typically obtain significantly more formal credit, especially from state-controlled banks.

5.1.2. Chapter three

In Chapter three, we study the role played by net trade credit (measured as the difference between accounts payable and accounts receivable), in shaping the capital structure of Chinese unlisted companies.

Using a system-GMM to deal with endogeneity, we document a threefold effect of net trade credit on total, short- and long-term leverage.

First, we show a positive association between net trade credit and both total and short-term debt. Contrary to the vast majority of studies looking at the relationship between trade credit and bank credit (e.g. Lin and Chou, 2015; Du *et al*., 2012), we detect a strong complementarity between net trade credit and other sources of debt. This is consistent with the signalling hypothesis put forward by Connelly *et al*. (2011) and with the seminal contribution of Bias and Gollier (1997, p. 905), who argue that companies obtaining trade credit provide a message of reliability and trustworthiness to the banking system.

Second, we detect a positive association between net trade credit and both total and short-term debt only for firms located in those provinces with the highest level of marketization. This suggests that the signal associated with trade credit might be distorted in the provinces with the lowest levels of marketization due to the backwardness of the institutional environment and the associated presence of information asymmetries.

Third, we document that a positive association between trade credit and short-term debt is in place for private and foreign firms only. The economic effect of net trade credit leads to a higher increase in short-term debt for foreign than for private firms. This might be due to a reinforcing signalling effect that foreign ownership has on top of net trade credit and to a preferential treatment granted to foreign investors in their access to finance.

The positive association between net trade credit and short-term debt is *only* observed if firms are located in the provinces with the highest level of marketization. Moreover, the magnitude of the quality signal embedded in net trade credit is reinforced for private firms that are located in the provinces with the highest levels of marketization.

5.1.3. Chapter four

In Chapter four we investigate how trade credit affects the probability of exporting of Chinese unlisted companies. First, using a pooled probit model we show that accounts payable and accounts receivable enhance the probability of exporting, but only up to a certain threshold. In fact we report evidence of an inverted U-shaped relationship between both measures of trade credit and the likelihood of being an exporter. The results are robust to using an initial conditions econometric approach.

Second, focusing on companies owned by different agents, we show that accounts payable and exporting are linked by an inverted U-shaped relationship for all firms. This is the result of a combination of effects. In fact, if a firm is receiving credit from its suppliers, it is, *ceteris paribus*, more likely to be able to distract other internal sources to pay the sunk costs needed to finance exporting. Yet, receiving a too high amount of trade credit will increase the amount of debt in the firm's balance sheet and possibly lead to an excessive

burden of short-term liabilities that the firm may find difficult to pay back. The negative effect associated with the increase in the obtainment of trade credit is only true for a limited number of companies across the specified ownership groups. In fact, the turning points we detected for accounts payable are larger than the median value for all ownership groups. In addition, the coefficients for the linear and quadratic term of accounts payable for SOEs and collective firm are only marginally significant.

Third, we show that if accounts receivable and accounts payable are both considered at the same time in our econometric specification, the U-shaped relationship for the extension of trade credit is recorded only for private firms. Such a positive relationship between accounts receivable and the likelihood of exporting may be explained considering two opposite effects. Not only firms with a good financial health are in a position to grant trade credit to their counterparts, but also those in financial distress may extend trade credit in order to obtain an increase in their sluggish sales. This phenomenon affects private firms only, as these companies are the most likely to adopt an aggressive sales policy to maintain or expand their sales through a large extension of accounts receivable (van Biesenbroeck, 2014; Petersen and Rajan, 1997).

5.2. Policy and managerial implications

The analysis we perform allows us to supply a set of policy reccomendations.

First, we suggest to devise measures aimed at improving the institutional environment, the legal framework and contract enforcement, especially in the least marketized provinces. This may be coupled with a gradual disengagement of the role of government in business, and a reduction of the size of government, because a large presence of the state may be a source of

inefficiencies. This is related to our findings in Chapter two, where we record that accounts receivable display a faster speed of adjustment for firms located in provinces with higher levels of marketization. This situation is likely to be associated with the presence of a larger degree of inter-firm trust. Hence, the policy measures we reccomend may provide a stimulus for faster repayment of debt obligations between business peers in less marketized provinces, thanks to an improved confidence in the rule of law. This intervention is also connected to our results in Chapter three. In fact, in order to guarantee that net trade credit could bring its trustworthiness signal in less marketized provinces without frictions and distortions, transparency in both transmission and receipt of information on firms' status is required. This is relevant for the communication of data on firms' solvency between companies and between companies and both formal and informal providers of finance.

Second, we advise policy makers to continue with state-drive actions aimed at smoothing economic and institutional difference across provinces, supporting the development of those areas that are lagging behind. This is related to our findings in Chapter two, where we emphasize that accounts payable show a faster adjustment in provinces with intermediate levels of marketization. This might be attributable to a possible catching up process towards the nature of inter-firm trade credit relations recorded in the most prosperous parts of the country.

Third, we advocate state intervention to reform the banking structure, which should be able to supply funds to financially sound companies. The credit system should be able to distinguish firms in distress due to managerial malpractices, from those that are severely constrained in the obtainment to finance because unfairly discriminated in the allocation of funds. This is the case of private companies, whose access to credit should be eased, either if they operate only domestically, or if they wish to embark in exports. This is connected to our

findings in Chapter two where we describe that the extension of trade credit by private firms decreases when both internal and external sources of finance increase, as a possible consequence of precautionary motives. This is also linked to the results in Chapter four. In fact, if bank finance is accessible to private firms these will not be forced to excessively rely on accounts payable to start exporting, and to eventually disrupt their balance sheet, with a consequent undesired effect of a decreased likelihood of exporting. In addition, an enhanced access to bank credit for private companies may limit the disproportionate extension of trade credit aimed at promoting sales (even abroad) as a consequence of low profitability or scarce turnover.

Fourth, we claim that the market-oriented reforms that interest SOEs and collective enterprises should persist, leading to a progressive reduction of their soft budget constraints and expose them to the competition of private and foreign firms. This is related to our results in Chapter two, where we detect that the extension of accounts receivable is positively associated with the obtainment of accounts payable, with a possible reappearance of the Triangle Debt Dilemma. This policy advice is also connected to our findings on Chapter three, where we show the irrelevance of net trade credit in the obtainment of non-supplier finance by government-controlled companies.

5.3. Limitations of the research

The thesis suffers from a few limitations.

Three affect all the dissertation. The first is the use of a short-sample size, which dates back to more than a decade ago (between 2004 and 2007). The second is the availability of information on firms with annual sales more than 5 million Renminbi only, with no data on

those with lower turnover. The third is that our econometric approach does not allow to claim for the presence of causation between explanatory and independent variables. It only allows to establish sign and significance of the association. We should thus look for supplementary information and employ additional estimation techniques to possibly identify causality.

Specific shortcomings also affect each chapter.

In Chapter two, there is no information on where the customer and the supplier are located (domestically or abroad). Yet, we do know where the related creditor, who extended accounts receivable, or the related debtor, who received accounts payable, is located. This is relevant as the level of economic, financial and institutional development of the province (or the country) where the buyer or the seller is situated may have an interplay with the degree of marketization that characterizes the place where the Chinese creditor or debtor is located. This interaction may in fact influence the terms of the trade credit contracts as a consequence of the diverse degrees of bargaining power and inter-firm trust that characterize the relationships amongst business peers located in areas that share few similarities (from an economic, financial and institution perspective).

In Chapter three, in addition to the shortcomings described in the previous paragraph, there is no information on duration and implicit tax rate of trade credit contracts deriving from discounts for early payments and penalties for late payments. Such data may help us to build additional and more homogeneous definitions of net trade credit, especially if such information is available for firms located in provinces with diverse levels of marketization and owned by different agents. As a result we could have a more precise understanding of the role of trade credit in the capital structure of Chinese firms.

In Chapter four we do not have information neither on the type of good exported nor on the destination market. It would be thus worth checking if the propensity to export varies if

the product sold belongs to a differentiated or homogeneous industry. This might enable us to rely on an additional dimension that the literature proved to be associated with the access to external finance (e.g. Guariglia and Mateut, 2016). In addition, it would be interesting to know if the purchaser is located in a developed, developing or transitional economy. This would help us to check for a possible heterogeneity in the financial sunk costs of entry across different destinations.

5.4. Suggestions for future research

Our findings in Chapter two are numerous and suggest the extension of our research along a relevant set of paths. First, given the large heterogeneity in the financial structure of the firms under scrutiny, we may test if our results hold on subsamples made up by either companies that are in financial distress or by those with high leverage. In fact, it would be interesting to check whether, and to what extent, the determinants of accounts receivable change if the company exceeds in the extensions of supplier credit to support its sluggish sales. In a symmetric way, the presence of abnormal levels of non-supplier forms of debt may modify the creditworthiness of the prospective borrower and alter the choices of the prospective lender. Second, given the large importance of trust in the Chinese business environment, we could complement our analysis with proxies of trust that explicitly measure the degree of perceived reliability and creditworthiness amongst enterprises, following the work by Wu *et al*. (2014). Third, it would be of particular importance to collect information on the duration of trade credit to unveil if firms roll over accounts payable and use them for financial and not merely transactional motives (Yano and Shiraishi, 2016). Fourth, one could test if our

findings change for firms with different degrees of political affiliation, or firms belonging to different industries.

Chapter three shows that net trade credit is a key determinant in shaping the capital structure of Chinese unlisted firms. It provides a signal of reliability that encourages business peers, informal and formal providers of funds to grant credit. This occurs only if the firm is private or foreign and if it is located in provinces with the highest level of marketization. The relevance of these results indicates paths for future possible extensions. First it would be interesting to check if our findings also hold specifically for SMEs, whose use of trade credit is likely to be influenced by social capital, as advocated by Du *et al*. (2015). It may also be useful to extend our investigation by taking into account how political and economic uncertainty affect the role that trade credit plays in the capital structure of Chinese listed firms, as put forward by Zhang *et al*. (2015). Next we could analyse the behaviour of firms belonging to different industries, placing particular emphasis on the difference between manufacturing sectors and service sectors, as firms operating in the latter are likely to be listed companies and thus more inclined to rely on formal forms of finance. Moreover, we could analyse the effect of net trade credit on different types of private debt securities, whose use is influenced, amongst other factors, by the rule of law in the form of creditors' right protection.

Chapter four shows that trade credit affects the likelihood of exporting of Chinese unlisted firms through an inverted U-shaped relationship. It would be interesting to investigate if a similar relationship also holds for listed firms which are less financially constrained, as they may have easier access to bank credit or to additional funds through the participation in the stock markets (Allen *et al*., 2005). Given that almost one third of total Chinese exports is provided by pure exporters, (i.e. firms selling abroad more than 90% of

their sales) (Defever and Riaño, 2012), it would also be interesting to check if our outcomes apply to these types of firms. This is on the agenda for future research.

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