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TRADE CREDIT, FINANCIAL INTERMEDIARY DEVELOPMENT AND INDUSTRY GROWTH

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ABSTRACT

Recent work suggests that financial development is important for economic growth, since financial markets more effectively allocate capital to firms with high value projects. For firms in poorly developed financial markets, implicit borrowing in the form of trade credit may provide an alternative source of funds. We show that industries with higher dependence on trade credit financing exhibit higher rates of growth in countries with weaker financial institutions. Furthermore, consistent with barriers to trade credit access among young firms, we show that most of the effect that we report comes from growth in the size of pre-existing firms.

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I. Introduction

In recent years, there has been increasing interest in the economics literature in the role of financial intermediaries in promoting economic growth. Recent papers have shown that improved financial market development is associated with growth, using a variety of methodologies and datasets.[1] One of the basic explanations for this pattern is that the financial sector serves to reallocate funds from those with an excess of capital, given their investment opportunities, to those with a shortage of funds (relative to opportunities). Thus, an economy with well-developed financial institutions will be better able to allocate resources to projects that yield the highest returns.

This allocative role of financial institutions in promoting development was the focus of Rajan and Zingales (1998), who found that industrial sectors with a greater need for external finance develop disproportionately faster in countries with more developed financial markets. This then begs the question of whether firms with high return projects in countries with poorly developed financial institutions are able to take steps to mitigate the effects of deficient (formal) financial intermediaries, and if so, how. One answer, implicit in Rajan and Zingales, is that firms will be forced to rely more on internally generated funds. Recent work by Petersen and Rajan (1997), suggests that implicit borrowing from suppliers may provide an additional possibility. They found that, among small firms in the United States, those with less well-established banking relationships held significantly higher levels of accounts payable. Similarly, firms in MSA's with a relative scarcity of financial institutions carried higher levels of accounts

[1] Perhaps the earliest work relating financial market development to economic growth is Cameron (1967). More recent work that examines this relationship using cross-country data includes Levine and King (1993) and Demirguc-Kunt and Maksimovic (1996). More sophisticated approaches have been utilized by: Rajan and Zingales (1998), who use within-country variation in industry characteristics; Bekaert et al (2000), who make use of time-series variation in looking at the effect of financial liberalization on growth; and Rousseau and Wachtel (1998), who look at the links between the intensity of financial intermediation and economic performance in five industrialized countries.

payable. They suggest that their results imply that trade credit is used as a source of 'financing of last resort' by very constrained firms. Nilsen (2000) looks at this issue from another angle, showing that during monetary contractions small firms, which are likely to be more credit constrained, react by borrowing more from their suppliers.

Now, even the most constrained of American firms face far less scarcity of funding from formal institutions than companies in many other countries, where stock markets are in their infancy, and formal lenders are rare. A natural extension of Petersen and Rajan's reasoning is that firms with financing needs in such countries will be more likely to fall back on supplier financing in the form of trade credit as a means of funding growth.

Suppose that it is the case that trade credit is a substitute for institutional financing where financial intermediaries are scarce, and further that it is also true that firms in certain industries find it inherently easier to access trade credit, for reasons that will be discussed in the next section. Then, this would imply a substitutability between 'trade credit suitability' and financial market development. That is, financial market development should matter disproportionately more for firms that cannot make use of trade credit financing, or conversely, firms with access to trade credit financing should face (relatively) fewer difficulties in countries with less developed financial markets.

Using the methodology of Rajan and Zingales (1998), we test this hypothesis, using data from a panel of 37 industries and 44 countries. Consistent with the basic hypothesis outlined above, we find that firms in industries with higher rates of accounts payable exhibit higher rates of growth in countries with relatively weak financial institutions.[2] We find these results to be

[2] We wish to emphasize that our conclusions on the substitutability of trade credit and bank credit are based on the within country variation in trade credit usage across industries. Thus, our results imply substitution between these two sources of financing at the micro level, which is consistent with previous findings for US firms by Petersen and Rajan (1997), described above. However, since both sources of financing are likely to be positively correlated with

very strong, and robust to a wide variety of specifications. However, since trade credit, particularly in the absence of effective legal enforcement, requires trust and reputation, startup firms may have more difficulty in benefiting from trade credit financing, as described above.[3] Consistent with this hypothesis, we find that when growth is measured by the creation of new establishments, 'credit intensive' industries do not grow significantly more rapidly in countries with underdeveloped capital markets.

The rest of the paper will be structured as follows: Section II will review the primary theories of trade credit provision, and discuss why they imply an industry-specific element to trade credit access. In section III, we discuss the data sets used in the analysis. Our basic results are reported in section IV; we give our conclusions and discussion in section V.

II. Theories of Trade Credit Provision

There are numerous theories that provide explanations for the provision of credit by suppliers. These theories often pertain to particular aspects of market structure and/or product characteristics, and suggest that certain industries may have a greater ability to utilize trade credit than others. Since we will be using an industry-specific measure of trade credit intensiveness, we will begin by outlining these basic theories of trade credit provision, with particular reference to industry specificity. Most theories of trade credit provision fall into one of the following categories: 1) comparative advantage in liquidation, 2) price discrimination by suppliers, 3) warranty for product quality, and 4) customized products.

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contract enforcement, legal or otherwise, in a cross-country regression one might observe a positive correlation between trade credit provision and formal financial intermediation, which could be incorrectly interpreted as representing a complementarity between these two sources of financing. This highlights the importance of utilizing cross-industry differences, which allows us to better control for heterogeneity across countries in factors such as legal enforcement.

[3] See, for example, McMillan and Woodruff (2000) for evidence on the relationship between credit access and firm age.

First, several authors have suggested that credit provision will be more likely in circumstances where there is easier resale of the product being sold, since this will allow the seller to seize and resell its product if default occurs (see, for example, Mian and Smith (1992) and Frank and Maksimovic (1998)). Ease of resale will clearly be related to a number of characteristics of these inputs: depreciation; firm-specificity; inventory stocks. An implication of this theory is that industries that utilize undifferentiated raw materials, and that are required to hold large amounts of raw materials inventories (relative to finished goods inventories) will be better able to obtain trade credit financing where necessary.[4]

The second theory involves price discrimination as a motive for trade credit provision by suppliers. Brennan, Maksimovic and Zezhner (1988) present this argument, claiming that low competition among suppliers in an input market may create incentives to discriminate among cash and credit customers. This would happen if, first, the demand elasticity (or the reservation price) of credit customers is lower than that of cash customers, and second, if there is adverse selection in the credit market. In addition, trade credit could be used as a strategic instrument in the oligopolistic supplier market. Depending on the degree of competition in the input market, some industries may therefore be more prone to price discrimination by their suppliers. If some industries are 'naturally' concentrated (e.g., because of high fixed costs), and use of inputs are reasonably similar within a given industry, access to trade credit from upstream firms will also be similar. In support of this, an early study by Pryor (1972) finds that the rank ordering of industrial concentration is highly correlated among 12 developed countries.

Some industries may require trade credit as a guarantee for product quality, as in Long, Malitz and Ravid (1994). According to their theory, the supplier will willingly extend credit to

[4] This hypothesis is, in fact, borne out by our data: we find that, in a between industry regression of accounts payable over assets on raw materials inventories over assets, the coefficient on inventories is positive and statistically significant. Results available from the authors.

allow the customer sufficient time to test the product. Similarly, in Lee and Stowe (1993), and Emery and Nayar (1998), the choice of trade credit terms offered by the supplier can serve as a signal of product quality. Certainly, some products, for example high-tech or newly developed products, need more quality assurance for their inputs than others, such as commodities.

Another theory of credit provision comes from a model in a recent paper by Cunat (2000). In this paper, supplier-customer relationships that have tailor made products, learning by doing, or other sources of sunk costs, will generate a surplus that will increase with the length of the relationship. This will increase the amount of credit that suppliers are willing to provide, since it ties firms to particular suppliers, thereby increasing the scope for punishment of nonpayment. Similar to the 'inspection' discussion outlined above, industries with more complex input needs will better fit this argument.

Finally, of particular relevance for this paper, Smith (1987) provides a theory of credit provision that spans several categories, using arguments related to product quality guarantees, market power and sunk costs to generate a model of trade credit terms. She argues that credit terms will be uniform within industries and differ across industries. The empirical support for this model is presented in a recent paper by Ng, Smith and Smith (1999), who document wide variation in credit terms across industries but little variation within industries. This evidence lends some credibility to our assumption about the industry-specific use of trade credit. We provide further evidence in the Data section below, in support of our claim that there is an industry-specific element to trade credit intensiveness.

We have laid out, in this section, a number of theories of trade credit provision that may have industry-specific components to them. It is worth noting that the purpose of this paper is not to assess which of these theories are primarily responsible for differences across industries in

reliance on trade credit. Rather, for us, it is sufficient to note that there are many reasons to believe that such differences should exist, to document that such differences *do* in fact exist in our data, and to show that these differences are consistent and persist over time.

One additional concern related to the theory of credit provision is that many of the enforcement or information problems that may prevent the establishment of financial institutions may potentially affect the ability of firms to obtain trade credit financing. In particular, where rule of law is weak, firms will not have legal recourse in the case of credit nonpayment. This is of concern, since we are claiming that trade credit exists as a substitute for bank financing where the latter is scarce. We will argue, however, that even though weak creditor protection and imperfect information will affect both formal intermediaries and trade credit providers, trade creditors may mitigate these problems better than formal lenders for several reasons. These include advantages in 1) information acquisition, 2) the renegotiation/liquidation process, and 3) enforcement.

The first set of advantages stems from the fact that suppliers are thought to have a cost advantage over banks in acquisition of information about the financial health of the buyers. For example, Mian and Smith (1992) argue that monitoring of credit-quality can occur as a by-product of selling if a manufacturer's sales representatives regularly visit the borrower. Similarly, suppliers often offer two-part trade credit, where a substantial discount is offered for relatively early repayment, such as a two percent discount for payments made within ten days. The failure of a buyer to take this discount could serve as a very strong and early signal of financial distress. Biais and Gollier (1993) assume that suppliers have different signals about the customer's probability of default than do banks, and furthermore, that the bank will extend more credit if it observes the offering of the trade credit by supplier. Alternatively, Smith (1987)

argues that the choice of the trade credit terms made can be used as a screening device to elicit information about buyers' creditworthiness.

The other arguments follow directly from the preceding discussion: because of advantages in the liquidation process, described above, the supplier would lend to a customer even if the bank would not. Finally, sunk costs and repeated interaction (as in the model by Cunat (2000) discussed above) may generate surplus split among the supplier and the customer and this surplus will give the supplier an advantage over the bank lending in enforcement.

These models taken together provide theoretical grounds for arguing that in the situations when bank credit is unavailable, trade credit could serve as a (weak) substitute.[5,6]

III. Data

The data are primarily drawn from Rajan and Zingales (1998) (referred to below as RZ) and are described in detail in their paper. A complete list of the variables used in this paper with the original sources is given in the Table 1. Our primary outcome variable is real growth in valued added, estimated for each of 37 industries in 43 countries (UNCTAD, 1999).[7] To estimate each industry's dependence on external finance, RZ use US firms from the Compustat database. Similarly, we use Compustat to calculate an industry-level "propensity for trade credit". As in RZ, we interpret the US data as 'industry representative' – the actual use of trade

[5] These arguments are also consistent with the cross-country pattern in rates of trade credit provision, which is uncorrelated with financial development. This is presumably because the counteracting effects described above cancel one another out in the aggregate. Results available from the authors.

[6] Note that an alternative theory of trade credit is that it exists to decrease transaction costs of making payments on delivery (Ferris, 1981). According to this explanation, trade credit usage by an industry could be interpreted as the level of transaction costs specific for that industry (for example, some industries need more frequent deliveries of inputs than others and therefore transaction costs will be higher). It is plausible to argue that financial development reduces the transaction costs of payments and therefore will benefit firms (or industries) with high transaction costs disproportionately. This generates the following alternative hypothesis - that industries with higher reliance on trade credit are relatively better off in countries with more developed financial intermediaries. Our results, reported below, strongly reject this alternative hypothesis.

[7] Consistent with RZ, we drop observations with growth rates above 100 percent, to eliminate the influence of outliers.

credit will vary across countries, and the US firms are likely to represent the desired (optimal) level of trade credit used by firms in a given industry. Using the US trade credit data implicitly assumes that trade credit usage by industries in US is representative of trade credit usage in other countries. This is a strong assumption, borne of necessity, as we do not have adequate cross-country data on trade credit usage. However, it is an assumption that has a strong theoretical rationale. Using each country's individual "dependence on trade credit" would be problematic, for reasons of endogeneity: one of our basic assumptions is that trade credit usage is a response to poor financial development. To capture the underlying 'technological affinity' of an industry for trade credit dependence, it is more appropriate to look at a country with well-developed markets, where trade credit choices are, in some sense, optimal. The United States, which is excluded from our regressions, provides a potential 'exogenous' measure of this.

For most of our analyses, we use the entire universe of Compustat firms, which is merged with CRSP data to obtain correct industry codes. To be consistent with previous work, we take 1980-1989 as our main sample period, and for robustness tests we use data from 1970- 1998. In examining the growth of the number of firms in each industry, we also provide results based on measures of trade credit and financial dependence calculated from firms in the smallest quartile in each industry, by sales. If there are systematic differences across industries regarding access to various forms of financing of small relative to large firms, this should provide a better indicator of the propensity to access trade credit (and other forms of financing, in the case of financial dependence) of startups. Based on a similar rationale, we also provide results utilizing only relatively young firms.

To obtain industry-level measures of trade credit usage we use the ratio of accounts payable to total assets (APAY/TA), the same measure of the demand for credit used by Petersen

and Rajan (1997). [8] To obtain a value for each industry, we then take industry medians of the ratios over all firm-years in the relevant time period. This ratio gives the percentage of total assets that is financed by trade credit, and hence represents an industry's ability to rely on informal credit rather then institutional financing. Since trade credit may be used to finance working capital (current assets), and may also be loaded up on and rolled over to finance investment for firms with no other source of funds, we concur with Petersen and Rajan that total firm assets is the most appropriate deflator.[9] As an alternative measure, we also use the ratio of accounts payable to total liabilities, which measures the percentage of liabilities that are covered by trade credit, and obtain similar results. The correlation between these two measures is 0.84.[10]

An important robustness test of our results involves examining the joint performance of our trade credit measures and RZ's measures of external finance. Our primary definition of trade credit reliance is a ***stock*** measure, i.e. the ratio of the stock of accounts payable to the stock of total assets, while the original RZ measure of external finance is a ***flow*** measure (denoted by ΔEXTFIN), which measures the proportion of capital expenditures (i.e. the change in fixed capital), financed by an inflow of external financing.

In order to compare our results to those of RZ, we must also construct a stock measure of dependence on outside financing. The stock measure most closely analogous to that of RZ's original measure is the proportion of the firm's assets that have not been financed internally. We

[8] One possible problem with this measure of credit is that payables may reflect factoring (payables that have been sold to a third party), rather than credit owed to suppliers. If this is the case, then factoring may show up as private credit. By this argument, however, industries where factoring is common should actually *benefit* from financial development, as measured by PRIV (see below). While factoring is a relatively small proportion of receivables, this does suggest that the effect of supplier credit may be even stronger than that which we report in the paper.

[9] Note that we also experimented with deflators based on inventories and capital expenditures separately, and found that our basic results held for both measures, though more weakly in both cases.

[10] We also experimented with other industry-level measures such as: accounts receivable (as a measure for the industry's need to provide its customers with the credit); inventories; net credit (difference of accounts payable and accounts receivable); and sales to capital ratio as a measure of capital intensity. The main results on accounts payable were always robust to the inclusion of any of these additional measures (the results are available on request).

construct this stock measure of external finance as the difference between total assets and retained earnings, deflated by total assets (EXTFIN).[11] Like APAY/TA, EXTFIN is an industry median of ratios over all firm-years. Thus, by construction, both measures (APAY/TA and EXTFIN) have total assets as a common denominator, which further increases their comparability. It is important to note that our constructed stock measure of external finance and original flow measure of external finance used by RZ are highly correlated (see Table III),[12] which gives us further confidence in the similarity of our stock measure of external finance and the original flow measure.

An alternative to constructing a stock measure of financial dependence is to construct a flow measure of trade credit reliance, more in the spirit of RZ's approach. The closest flow analog to APAY/TA is the change in accounts payable over the 1980s, deflated by the change in total assets (ΔAPAY/ΔTA). This gives the total proportion of new assets accumulated over the decade that were financed by increases in payables.

In our main results, we use stock measures of both financial dependence and trade credit reliance.[13] The stock approach provides a number of advantages. Most importantly, since growth during the 1980s is the outcome variable in all regressions, flow measures may be susceptible to picking up the effects of correlated shocks across countries, where these shocks

[11] Retained earnings (Compustat data item 36) is a portion of the book value of equity, equal to the cumulative earnings of a company less total dividend distributions to shareholders. Thus, if positive, it represents the accumulated stock of internally generated funds. In the case of negative retained earnings, which happens if the company paid out more than it earned, we assume that the company is was entirely financed externally (i.e. internally generated funds are zero).

[12] The correlation is 0.82, significant at 1%, when both measures are constructed with the data for 80's and 0.74, significant at 1% for the data for the 70's.

[13] In this sense, our results using the stock measure of external finance may also be seen as a robustness check of Rajan and Zingales' original results. However, we want to emphasize that we use a stock measure of external finance not to test RZ's results, but to test the robustness of our results on trade credit to the inclusion of a comparable measure of external finance. All of our results hold when we use RZ's original flow measure of external finance instead of our stock measure. However, using a stock and a flow measure in the same regression makes any comparison of the relative effects of the variables difficult to interpret.

are more highly correlated in more similar countries. Furthermore, since flow measures are essentially differenced versions of the stock measures, we may be differencing out important (and persistent) information about the industry-specificity of financing.[14] On the other hand, using the flow measure of trade credit financing provides a more direct comparison with RZ's results. We present the results using both flow measures as a robustness check of our main results.[15]

For both our stock and flow measures, exact definitions are given in Table I.

To construct measures of financial development we use several components available in the RZ dataset (the original source of financial development data is International Financial Statistics). Our main measure is the ratio of total credit held by private (non-governmental) organizations to GDP (PRIV). We concentrate on debt, since the theories laid out in the preceding section focus on trade credit financing as an alternative to funding by financial intermediaries, rather than equity or bond market financing. Furthermore, we focus on private (rather than public) debt, since governmental use of credit is often thought to be contaminated by political considerations that would not necessarily lead to optimal resource allocation. We also report regressions utilizing other measures of financial development such as stock market development (given by market capitalization to GDP), and total (government plus private) credit use; we find that our results are not sensitive to the inclusion/exclusion of these other sources of financing.

Table II contains data on the median levels of accounts payable used by industries in the US (both stock and flow measures). The ratios for APAY/TA vary from 5% to about 15% with a

[14] Consistent with this, we find that our stock measures are more highly correlated across decades than our flow measures. See below.

[15] Using flows may also have the further benefit of being less sensitive to inter-industry heterogeneity in trade credit propensities across countries due to factors such as differences in the terms and pricing of credit; see for example Ng, Smith and Smith (1999).

mean of 9%, and the ratios of ΔAPAY/ΔTA vary from 1.9% to 21% with a mean of 7%. Thus, even within the US, trade credit is a significant source of financing. By comparison, the mean of short-term debt to assets is 3.4% and the mean of long-term debt to assets is 16%.[16] The industries with the lowest usage of trade credit are: drugs; leather; pottery; and pulp and paper; and the industries with the highest usage are: spinning (a slight outlier and a relatively small category); motor vehicles; and petroleum refineries. These patterns fit, at least anecdotally, with the theories laid out in the previous section. For example, petroleum refineries are raw material intensive, and utilize relatively undifferentiated inputs. At the other extreme, the pharmaceutical industry often makes use of product specific inputs that are difficult to resell. We recognize, however, that it is always possible to come up with post hoc explanations for such patterns in the data. Hence, we prefer to focus on the stability of trade credit ratios across time, by industry, as an indication of the industry specificity of trade credit. If our claim that trade credit is a meaningful and stable industry characteristic is correct, it should to be persistent across time periods.[17]

Table III shows correlations of industry-level measures of trade credit use and dependence on external financing across different time periods. Our main variable (APAY/TA) is measured over the 1980's to match the timing of the industry growth data. The correlation for APAY/TA between the 1980's and 1990's is 0.83, and between the 1970's and 1980's it is 0.79. This high persistence in trade credit usage provides strong support for our assumption of the industry-specificity of trade credit. Correlations are somewhat weaker for the flow measure of

[16] Cunat (2000) reports that US is on the low side in the cross-country comparison of trade credit usage, so for most other countries trade credit is even more important as a source of financing.

[17] Another interesting observation, also consistent with the idea of industry-specific 'propensity for trade credit', is that in regressions of trade credit intensiveness on firm size, about five times more variation is explained by between industry variation than within industry variation. So, to the extent that size is a predictor of credit access, most of this seems to result from some industries having 'naturally' larger firms, and also being naturally suited to credit access.

trade credit.[18] By comparison, the correlation for the stock measure of external financing dependence, EXTFIN, between the 1980's and 1990's is 0.77, and between the 1970's and 1980's it is 0.62, which is almost the same as the correlation between the 1970's and 1980's for the original RZ flow measure of external finance (see Table III). Finally, note that for both APAY/TA and EXTFIN, the stock measures are highly correlated with the flow measures.

IV. Results

IV.1. Main results

Our main hypothesis is that industries that are more "dependent" on trade credit will be relatively better off in countries with less developed institutional finance.

The regression implied by this conjecture is the following:

$$GROWTH_{ci} = \alpha_i + \xi_c + \beta * PRIV_c * (APAY/TA)_i + \varepsilon_{ci} \quad (1)$$

where c denotes country, i denotes industry, and we expect a negative sign on the interaction term PRIV*APAY/TA. We use industry and country dummies (α_i and ξ_c) to control for all unobservable sources of value added growth specific to each country and each industry, and there is thus no need for PRIV and APAY/TA to enter the regression on their own. The main results are given in Table IV. Model 1 presents a result analogous to those in RZ's paper, using instead our stock measure of external dependence on finance, EXTFIN, and our country-level measure of (private) financial intermediary development (PRIV); as with the original paper, we find that industries that are more dependent on external financing grow more rapidly in countries

[18] For our flow measure of trade credit the correlation between the 1970's and 1980's is 0.43 and between the 1980's and 1990's it is 0.59, both significant at 1%.

with more developed financial markets (a positive coefficient on the interaction term, EXTFIN*PRIV).[19] Model 2 shows our main finding - the negative coefficient on the interaction of the industry-level measure of accounts payable scaled by total assets (APAY/TA), and PRIV.[20] This coefficient is significant at 1% (all errors in this paper are adjusted for heteroskedasticity), consistent with our main hypothesis that industries that are more dependent on trade credit have a relative advantage in countries with less developed financial intermediaries. The magnitude of the effect of our main interaction on value added growth may be thought of in the following terms: consider a move from the country at the 75th percentile of private financial intermediary development (e.g., Korea) to the country at the 25th percentile (e.g., Egypt). According to our calculations, this will widen the gap in growth rates between the industries at the 25th (Printing and Publishing) and 75th (Plastics) percentiles of trade credit intensity by 1.2 percent. This difference in differences is virtually identical to the interaction effect described in RZ. The stock measure of financial dependence, more comparable to our measure of trade credit dependence, implies an effect that is also very similar in magnitude.[21] As noted in RZ, this order of magnitude is similar to other explanatory variables used in growth regressions such as investment's share of GDP and per capita income.

Model 3 shows that this finding is robust to exclusion of the fraction of industry's share in total manufacturing, which is used as a control variable in the rest of the regressions. Model 4 shows that including both APAY/TA and EXTFIN leaves the significance of both interaction terms virtually unchanged, suggesting that the trade credit channel provides an effect on growth

[19] Note that we use private credit as our measure of financial development, once again in order to make direct comparisons with our results on trade credit. In the robustness section, we will utilize more directly the RZ interaction term, when we use all forms of financing as our measure of financial development.
[20] Throughout the paper we refer to this product of APAY/TA and PRIV as "our main interaction".
[21] The difference in PRIV between the 25th and 75th percentiles is 0.3 and the difference in APAY/TA is approximately 0.02 which, multiplied by the coefficient estimate, implies a change in the growth rate of 1.2%, as reported in the main text. For the stock measure of external finance the difference between the 25th and 75th percentiles is approximately 0.1, which implies a change in the growth rate of about 0.9%.

that is independent of the external financing channel. As a final robustness check, we also investigate a model without country and industry fixed effects, where we include APAY/TA and PRIV as independent regressors, and find similar results (see model 5).

IV.2. Composition of capital markets

In Table V we check for the sensitivity of the results to alternative measures of financial development to explore which of the aspects of financial development are stronger substitutes for trade credit. In model 1, we look at total financial development (FD), the sum of market capitalization and total domestic credit, deflated by GDP, the measure utilized by RZ. We find that the coefficient on the interaction term, APAY*FD is somewhat lower than that of our main interaction term.[22] The coefficient on EXTFIN*FD is similarly lower.

Model 2 uses *total* domestic credit to GDP, rather than private domestic credit to GDP as used in our main measure PRIV. The result is still significant at the 1% level, though marginally smaller in magnitude. Next, in model 3, we look at RZ's measure of market capitalization to see whether stock market development or financial intermediary development is a stronger substitute for trade credit. The interaction with market capitalization is significant, but only at the 5% level; in contrast, measures based on domestic credit or private domestic credit are always significant at 1%. Moreover, when we include interactions with both PRIV and market capitalization in the same regression (model 4), the coefficient on market capitalization is only significant at 10% and is considerably lower in magnitude. These results are consistent with our hypothesis that it is financial intermediaries rather than stock markets that primarily act as close substitutes for trade credit.

[22] Note, however, that the variable FD has a standard deviation of 0.38, while PRIV has a standard deviation of 0.20.

A few additional regressions highlight the robustness of our primary findings. When we include both total domestic credit and private credit in the same regression (model 5), the significance of domestic credit disappears. This is effectively capturing the fact that, after controlling for the presence of private credit, additional domestic credit (i.e., credit to public organizations) is irrelevant for explaining our results. Finally, we test whether our main result could be caused by a simple income (i.e. GDP) effect, rather than financial institutions' development, by including APAY/TA interacted with log GDP per capita. Model 6 shows that this is not the case: the interaction of APAY/TA with GDP is not significant, while our main interaction is still significant at the 1% level.[23]

IV.3. Growth in average firm size versus growth in number of firms.

In Table VI we decompose growth in value added into growth in the total number of firms in the industry and growth in the average size of individual firms. This addresses the question of whether trade credit is a more important source of growth for new firms (growth in the number of firms) or for more mature firms. In models 1 and 2 we use growth in the average size of firms as the dependent variable, and find that the coefficient on our main interaction is significant at 1%. By contrast, the effect of our main interaction on growth in the number of firms is not significant at conventional levels (models 3 and 4). Collectively, these results are consistent with the hypothesis that for young firms, which have not yet had a chance to establish

[23] While the focus of this paper is on trade credit effects, rather than financial dependence more generally, we include our stock measure of financial dependence in all of the preceding models to highlight the robustness of our results to its inclusion, and also to further probe the sensitivity of financial dependence to different types of financial development. We find that these results also emphasize the importance of private domestic credit. If all models in Table V are run excluding the external finance interactions, the results on trade credit are unaffected.

reputations for credit worthiness, trade credit is a less accessible source of substitute financing than it is for mature firms.

Our measure of trade credit dependence is calculated using all firms in each industry. If there is a significant difference in trade credit usage between small and large firms, this could create a bias against finding any effect on the growth of startups, due to measurement error. To ensure that this is not driving our results, we run several robustness checks based on measures for trade credit and external finance calculated using only small firms or young firms. In the calculations based on small firms, we use only firms in the smallest 25th percentile, by sales, for each industry. For calculations based on young firms, we use only firms with an IPO date of 1970 or later.[24] Consistent with the results using the full sample of firms, the results using small firms (models 5 and 6) do not show any significant effect of our main interaction term on growth in the number of firms. We obtain similar results when our measure of trade credit reliance is based on young firms (models 7 and 8).

IV.4. Robustness

We begin our robustness checks by reproducing all of our main results using flow measures of trade credit and external finance instead of the stock measures used previously. The flow measure of trade credit is given by the change in accounts payable over the change in total assets ($\Delta APAY/\Delta TA$) and the flow measure of external finance is the original RZ measure of financial dependence (see Table 1 for complete definitions). The results presented in Table VII are consistent with our previous conclusions. Model 1 shows that the trade credit interaction with

[24] To be more precise, the starting date is the date in which the firm first appears in the CRSP database, which is almost always the listing date. Note furthermore that using 1975 (which avoids the issue of the founding of the NASDAQ exchange in 1971) as a cutoff point does not change the results.

PRIV is negative and significant at 1%. While its coefficient is about half the size of the coefficient for the stock measure, the standard deviation for the flow measure is twice as large. Hence, the total effect is similar in magnitude to that implied by our main results. In model 2 we add the RZ flow measure of external finance and find that it is significant at 1%. The magnitude of the effect implied by its coefficient is similarly close to that implied by the results based on our stock measure. The coefficient on our flow trade credit interaction variable is not affected by the addition of this external finance measure. In model 3 we use a different measure of financial development (FD, which is the sum of domestic credit and market capitalization, utilized by RZ) and find that our results are not affected by this replacement. In model 4 we add interactions of both trade credit and external finance measures with log GDP per capita to test for the income effect and find that our results are still significant at the 1% level.

Next, we reproduce our main results on the growth in number and average size of firms using both flow measures. Again, we find that trade credit is a significant source of financing only for mature firms (i.e. growth in average size of firms in model 5) but do not observe any effect on growth in number of firms (see models 6-8; model 6 uses the whole sample, model 7 uses only small firms and model 8 uses only young firms, similar to the results reported in section IV.3). The flow measure of external finance is significant in all regressions, however, indicating that external finance is the only significant source of growth for startup firms, while mature firms can make use of trade credit financing as well.

Table VIII explores the robustness of our results to alternative definitions of trade credit dependence. In models 1 and 2 we use APAY/TL (accounts payable scaled by total liabilities) as a measure of trade credit dependence, and find that this alternative definition does not affect our results. We confirm that our main results are unaffected by the choice of time period: models 3

and 4 use APAY/TA and EXTFIN measured over the 1970's and in models 5 and 6 use APAY/TA and EXTFIN measured over the 1990's. Thus, our main result is not sensitive to a different scaling factor or different time horizons.

Next, we address the question of reverse causality in financial development. The argument here is that if the country's economy contains more industries that rely more on trade credit, there will be less need for formal intermediaries to develop. This is a weak argument, since first, the presence of trade credit still leaves a lot of room for formal credit markets to develop. Second, trade credit seems to be a second best option, as firms that have access to bank credit prefer it to the use of trade credit (see Petersen and Rajan (1997)). Nevertheless, following RZ, we run our main regression using instrumental variables with legal origin dummies as instruments for financial development. In model 7 we find that our main result is still significant, although now only at 6% level. Finally, we use accounting standards as a proxy for financial intermediary development and still find a negative relationship (model 8). This could be interpreted as evidence in support of information-based theories of trade credit advantages, since with poor accounting standards, less information is available for financial intermediaries, thereby tilting the balance in favor of supplier financing. However, this result is somewhat weaker than our other results: the significance is only 10%, though this is partially a reflection of the decline in sample size (about 20%).

V. Conclusions

In this paper, we have shown that firms in countries with less developed financial markets appear to substitute informal credit provided by their suppliers to finance growth. Using

the methodology pioneered by Rajan and Zingales (1998), we find that industries that are more dependent on trade credit financing grow relatively more rapidly in countries with less developed financial intermediaries. The result is robust to the addition of various industry-level measures, alternative financial development measures, and exclusion of influential observations. We also find that trade credit usage affects growth in the average size of firms rather than the growth in the number of firms. This is consistent with 'reputation-based' theories of trade credit, which argue that new firms will have greater difficulties in obtaining trade credit.

This paper uncovers an important and significant role for trade credit as a source of firm financing and growth, thus calling into question claims that trade credit exists only to reduce transaction costs. This certainly does not detract from the importance of financial development as an engine of growth: as we have emphasized, our argument is driven by the assumption that firms view trade credit as a second-best alternative to bank financing. Furthermore, our results on new firm growth imply that, in some sense, trade credit is less 'democratic' than bank financing in promoting growth, which may raise concerns about fostering industry competition and may also have distributional implications. Still, our work highlights the fact that in the face of adverse circumstances, firms are effective in finding substitutes to poorly developed institutions. The substitution of trade credit for formal bank financing is just one example, and we leave similar analyses along other dimensions as possibilities for future work.

References

Bekaert G., C. Harvey, and C. Lundblad, 2000, “Emerging Equity Markets and Economic Development," NBER working paper 7763.

Biais, Bruno and Christian Gollier, “Trade Credit and Credit Rationing” Review of Financial Studies; 10(4), Winter 1997, pp. 903-37.

Brennan, Michael J., Vojislav Maksimovic and Josef Zezhner, “Vendor Financing” Journal of Finance 43(5), December 1988, pp.1127-41

Cameron, R. et al. “Banking in the Early Stages of Industrialization: A study in Comparative Economic History,” New York: Oxford U. Press, 1967.

Cunat, Vicente, “Inter-Firm Credit and Industrial Links,” Mimeo, London School of Economics, 2000.

Demirguc-Kunt, A., and R. Levine, “Stock Market Development and Financial Intermediaries: Stylized Facts,” World Bank Economic Review, 1996 (10), pp.291-321.

Demirguc-Kunt, A., and V. Maksimovic, “Law, Finance and Firm Growth,” Journal of Finance, 1998, (53).

Emery, Gary, and Nandkumar Nayar, “Product Quality and Payment Policy,” Review of Quantitative Finance and Accounting, 1998 (10), pp. 269-84.

Ferris, J. S., “A Transactions Theory of Trade Credit Use, ” Quurterly Journal of Economics, 1998 (94), pp. 243-270.

Frank, Murray and Vojislav Maksimovic, “Trade Credit, Collateral and Adverse Selection,” Mimeo, 1998.

King, R.G., and R. Levine, “Finance and Growth: Schumpeter Might be Right,” Quarterly Journal of Economics, 1993 108(3), pp. 717-37.

Lee, Yul W., and John D. Stowe, "Product Risk, Asymmetric Information, and Trade Credit," Journal of Financial and Quantitative Analysis 28, 1993, pp. 285-300.

Long, Michael, Ileen Malitz and Abraham Ravid, "Trade Credit, Quality Guarantees, and Product Marketability," Financial Management, 1993 (22), pp.117-127.

Love, Inessa, "Financial Development and Financing Constraints: International Evidence from the Structural Investment Model", Mimeograph, Columbia University, 1999.

McMillan, John, and Christopher Woodruff. "Interfirm Relationships and Informal Credit in Vietnam." Quarterly Journal of Economics, 114(4), November 1999, pp. 1285-1320.

Mian, Shehzad L., and Clifford Smith, "Accounts Receivable Management Policy: Theory and Evidence," Journal of Finance, 47(1), March 1992, pp.169-200.

Ng, Chee K., and Janet Kiholm Smith and Richard Smith, "Evidence on the Determinants of Credit Terms Used in Interfirm Trade," Journal of Finance 54(3) June 1999, pp.1109-129.

Nilsen, Jeffrey, "Trade Credit and the Bank Lending Channel of Monetary Policy Transmission," Journal of Money, Credit, and Banking, forthcoming, 2001.

Petersen, Mitchell and Raghuram Rajan, "Trade Credit: Theories and Evidence," Review of Financial Studies, Fall 1997, 10(3) pp.661-691.

Pryor, Frederic L., "An International Comparison of Concentration Ratios," Review of Economics and Statistics, 54(2), May 1972, pages 130-40.

Rajan, R., and L. Zingales, 1998, "Financial Dependence and Growth," American Economic Review, 88(3), pp. 559-86.

Rousseau, P. and P. Wachtel, "Financial Intermediation and Economic Performance: Historical Evidence from Five Industrialized Countries," Journal of Money Credit and Banking 30(4), November 1998 pp. 657-78.

Smith, Janet Kiholm, "Trade Credit and Informational Assymetry," Journal of Finance, 42(4), September 1987, pp. 863-72.

Table I. List of variable abbreviations, definitions and sources.

Abbreviation	Description
1. Industry-level variables, original source Compustat:	
ΔEXTFIN	Dependence on external financing, industry-level median of the ratio of capital ependitures minus cash flow over capital expenditures (the numerator and denominator are summed over all years for each firm before dividing). This variable measures the portion of capital expenditures not financed by internally generated cash. Cash flow is defined as the sum of funds from operations, decreases in inventories, decreases in receivables, and increases in payables. From Rajan and Zingales (1998).
EXTFIN	Stock measure of External Finance, equal to the industry median of the ratio of total assets minus retained earnings over total assets. This variable measures the accumulated stock of internally generated funds.
APAY/TA	Stock measure of dependence on trade credit, equal to accounts payable over total assets, industry medians of firm-level measures.
ΔAPAY/ΔTA	Flow measure of dependence on trade credit, equal to the change in accounts payable over change in total assets over the decade, industry medians of firm-level measures.
APAY/TL	Accounts payable scaled by total liabilities, industry medians of firm-level measures.
2. Country-Industry level variables from Rajan and Zingales (1998) (Originally from United Nations Statistics):	
Industry growh	Main measure is growh in value added; it is annual compounded growth rate in real value added estimated for the period 1980-1990 for each ISIC industry in each country. Growth in number equals to the diference in the log of ending period firm number less the log of firm number in the beginning of period. Growth in average size equals the difference in logs of the average size, which is defined as total value added in the industry divided over the number of frms in the industry.
Fraction	Fraction of the industry's value added in total manufacturing value added for 1980.
3. Country-level variables from Rajan and Zingales (1998):	
Domestic credit	Ratio of domestic credit held by monetary authorities and depositary institutions (excluding interbank deposits) scaled by GDP for 1980. Original source is International Financial Statistics (IFS).
Private credit	Ratio of private domestic credit held by monetary authorities and depositary institutions (excluding interbank deposit) scaled by GDP for 1980. Original source is International Financial Statistics (IFS).
Market cap.	Ratio of stock market capitalization to GDP in 1980. IFS.
Log GDP PC	Log of GDP per capita in US dollars in 1980. IFS
Legal origin	Dummies for English, French, German or Scandinavian origin of the legal system. La Porta et al. (1996)
Accounting Standards	Amount of disclosure of companies's annual reports in each countries. La Porta et al.(1996)

Table II. Trade credit use by industry

Industry medians of firm-level variables. See Table I for variable definitions and sources.

ISIC code	Description	APAY/TA 1980's	Δ APAY/ΔTA 1980's	EXTFIN 1980's
311	Food products	11.2%	5.7%	72%
313	Beverages	9.1%	5.3%	61%
314	Tobacco	6.6%	4.0%	63%
321	Textile	10.1%	7.5%	68%
3211	Spinning	14.9%	17.5%	69%
322	Apparel	11.1%	7.9%	66%
323	Leather	5.5%	2.0%	64%
324	Footwear	9.3%	4.3%	59%
331	Wood Products	8.8%	8.4%	75%
332	Furniture	9.2%	4.8%	64%
341	Paper and Products	8.1%	5.6%	67%
3411	Pulp, paper	6.5%	6.1%	65%
342	Printing and Publishing	7.5%	5.3%	64%
3511	Basic chemicals excl. Fertil.	8.3%	5.6%	68%
3513	Synthetic resins	9.3%	7.3%	74%
352	Other Chemicals	9.7%	6.7%	63%
3522	Drugs	5.5%	3.1%	94%
353	Petroleum refineries	11.8%	21.7%	69%
354	Petroleum and coal products	9.6%	7.0%	65%
355	Rubber products	8.8%	13.4%	66%
356	Plastic products	9.9%	9.7%	80%
361	Pottery	6.7%	3.2%	66%
362	Glass	8.9%	3.5%	65%
369	Non metal products	6.4%	6.8%	71%
371	Iron and Steel	9.4%	9.1%	72%
372	Non-ferrous metal	7.8%	8.1%	73%
381	Metal products	8.8%	8.0%	71%
382	Machinery	8.6%	8.5%	73%
3825	Office, computing	8.3%	5.7%	89%
383	Electric machinery	8.2%	7.7%	80%
3832	Radio	7.6%	6.6%	83%
384	Transportation equipment	10.5%	5.9%	71%
3841	Ship	10.1%	7.9%	83%
3843	Motor veichle	11.2%	9.9%	75%
385	Professional goods	7.2%	4.9%	86%
390	Other ind.	8.7%	7.8%	77%
	Mean	8.9%	7.3%	71%
	Median	8.8%	6.8%	70%
	Standard deviation	1.9%	3.8%	8%

Table III. Correlations of industry-level measures.

Correlations of industry-level medians. See Table I for variable definition and sources. All correlations are based on 36 observations, except Δ EXTFIN measured over 1970's which has only 35 observations. P-values are in parenthesis (0 stands for lower then 0.01), * dentotes significance at 1%.

	APAY/TA 1980's	APAY/TA 1970's	Δ APAY/ΔTA 1980's	Δ APAY/ΔTA 1970's	EXTFIN 1980's	EXTFIN 1970's	Δ EXTFIN 1980's
APAY/TA 1970's	0.7529 * (0.00)						
Δ APAY/ΔTA 1980's	0.6725 * (0.00)	0.5888 * (0.00)					
Δ APAY/ΔTA 1970's	0.4648 * (0.00)	0.5175 * (0.00)	0.4339 * (0.01)				
EXTFIN 1980's	-0.1328 (0.44)	0.1475 (0.39)	0.0152 (0.93)	-0.0706 (0.68)			
EXTFIN 1970's	0.303 (0.07)	0.4553 * (0.01)	0.2796 (0.10)	0.2092 (0.22)	0.6185 * (0.00)		
Δ EXTFIN 1980's	-0.1604 (0.35)	0.1023 (0.55)	-0.11 (0.52)	-0.0282 (0.87)	0.8213 * (0.00)	0.4362 * (0.01)	
Δ EXTFIN 1970's	-0.0121 (0.95)	0.1181 (0.50)	0.1107 (0.53)	0.0555 (0.75)	0.6748 * (0.00)	0.7415 * (0.00)	0.6292 * (0.00)

Table IV. Accounts Payable and Industry Growth

Dependent variable is real growth in value added. Fraction is fraction of industry Value Added in total manufacturing in 1980, APAY/TA is industry's dependence on trade credit measured by Accounts Payable over Total assets, EXTFIN is stock measure of external finance, equal to total assets minus retained earnings over total assets, PRIV is Financial Intermediary development in 1980 (the ratio of total credit held by private (non-governmental) organizations to GDP). All variables are from RZ except for APAY/TA and EXTFIN which are from Compustat 1980-1989. All models except model 5 include country and industry dummes. Standard errors appear in parentheses, and are adjusted for heteroskedasticity. Significance levels ***, ** and * correspond to 1%, 5% and 10% respectively.

	1	2	3	4	5
Fraction	-0.85	-0.88		-0.95	-0.622
	(0.246) ***	(0.247) ***		(0.248) ***	(0.187) ***
EXTFIN * PRIV	0.295			0.307	
	(0.150) **			(0.151) **	
APAY/TA * PRIV		**-2.01**	**-1.64**	**-2.06**	**-2.17**
		(0.597) * **	**(0.604) *** **	**(0.600) *** **	**(0.720) *** **
APAY/TA					0.84
					(0.370) **
log GDP PC					-0.013
					(0.005) ***
PRIV					0.277
					(0.067) ***
N	1217	1217	1217	1217	1171
R2	0.28	0.29	0.27	0.30	0.065

Table V. Composition of Capital Markets and GDP

Dependent variable is real growth in value added. Fraction is fraction of industry Value Added in total manufacturing in 1980, APAY/TA is industry's dependence on trade credit measured by Accounts Payable over Total assets, EXTFIN is stock measure of external finance, equal to total assets minus retained earnings over total assets. Domestic credit is the ratio of total credit to GDP in 1980; PRIV is Financial Intermediary development in 1980 (the ratio of total credit held by private (non-governmental) organizations to GDP); Market cap is the ratio of stock market capitalization to GDP in 1980; FD is the financial development measure used by RZ (the sum of domestic credit and market capitalization). All variables are from RZ except for APAY/TA and EXTFIN which are from Compustat 1980-1989. All models include country and industry dummes. Standard errors appear in parentheses, and are adjusted for heteroskedasticity. Significance levels ***, ** and * correspond to 1%, 5% and 10% respectively.

	1	2	3	4	5	6
Fraction	-0.91	-0.85	-0.87	-0.93	-0.91	-0.93
	(0.25) ***	(0.25) ***	(0.25) ***	(0.25) ***	(0.25) ***	(0.25) ***
Interaction of APAY/TA with:						
FD	-1.12					
	(0.38) ***					
Domestic credit		-1.42			0.68	
		(0.51) ***			(0.71)	
PRIV				-1.83	-2.78	-1.42
				(0.57) ***	(0.86) ***	(0.58) ***
Market Cap.			-0.76	-0.49		
			(0.33) **	(0.29) *		
Log GDP PC						-0.19
						(0.14)
Interaction of EXTFIN with:						
FD	0.18					
	(0.08) **					
Domestic credit		0.15			-0.15	
		(0.13)			(0.13)	
PRIV				0.32	0.43	0.22
				(0.16) **	(0.16) ***	(0.18)
Market Cap.			0.15	0.12		
			(0.08) **	(0.08)		
Log GDP PC						0.025
						(0.02)
N	1217	1217	1217	1217	1217	1217
R2	0.29	0.29	0.28	0.29	0.29	0.29

Table VI. Growth in Number and Size

Dependent variable is growth in the average size of establishments in models 1 and 2 and growth in the number of establishments in models 3 -8. Fraction is fraction of industry Value Added in total manufacturing in 1980, APAY/TA is industry's dependence on trade credit measured by Accounts Payable over Total assets, EXTFIN is stock measure of external finance, equal to total assets minus retained earnings over total assets, PRIV is Financial Intermediary development in 1980 (ratio of total credit held by private (non-governmental) organizations to GDP). Models 5 and 6 use industry variables calculated for small firms only (less then 25th percentile for each industry in real sales) and models 7 and 8 use industry variables calculated for young firms only (less then 10 years after IPO at the start of the period). All models include country and industry dummes. Standard errors appear in parentheses, and are adjusted for heteroskedasticity. Significance levels ***, ** and * correspond to 1%, 5%

Dependent Variable:	Growth in Average Size of Establishments		Growth in Number of Establishments					
			All firms		Small Firms		Young Firms	
	1	2	3	4	5	6	7	8
Fraction	-0.77	-0.78	-0.19	-0.2	-0.19	-0.19	-0.19	-0.2
	(0.33) **	(0.33) *	(0.14)	(0.14) **	(0.14)	(0.14)	(0.14)	(0.14)
APAY/TA * PRIV	-1.97	-1.89	-0.47	-0.42	-0.32	-0.39	-0.44	-0.44
	(0.58) ***	(0.57) ***	(0.38)	(0.36)	(0.33)	(0.34)	(0.36)	(0.36)
EXTFIN * PRIV		0.18		0.13		0.064		0.12
		(0.13)		(0.097)		(0.047)		(0.08)
N	1047	1047	1073	1073	1073	1073	1073	1073
R2	0.43	0.42	0.45	0.45	0.45	0.45	0.45	0.45

Table VII. Flow measures of Trade Credit and External Finance

Fraction is fraction of industry Value Added in total manufacturing in 1980, ΔAPAY/ΔTA is the flow measure for industry's dependence on trade credit measured by change in Accounts Payable over change in Total Assets. ΔEXTFIN is the flow measure of external finance equal to financial dependence measure from RZ. PRIV is Financial Intermediary development in 1980 (the ratio of total credit held by private (non-governmental) organizations to GDP); FD is financial development (the sum of domestic credit and market capitalization). All variables are from RZ except for APAY/TA which is from Compustat 1980-1989. All models include country and industry dummes. Model 7 uses industry variables calculated for small firms only (less then 25th percentile for each industry in real sales) and model 8 uses industry variables calculated for young firms only (less then 10 years after IPO at the start of the period). Standard errors appear in parentheses, and are adjusted for heteroskedasticity. Significance levels ***, ** and * correspond to 1%, 5% and 10% respectively.

	1	2	3	4	5	6	7	8
Dependent variable:	Total Growth				Growth in Size	Growth in Number of Establishments		
Fraction	-0.84	-0.91	-0.92	-0.96	-0.77	-0.2	-0.2	-0.14
	(0.24) ***	(0.24) ***	(0.24) ***	(0.24) ***	(0.33) **	(0.15)	(0.14)	(0.16)
Interaction of ΔAPAY/ΔTA with:								
PRIV	-0.85	-0.77			-0.76	0.03	-0.025	-0.07
	(0.29) ***	(0.29) ***			(0.34) **	(0.18)	(0.04)	(0.20)
FD			-0.56	-0.475				
			(0.17) ***	(0.18) ***				
Log GDP PC				-0.046				
				(0.04)				
Interaction of Δ EXTFIN with:								
PRIV		0.11			0.058	0.038	0.039	0.025
		(0.036) ***			(0.028) **	(0.018) **	(0.019) **	(0.013) **
FD			0.07	0.051				
			(0.022) ***	(0.023) **				
Log GDP PC				0.012				
				(0.008)				
N	1217	1217	1217	1217	1047	1973	1073	1073
R2	0.28	0.29	0.28	0.29	0.42	0.45	0.45	0.44

Table VIII. Alternative Measures

Fraction is fraction of industry Value Added in total manufacturing in 1980, APAY/TA is industry's dependence on trade credit measured by Accounts Payable over Total assets. EXTFIN is stock measure of external finance, equal to total assets minus retained earnings over total assets. PRIV is Financial Intermediary development in 1980 (the ratio of total credit held by private (non-governmental) organizations to GDP). Models 1 and 2 use APAY/TL measured over 1980's; models 3 and 4 use APAY/TA and EXTFIN measured over 1970's; models 5 and 6 use APAY/TA measured over 1990's; model 7 is estimated by instrumental variables with legal origin used as instruments for PRIV -financial intermediary development. Model 8 is the interaction of APAY/TA with accounting standards. All models include country and industry dummies. Standard errors appear in parentheses, and are adjusted for heteroskedasticity. Significance levels ***, ** and * correspond to 1%, 5% and 10% respectively.

	APAY/TL 1980's		APAY/TA 1970's		APAY/TA 1990's		IV	Accounting
	1	2	3	4	5	6	7	8
Fraction	-0.86	-0.88	-0.84	-0.86	-0.83	-0.84	-0.85	-0.61
	(0.25) ***	(0.25) ***	(0.25) ***	(0.25) ***	(0.24) ***	(0.24) ***	(0.25) ***	(0.21) ***
APAY/TA * PRIV	-0.86	-0.91	-1.67	-2.50	-1.53	-1.6	-0.94	-0.013
	(0.30) ***	(0.33) ***	(0.69) **	(0.89) ***	(0.58) ***	(0.59) ***	(0.54) *	(0.007) *
EXTFIN * PRIV		0.38		0.4		0.26		
		(0.16) **		(0.19) **		(0.12) **		
N	1217	1217	1217	1179	1217	1217	1207	1067
R2	0.29	0.3	0.28	0.29	0.29	0.29	0.29	0.34

Table IX. Robustness III -Excluding Outliers

Dependent variable is real growth in value added. See Table 1 for variable definitions and sources. Models 1-3 exclude 1% of obseravtions on each side for the dependent variable, model 4 excludes industry 3211 (Spinning), and model 5 excludes industry 3211 in addition to 1% outlier on each side. All models include country and industry dummes. Standard errors appear in parentheses, and are adjusted for heteroskedasticity. Significance levels ***, ** and * correspond to 1%, 5% and 10% respectively.

	1	2	3	4	5
Fraction	-0.41	-0.43	-0.46	-0.92	-0.43
	(0.11) ***	(0.11) ***	(0.11) ***	(0.27) ***	(0.12) ***
APAY/TA * PRIV		-0.86	-1.34	-2.19	-1.36
		(0.26) ***	(0.40) ***	(0.77) ***	(0.51) ***
EXTFIN * PRIV	0.15		0.17		
	(0.09) *		(0.09) *		
N	1202	1202	1202	1187	1172
R2	0.36	0.36	0.36	0.29	0.36