PRODUCT DIFFERENTIATION, MARKET DYNAMICS AND THE VALUE RELEVANCE OF TRADE PAYABLES: EVIDENCE FROM UK LISTED FIRMS

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We thank the anonymous referee, and Professor Peter M. Clarkson (Editor) for their helpful comments and suggestions.

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Abstract

This paper provides a comprehensive evidence on how product and market dynamics affect the value relevance of trade payables. Using a sample of 2,559 UK listed firms over the period 2005-2014, we find a positive relationship between trade payables and firm performance. Our evidence suggests that trade payables increase (decrease) performance in firms with differentiated products and demand uncertainty (larger market share). We demonstrate that the relative value relevance of bank credit versus suppliers' credit is dependent on the nature of the product, the level of sales volatility, and market share. We use an innovative approach to assess the robustness of our results to omitted variable bias.

Keywords: Product differentiation, market dynamics, trade payables, excess return.

JEL classification: G30, G31, G32

1. Introduction

Suppliers' credit is the main source of finance for many firms around the world (Demirguc-Kunt and Maskowitz, 1999). In fact, in the UK, firms buy over 80% of their merchandise on credit (Peel et al., 2000). However, the ubiquitous use of suppliers' credit is puzzling because relative to institutional finance, it is more expensive (Yang, 2011; Lin and Chou, 2015).

In explaining why firms use suppliers' credit, studies either argue from the effect on market valuation or on other operational imperatives. The market valuation argument mainly focuses on the information content of suppliers' credit and how it impacts upon market valuation by signalling the private information of one stakeholder to another. For example, Goto et al. (2015) argued that relative to financial institutions, suppliers have a significant information advantage about borrowers' future growth prospects. Consequently, their evidence suggested that suppliers' credit signals favourable information about the buying firm's future sales growth and improves subsequent stock returns. Similarly, arguing from a borrower's perspective, Aktas et al. (2012) opined that relative to cash credit, trade credit is illiquid and less likely to divert. Accordingly, trade credits may improve firms' market valuation by signalling managers' private information about their firms' investment quality to outside investors. On the contrary, studies that focus on the operational imperatives are mainly concerned with the centrality of suppliers' credit in firms that operate under certain product and market dynamics. For example, these studies mainly argue that trade credits are more important for the operations of firms with a greater need for inventory optimization management (Bougheas et al., 2009), long-term customer relationships (Wilson and Summers, 2002), and with demand uncertainty (Petersen and Rajan, 1997), among others. The central question in this paper is whether these operational imperatives govern the market valuation of suppliers' credit. We show that the market valuation of suppliers' credit varies under different operational

conditions and that the relative performance effects of trade credits and institutional finance are dependent on certain product and market dynamics.

Diversion motive theory suggests that suppliers' credit should impact positively on performance because it allows firms adequate time to assess the quality of inputs (Giannetti et al., 2011; Mateut et al., 2015). Similarly, from an operational motive theory perspective, suppliers' credit improves operating efficiency through the separation of payment from delivery (Ferris, 1981; Nelson and Nelson, 2002). Consequently, firms with demand volatility will require more trade payables (Martinez-Sola et al., 2014). Thus, with demand volatility firms face two peculiar problems: either to vary production to suit demand or fluctuate selling price to reflect demand (Martinez-Sola et al., 2014). However, each strategy is very costly. For example, a variation in production will lead to high production costs, while a variation in selling price will lead to a high information search cost for buyers (Martinez-Sola et al., 2014). All these will have implications for a firm's performance. As such, firms with variable demand can smooth production by demanding more credit from suppliers. In that case, a firm will enjoy stable production, which should minimise the cost of production and increase performance. Long et al. (1993) found a positive relationship between trade payables and demand uncertainty. We re-examine the value relevance of suppliers' credit and explore how this varies in firms with different levels of demand uncertainty.

Trade payables are crucial to the performance of firms vying for market share. This is because firms extend more credit to customers in order to increase market share (Nadiri, 1969; Hill et al., 2012). However, the amount of credit firms give to customers is a function of how much credit they receive from suppliers (Love et al., 2007; Burkart and Ellingsen, 2004; Hill et al., 2012). In other words, firms that give more credit to customers also demand more credit from their suppliers (Fabbri and Menichini, 2010). This is because firms finance part of their trade receivables with trade payables (Molina and Preve, 2009; Aktas et al., 2015). This means

that trade payables may be more important to firms trying to increase market share through trade credit since they will need to finance credit to customers (Atanasova, 2007). Our study considers how market share may impact on the trade payables-market valuation relationship.

Firms with differentiated inputs may have a greater need for trade payables (Mateut et al., 2015). This is because firms need more time to verify the quality of differentiated inputs (Fabbri and Menichini, 2010). Further, sellers and producers of differentiated products have stronger supplier relationships because they have fewer alternative suppliers (Mateut et al., 2015) and thus receive more supplier trade credits than those with standardised goods (Giannetti et al., 2011). Accordingly, the diversion theory suggests that trade credit usage is correlated with the nature of goods being traded (Mateut et al., 2015). Trade payables are therefore expected to be more important for firms with differentiated products than those with standardised products (Burkart and Ellingsen, 2004). We study the value relevance of suppliers' credit in firms with differentiated products.

Using a comprehensive sample of 2,559 UK firms for the period 2005 to 2014, this paper finds support for the conjecture that suppliers' credit positively impacts upon firm performance. The findings indicate that suppliers' credit is value relevant in firms with sales volatility and differentiated products, but value decreasing in firms with bigger market share. On the contrary, suppliers' credit only increases performance in firms with bigger market share during the crisis period. Further, although institutional finance is more value relevant than suppliers' credit, this is only conspicuous in firms with low demand uncertainty as well as those with small market share and standardised products. In firms with high demand uncertainty, larger market share and differentiated products, institutional finance is not value relevant. The results are robust to endogeneity and alternative proxies.

The first unique contribution we make to the trade credits literature is the finding that suppliers' credit is value increasing (value decreasing) in firms with sales volatility and

differentiated products (bigger market share). The importance of suppliers' credit to firms with demand uncertainty, differentiated products and market share has long been recognized in the trade credits' literature (Emery, 1987; Hill et al., 2010; Hill et al., 2012; Bougheas et al., 2009; Fabbri and Menichini, 2010; Martinez-Sola et al. 2014; Mateut et al., 2015). However, research on how these may affect the performance effects of suppliers' credits remain scarce. Although we focus on market valuation, our findings are also germane to researchers and managers interested in other consequences of suppliers' credits. The result implies that in examining the effect of suppliers' credit on other firm-level outcomes, the different products and market dynamics that firms face should also be considered. In addition to its theoretical importance, Aktas et al. (2012) demonstrated theoretically how the performance effects of trade credits emanate from their ability to signal managers' private information to outside investors. They argued that relative to cash, suppliers' credit is illiquid and less likely to divert. Therefore, suppliers' credit may increase market valuation by signalling managers' commitment not to expropriate. By extension, our findings indicate that product differentiation and demand uncertainty (bigger market share) increase (reduce) the signal strength of suppliers' credit and ultimately enhance (diminish) its performance effects. This interpretation is in consonance with arguments in signalling and information asymmetry theory that signal honesty (dishonesty) increases (decreases) signal strength and improves (impair) the effect of the signal on the receiver (Connelly et al., 2011).

The second unique contribution we make to the literature is the finding that the relative value relevance of suppliers' credit versus institutional finance hinges on market share, nature of product and level of demand uncertainty. The existing literature is almost unanimous in finding that institutional finance is cheaper (Yang, 2011; Lin and Chou, 2015) and has greater performance effect (Du et al., 2012) than suppliers' credit. This is due to the argument that the reliance on suppliers' credit is more important to firms operating in developing countries

because of the underdeveloped nature of the financial sector (Cull et al., 2009; Ge and Qiu, 2007). However, although other studies show that firms residing in developed countries equally rely on suppliers' credit (Petersen and Rajan, 1997; Peel et al., 2000, Ferrando and Mulier, 2013), the existing literature mainly focuses on trade receivables (see, Hill et al., 2012; Martinez-Sola et al., 2014). We contribute to the literature by documenting that institutional finance is more value relevant than suppliers' credit in firms with bigger market share. However, in firms with differentiated products and demand uncertainty, suppliers' credit is more value relevant than institutional finance. This finding has implications for managers in making inventory-financing decisions.

The remainder of the paper is structured as follows. The next section discusses the theoretical and empirical literature on trade payables and firm performance and develops hypotheses. The study data and research design are discussed in Section 3. The empirical results are discussed in Section 4 and Section 5 discusses several further analyses. The robustness tests are presented in Section 6. Section 7 concludes the paper.

2. Theory, Literature Review and Hypotheses

2.1 Trade payables and firm performance: Theoretical framework

Many theories, including financing theory, diversion motive theory, transaction cost theory and recently, signalling and information asymmetry theory, have established a link between trade payables and firm performance. Financing theory (Emery, 1984; Petersen and Rajan, 1997; Bhattacharya, 2008) suggests a positive association between trade payables and performance. This theory argues that inefficiencies in financial markets lead to credit rationing (Van den Bogaerd and Aerts, 2015) which prevents firms from accessing the needed funds to finance their operations (Emery, 1984; Petersen and Rajan, 1997); that is, suppliers' credit acts as a complement to bank credit (Kohler et al., 2000; Van den Bogaerd and Aerts, 2015). The theory

explains that firms rely on trade payables as an important source of short-term finance (Cook, 1999) because it shields them from inefficiencies in the capital markets (Ferrando and Mulier, 2013).

The diversion theory of trade credit provision argues that the level of trade credit received from suppliers corresponds to the product's characteristics (Cunat, 2007; Giannetti et al., 2011; Mateut et al., 2015). According to this theory, suppliers of differentiated products are more willing to sell on credit than suppliers of standardised products because of the amount of time needed by the buyer to inspect differentiated inputs (Mateut et al., 2015). This theory also argues for lengthy credit periods for differentiated products because buyers are less able to divert the use of items purchased, given their unique nature (Burkart and Ellingsen, 2004). It, therefore, suggests a lower moral hazard associated with differentiated products (Giannetti et al., 2011). A longer credit period will help such firms to fund operations using suppliers' credit, or invest the amounts in short-term opportunities such as treasury bills.

The transaction cost theory of trade credit argues that the problem with the holding of both money and goods are reduced because trade credit makes it possible for firms to separate payment schedules from delivering schedules (Ferris, 1981). This theory argues for a higher performance of trade credit because suppliers and customers can reduce the cost of transactions between them by use of trade credit (Nelson and Nelson, 2002). Without trade credit, for example, buyers will have to immediately pay for goods and services on every occasion. This will lead to a higher cost of transferring cash to the supplier. Also, the theory predicts a higher performance for trade payables because it helps to smooth production cycles (Petersen and Rajan, 1997), especially, in firms with sales volatility. With suppliers' credit, firms can actually increase production to meet sales demand in peak periods by acquiring inputs of production immediately and paying for them in the future.

More recently, studies have used signalling and information asymmetry theory to explain the performance effects of suppliers' credit. Signalling theory describes the behaviour of two parties in the presence of information asymmetry (Spence, 2002). Thus, a party (signaller) uses an observable quality to signal an unobservable quality (private information) to another party (Zhang and Wiersema, 2009). Within signalling theory, suppliers' credit contains the private information of different stakeholders such as managers (Aktas et al., 2012) or suppliers (Goto et al., 2015). Therefore, their use signals the favourability of this information to outside investors who may, in response, adjust their valuation of the firm. For example, because trade credits are less likely to divert than cash credits, managers use it to signal their commitment to the pursuit of shareholder interests to outside investors (Aktas et al., 2012). In response, investors may decode this signal and adjust their valuation for the firm upwards. Similarly, Goto et al. (2015) note that suppliers have private information about their borrower's future sales growth. As a result, suppliers' credit signals the favourable information suppliers have about their customers. However, within signalling theory, a signal can be strong or weak (Gulati and Higgins, 2003) depending on whether the signaller has signal honesty – the extent to which the signaller has the underlying quality associated with the signal. Accordingly, signal strength is determined by signal honesty or dishonesty which is also a function of the signaller (Zhang and Wiersema, 2009) so that the more signally honest (dishonest) the signaller is, the stronger (weaker) the signal strength, ceteris paribus. Dishonest signals can be costly because although they may be ignored by the receiver, the signaller will still have to bear the cost of producing the signal (Connelly et al., 2011).

2.2 Trade payables and firm performance: Empirical literature

Although several studies have examined the effect of trade receivables on firm performance, only a handful of studies have empirically examined the relationship between trade payables

and firm performance. However, these studies mostly focus on emerging markets. This is due to the argument that reliance on suppliers' credit is more important to firms operating in developing countries because of the underdeveloped nature of the financial sector (Cull et al., 2009; Ge and Qiu, 2007). Ge and Qiu (2007) use a sample of 570 state-owned and non-state-owned firms from China to examine the use of suppliers' credit on firm performance. Their evidence shows that the non-state-owned firms have higher performance from more supplier credit use. Using a panel of 37 industries and 44 countries, Fisman and Love (2003) examined the impact of trade payables on industry growth. They find that industries with a higher degree of dependence on suppliers' credit exhibit higher growth rates in countries with weaker financial institutions.

Li et al. (2016) use a survey of firms in China conducted by the World Bank in early 2003 to examine the relationship between trade payables and firm performance. Using ordinary-least-squares (OLS) estimations, their results show that trade payables are positively and significantly correlated with both labour productivity and return on assets (ROA). Nevertheless, they concluded that trade payables play a limited role in boosting firm performance, but suggest that they may have a long-run rather than short-run effect on firm performance. Using a sample of 1,566 firms from eight provinces in China, Du et al. (2012) record that trade payables improve firm performance but the magnitude is lesser than that of bank credit.

In developed countries where capital markets are relatively developed and efficient, studies mainly focus on the information content of suppliers' credit. These studies argue that suppliers' credit may impact upon market valuation by signalling the private information of one group of stakeholders to the other. For example, using US data, Aktas et al. (2012) report a positive relationship between suppliers' credit and several firm level proxies including z-score, ROA and long-run abnormal returns. They thus conclude that relative to bank credit, trade credits are less likely to be expropriated and that managers use them to signal their commitment

to quality investment and a desire not to expropriate shareholder wealth. Similarly, Goto et al. (2015) report that suppliers' credit assumes a positive relationship with both future sales growth and subsequent stock returns. They attribute their findings to the fact that suppliers' credit signals the favourable information suppliers have about their customers' sales growth potential, which also predicts stock returns. Another strand of the literature in developed countries contends that trade credit may be central to the operations of certain firms. For example, trade credits are crucial for the operations of firms in need of long-term customer relationships, (Bougheas et al., 2009) warranties for product quality (Long et al., 1993), and inventory optimization (Wilson and Summers, 2002), among others.

2.3 Hypotheses development

(i) Trade payables and firm performance

A firm's dependence on suppliers' credit is expected to affect its performance (Shin and Soenen, 1998; Kestens et al., 2012; Ferrando and Mulier, 2013). Firms can externally finance production either by relying on bank credit or suppliers' credit (Goto et al., 2015). Even though some studies argue that relying on bank credit is by far cheaper than suppliers' credit (Ng et al., 1999; Wilner, 2000; Kestens et al., 2012), other studies (Elliehausen & Wolken, 1993; Cook, 1999; Giannetti et al., 2011; Nelson and Nelson, 2002) cast doubt on this claim. In fact, almost all firms rely on suppliers' credit (Paul and Boden, 2008). The evidence so far suggests that even firms with good standing with their banks still rely on suppliers' credit (Cook, 1999; Fabbri and Menichini, 2010; Giannetti et al., 2011). In fact, Tsuruta (2015) found that suppliers' credit and bank loans are complements and not substitutes. This refutes the assertion that trade credit is used as a last resort, and suggests that firms use suppliers' credit as a strategic tool to increase performance. Yang (2011) argue that both financially constrained and unconstrained

firms rely on trade credit as a source of finance, although it is more pronounced in the latter. Deloof (2003) opines that suppliers' credit can be an inexpensive form of credit. According to Ferrando and Mulier (2013), firms manage their trade payables in order to optimize performance.

Firms use suppliers' credit to finance their trade receivables (Molina and Preve, 2009; Ferrando and Mulier, 2013). The use of trade payables to finance trade receivables may increase performance because it can offset the lost interest associated with financing customers' purchases. Given that credit to customers represents an amount locked up in working capital (Ng et al., 1999), firms can improve their performance by releasing the amount locked up through the use of trade payables. In support of this argument, Wu et al. (2012) provide empirical evidence that firms that rely on suppliers' credit increase operating cash flow. Firms that give credit to their customers try to balance it by also demanding credit from their suppliers (Molina and Preve, 2009). In fact, Fabbri and Menichini (2010) provide empirical evidence to suggest that firms match the maturity of their trade receivables and trade payables for risk management purposes.

Trade payables can also increase a firm's performance through efficiency savings (Wilson and Summers, 2002), as suggested by the transaction cost theory. According to the transaction cost theory, buying on credit and paying at a later date can help firms to accumulate all payments and pay in bulk (Ferris, 1981). In that case, a firm will save money on the cost that would have been incurred by transferring funds to the supplier for each purchase made; that is, trade payables separate the purchase cycle from the payment cycle, which reduces uncertainty via transaction pooling (Elliehausen and Wolken, 1993). Trade payables reduce the uncertainty of waiting for cash to be received by the supplier before goods or services are delivered.

Trade credit can also be used as an evaluation tool to increase firm performance (Smith, 1987). The time gap allowed by a supplier can be a vital period where buyers can check the

quality of products. This reduces the time and effort in paying for goods and services and then requesting a refund. Avoiding the need to request a refund after making a payment is expected to increase firm performance via reduced transaction costs. Also, to the extent that trade credit is less liquid than cash credit, its usage signals managers' disincentive to expropriate wealth (Aktas et al., 2012). This indicates reduced principal-agent conflicts and improves firm valuation. It is therefore hypothesized that:

H_1 Trade payables are positively related to firm performance.

(ii) Trade payables, sales volatility, and firm performance.

Higher deviations in sales demand should increase the importance of trade payables to a firm's performance. A firm with sales volatility must use trade receivables to smooth sales (Hill et al., 2012). However, research shows that firms that give out more credit to customers also depend more on suppliers' credit (Burkart and Ellingsen, 2004; Love et al., 2007; Ferrando and Mulier, 2013); that is, the higher trade receivables as a result of sales volatility will trigger the need for firms to depend on trade payables. The matching of trade payables with receivables can help improve the cash flow of firms (Wu et al., 2012) and ultimately increase performance (Fabbri and Menichini, 2010).

From the transaction cost theory perspective, trade payables should improve the performance of firms with sales volatility through cost savings. The volatility of sales will lead to fluctuations in production, which will, in turn, result in erratic purchasing cycles. Therefore, firms with erratic purchasing cycles as a result of sales volatility can improve performance by acquiring the necessary inputs of production, separate from the payment cycle (Nelson and Nelson, 2002). The separation of the payment cycle from the purchasing cycle is very important to the performance of firms with sales volatility because it obviates the need to hold precautionary cash balances and reduces transaction costs associated with cash management

(Ferris, 1981). Therefore, we expect firms with sales volatility to have higher trade payables performance than firms with stable demand. Following the above arguments, it is hypothesized that:

H_2: The value relevance of trade payables is an increasing function of sales volatility.

(iii) Trade payables, market share, and firm performance.

Firms that need to increase their market share may have to rely more on trade payables to secure the necessary inputs for production. This is because firms increase market share by giving more credit to customers (Hill et al., 2012), and firms finance part of their trade receivables with trade payables (Molina and Preve, 2009). Therefore, the incentive to increase sales will result in a reliance on suppliers' credit (Hill et al. 2012). This view is also corroborated by Bougheas et al. (2009) as well as Fabbri and Menichini (2010). Credit sales need financing, however, firms with small market share have difficulties financing their credit sales with bank credit (Petersen and Rajan 1997; Nelson and Nelson, 2002; Baños-Caballero et al., 2014). This is because firms with small market share are usually small in size (Chen et al., 2014) and are associated with information asymmetry (Petersen and Rajan 1997). Nevertheless, these firms have higher growth opportunities due to their small market share and as such trade payables will help propel growth (increase sales) and result in higher performance. In contrast, firms with bigger market share have relatively fewer growth opportunities but greater access to bank credit (Petersen and Rajan, 1997). Therefore, given that trade payables are more expensive and negatively related to bank credit (Lin and Chou, 2015), they will be value decreasing in firms with bigger market share because they lack growth opportunities. In sum, these arguments lead to the following hypothesis:

H_3: The value relevance of trade payables is a decreasing function of market share.

(iv) Trade payables, differentiated products and firm performance.

Suppliers' credit usage is correlated with the nature of the transacted goods (see, Smith, 1987; Burkart and Ellingsen, 2004; Cuñat, 2007; Fabbri and Menichini, 2010; Giannetti et al., 2011; Mateut et al., 2015) and differentiated products are associated with more suppliers lending across industries (Burkart and Ellingsen, 2004; Caglayan et al., 2012). Longer trade credit is a norm in industries that deal with differentiated products (Longhofer and Santos, 2003; Frank and Maksimovic, 2005). This is because the need to form supplier-buyer relationships leads to limited buyer opportunism (Burkart and Ellingsen, 2004) and lower moral hazard (Mateut et al., 2015). This also implies that firms that buy differentiated inputs may not face the additional charges associated with credit from suppliers. Accordingly, Giannetti et al. (2011) conclude that for firms with differentiated products, trade payables are cheaper than bank credit.

Differentiated products require differentiated supplies or inputs. Consequently, both buyers and suppliers of differentiated products have a limited number of customers (Mateut et al., 2015). Wilson and Summers (2002) note that the use of trade payables is a vital tool to foster long-term supplier relationships. Therefore, in light of the limited number of suppliers, trade payables can increase performance in firms with differentiated products by nurturing good supplier relationships to ensure timely and adequate supply of inputs. More so, buyers of specialised inputs or materials require additional time from their suppliers to verify the quality before payment is made (Giannetti et al., 2011). Accordingly, Smith (1987) argues that buyers of differentiated inputs are always reluctant to make payment before quality is examined. However, trade payables provide a warranty for quality because they reduce the information asymmetry surrounding product quality (Long et al., 1993). Consequently, they will increase performance by reducing costs associated with the long input verification time required by producers of differentiated products.

We, therefore, expect the value relevance of trade payables to be higher for firms with differentiated products than those with standardised products or service providers[2]. Based on the arguments above, it is hypothesised that:

H_4: The value relevance of trade payables is an increasing function of differentiated products.

3. Sample, Data, and Methodology

3.1 Sample selection and data

Data for this study was sourced from the AMADEUS database. The sample consists of all listed firms on the London Stock Exchange (LSE) from 2005 to 2014. Similar to Deloof (2003) and Afrifa (2016), all financial firms are excluded. The final sample consists of 2,559 firms over the sample period. The unbalanced nature of our data helps alleviate possible selection and survivorship biases.

3.2 Variable definitions

The main dependent variable to be analysed is excess return. The use of excess return as a measure of firm performance is common in the trade credit literature (Hill et al., 2010; Aktas et al., 2015; Goto et al., 2015). The excess return is measured as the return on the buy-and-hold investment in the sample firm í less the return of the buy-and-hold investment in the benchmark portfolio. The benchmark controls for possible influencing elements that can affect excess return. After these influencing factors have been controlled for, whatever is not explained is

[2] This paper follows Hill et al. (2012) by separating the firms in the sample according to industry type: (1) standardized goods, (2) differentiated goods, services and (3), according to the UK SIC (2003) classification. To prevent selection bias, firms that are not included in any industry type are added to the standardized product industry. The results are quantitatively similar if unclassified firms are excluded. Standardised products include firms with UK SIC codes 1, 2, 7, 8-10, 12-17, 20-24, 26, 28, 29, 31, 33, 40, 43, 46, 58, 60, 62, 63, 64, 67, 70, 72, 76, 80, 81-84, 86-89, 91-97 and 99. Differentiated products include firms with UK SIC codes 25, 27, 30, 32 and 34-39. Services include 41, 42, 44, 45, 47-57, 59, 61, 65, 73, 75, 78 and 79.

abnormal. The excess return is computed as the buy-and-hold abnormal excess return using monthly return data. More specifically, the abnormal excess return is computed as:

$$\text{ExcessRet}_i = \prod_{t=1}^{T}(1 + R_{it})^{-} \prod_{t=1}^{T}(1 + R_{bt}) \quad (1)$$

Where ExcessRet, is the buy-and-hold abnormal return for stock í, R_{it} is the rate of return for stock i on month t, R_{bt} is the rate of return for the benchmark for stock í, and T is the investment horizon in a number of months. Following Aktas et al. (2015) and Hill et al. (2012), the Fama and French (1993) 5 X 5 size and book-to-market portfolio sorts are used as benchmark portfolios.

The main variable of interest is trade payables, which is scaled by the cost of goods sold (see, Love et al., 2007; Wu et al., 2012; Garcia-Appendini and Montriol-Garriga, 2013). Trade payables need differs from industry to industry (Hill et al., 2010), firm to firm (Aktas et al., 2015), and from one year to another (Afrifa, 2016). Therefore, to examine the effect of trade payables on firm performance, it is necessary to account for firm, year and industry effects (see, Hill et al., 2012; Aktas et al., 2015); that is, the industry/year adjusted trade payables are used as the independent variable. To do this, the trade payables averages are calculated for each industry/year, after that the industry/year averages are netted from each firm's trade payables per each year (Aktas et al., 2015; Hill et al., 2010). This method accounts for industry, firm and year effects. The UK SIC 2003 industry classification is used to group firms into industries.

As the goal of this paper is to measure the effect of trade payables on firm performance, all regressions include control variables[3] that have been widely used in the literature. Larger firms may benefit more from trade credit because of their bargaining power (Martinez-Sola et al., 2014**)**. We, therefore, control for firm size (Ferrando and Mulier, 2013), defined as the log of total assets. We include annual sales growth because higher sales are expected to increase

[3] The dummy variables DiffProd and Services were included in the main estimations. However, the coefficient estimates of these two dummies were subsumed by firm fixed effects and are therefore not reported in the regression table.

profitability. Following Baños-Caballero et al. (2014), annual sales growth is defined as (Sales-Salest-1)/Salest-1. Firms can increase performance as a result of increasing firm risk (Aktas et al., 2015). Firm risk (risk) is defined as the standard deviation of daily excess return (Aktas et al., 2015). Older firms may experience higher performance because of their long-standing relationship with suppliers (Baños-Caballero et al., 2010). Firm age (Age) is the difference in years between the date of incorporation and each firm's calendar year end (Afrifa and Gyapong, 2017). The tax shield benefit of financial leverage (Leverage) may help to improve a firm's performance (Modigliani and Miller, 1963). Leverage is measured as the total debt divided by total assets (Aktas et al., 2015). We include the ratio of intangible assets to total assets (Aktas et al., 2015) because firms with a higher proportion of intangible assets such as human capital may be able to use resources with maximum effectiveness (Harris and Robinson, 2001). Finally, cash flow is included in all regressions because firms with cash flow may increase performance by taking advantage of profitable venture. Cash flow is defined as operating income before extraordinary items + depreciation, scaled by total assets (Aktas et al., 2015).

3.3 Methodology

Preliminary data analysis was conducted to test for outliers in the samples. The method applied in this study was to winsorize all variables at the 0.5%. The decision to winsorize the affected data is in line with the similar procedure followed by previous researchers in the accounting and finance literature, including Kieschnick et al. (2006) and Hill et al. (2010).

To test hypothesis 1(Trade payables and firm performance), the following model is estimated:

$$ExcessRet_{it} = \beta_0 + \beta_1 Tpay, indadj_{it-1} + \beta_2 Control_{it-1} + Firm\ effects + Year\ effects + \varepsilon_{it} \quad (2)$$

.

To investigate the influence of sales volatility, market share, and product differentiation on the trade payables-firm performance relationship, the following specifications are proposed:

To test hypothesis 2 (Trade payables, sales volatility, and firm performance) the following model is estimated:

$$ExcessRet_{it} = \beta_0 + \beta_1 Tpay, indadj_{it-1} + \beta_2 CV\_Sales_{it-1} + \beta_3 Tpay, indadj * CV\_Sales_{it-1} + \beta_4 Control_{it-1} + Firm\ effects + Year\ effects + \varepsilon_{it} \quad (3)$$

To test hypothesis 3 (Trade payables, market share, and firm performance) the following model is estimated

$$ExcessRet_{it} = \beta_0 + \beta_1 Tpay, indadj_{it-1} + \beta_2 MktShare_{it-1} + \beta_3 Tpay, indadj * MktShare_{it-1} + \beta_4 Control_{it-1} + Firm\ effects + Year\ effects + \varepsilon_{it} \quad (4)$$

To test hypothesis 4 (Trade payables, differentiated products, and firm performance) the following model is estimated:

$$ExcessRet_{it} = \beta_0 + \beta_1 Tpay, indadj_{it-1} + \beta_2 Tpay, indadj * Services_{it-1} + \beta_3 Tpay, indadj * DiffProd_{it-1} + \beta_4 Services_{it-1} + \beta_5 DiffProd_{it-1} + \beta_6 Control_{it-1} + Firm\ effects + Year\ effects + \varepsilon_{it} \quad (5)$$

The dependent variable, ExcessRet, in all regressions is the firm's annual excess return. $Tpay, indadj$ represents industry-adjusted trade payables. Controls refer to control variables included in the regressions. The subscript i = number of firms (2,559), and the subscript t = number of years (10). μ_i = unobservable heterogeneity, and ε_{it} = error term. The right-hand side

variables of equations (2)-(5) are lagged by a one-year period to reduce the effect of simultaneity. Consistent with Petersen (2009), heteroscedasticity is accounted for by clustering the standard errors at the firm level

All variables are defined in Table 1.

[INSERT TABLE 1]

4. Results

4.1 Descriptive statistics and correlation matrix

The descriptive statistics are presented in Table 2. The results show that the excess return of the average firm in the sample is 1.4023%, which is similar to the 1.89% reported by Muradoglu and Sivaprasad (2012) in the UK. The median and standard deviation are 2.0378% and 3.8918%, respectively. The standard deviation figure shows a substantial variation in the excess return of the firms in the sample. The median excess return is much higher relative to the mean, indicating that the excess return distribution is negatively skewed. The mean of the industry adjusted trade payables is 0.0000[4] with a median of 2.5751. The average firm has a sales volatility of 16.7905%, which provides evidence of the presence of demand uncertainty of the firms in the sample. This is, however, lower compared with the figure of 31.12% reported by Hill et al. (2010). The market share of the average firm in the sample is 0.1436%, indicative of the competitive environment in which the firms are operating. The univariate results show that the majority of the firms in the sample are producers of standardised products (49.0020%), followed by service providers (27.8062%), before producers of differentiated products (23.1918%). This pattern is similar to that in Hill et al. (2012).

[INSERT TABLE 2]

[4] The mean values of industry-adjusted trade payables approximate zero by construction.

The results of the Pearson's bivariate correlation matrix are presented in Table 3. Excess return is positive and significantly related to industry adjusted trade payables (0.2346), sales volatility (0.0312), sales growth (0.0595), firm size (0.3716), and leverage (0.0809). In contrast, excess return is negative and significantly related to market share (-0.0223), risk (-0.2384), age (-0.1359), intangible assets (-0.1167) and cash flow (-0.1827). The correlations between the independent variables show no indication of multicollinearity as they are all well below the threshold of 80% (Field, 2005).

[INSERT TABLE 3]

4.2 Multivariate regression results and discussion

Table 4 presents the results of equations (2) to (5). The results for equation 2 (column 1 of table 4) show that trade payables have a significantly positive impact on firm performance (0.0288, T-Stat = 4.72). This result is consistent with hypothesis 1 and indicates that firms that rely on trade payables increase their performance. Specifically, the results indicate that a 10% increase in trade payables increases excess return by approximately 0.288%. The economic consequence is also quite substantial: a one standard deviation increase in trade payables is related to an increase of 2.1286% in excess stock return. Comparatively, this figure is higher than the 1.620% reported in a US study by Goto et al. (2015). Theoretically, the result is consistent with financing theory, diversion motive theory, and operational efficiency theory, all of which predict a positive relationship between trade payables and firm performance (Emery, 1984; Petersen and Rajan, 1997; Bhattacharya, 2008; Giannetti et al., 2011; Mateut et al., 2015). The result is also consistent with the empirical evidence from Ge and Qiu (2007) as well as Du et al. (2012), who emphasise the importance of trade payables to the performance of firms. The findings may be attributed to the fact that suppliers' credit helps firms to maximize production (Goto et al., 2015) and also shields them from inefficiencies in the financial market (Rajan and

Zingales, 1998). An alternative explanation may be that firms use trade payables to offset the lost interest associated with financing credit to customers and improving firms' operating cash flows (Wu et al., 2012). However, Aktas et al. (2012) showed that relative to cash credit, suppliers' credit is illiquid and signals managers' intentions not to expropriate firm resources to outside investors. Therefore, the finding could also imply that investors interpret this signal (suppliers' credit) as a reduced agency problem and adjust their valuation upwards. This finding provides an explanation for the existence and prevalent use of trade payables by firms and implies that firms receive trade credit from suppliers because it increases performance.

To test hypothesis 2, equation (3) is estimated. The results in column (2) of Table 4 indicate a positive coefficient of the interaction variable ($Tpay, indadj$ * CV_Sales) (0.0067, T-Stat = 3.43). Specifically, the results are consistent with hypothesis 2 and indicate that a 10% increase in trade payables of a firm with no sales volatility is 0.216%, but increases to 0.283% (0.216% + 0.067%) for firms with higher variation in sales. This finding demonstrates a higher excess return of trade payables in firms with more volatile sales. This result is consistent with the assertion that firms with sales volatility rely on suppliers' credit in order to adjust production without the need to worry about making immediate payment (Hill et al., 2012). Hill et al. (2010) opined that firms with high sales volatility use more trade payables to improve cash flow. Martinez-Sola et al. (2014) documented that trade payables are important to firms with demand uncertainty because it helps them smooth production to meet the erratic demand of their customers. Consequently, a reasonable explanation for the higher performance of trade payables in firms with sales volatility may be that it helps them to balance inventory (Bo, 2011) to smooth production to meet customer demands irrespective of their cash flow position. Alternatively, the results could imply that trade payables obviate the need for firms with volatile sales to raise costly capital at short notice to synchronize production and sales. However, from the signalling perspective of Aktas et al. (2012), the results suggest that in times of demand

uncertainty, suppliers' credit signals managers' efforts to smooth production to meet demand. Consequently, investors rightly decode the signal and adjust their valuation of the firm upwards.

Results for the effect of market share on the trade payables-firm performance relationship is presented in column (3) of Table 4. The coefficient of the variable (MktShare) is significant (-1.003, T-Stat = -3.62), demonstrating that market share impacts negatively on firm performance. This is also consistent with Hill et al. (2012). More importantly, the coefficient of the variable of interest ($Tpay, indadj *$ MktShare) is negative and statistically different from zero (-0.0258, T-Stat = -2.38), which confirms hypothesis 3. Our results suggest that for firms with bigger market share, a 10% increase in trade payables reduces excess return by 0.258%. The result shows that the value of trade payables does depend on the relative market share of firms, and that smaller firms benefit more from suppliers' credit than bigger ones. This is intuitive because unlike bigger firms, smaller firms have smaller market share and more growth opportunities, leading to a greater incentive to increase market share. To achieve this, they give out more credit to their customers (Hill et al., 2012). This increase in credit to customers is only possible with high institutional finance or an increase in trade payables (Molina and Preve, 2009). Nonetheless, although institutional finance is generally cheaper than suppliers' credit (Yang, 2011), institutional finance is less accessible to smaller firms (Petersen and Rajan, 1997; Baños-Caballero et al., 2014). Therefore, in firms with smaller market share, a reliance on trade credit helps increase sales and growth, leading to increased performance. In contrast, firms with bigger market share (usually large firms) have less growth opportunities but relatively easy access to institutional finance (Petersen and Rajan, 1997; Baños-Caballero et al., 2014). The limited growth opportunities and the access to less expensive institutional finance make trade payables value decreasing in these firms. From a signalling perspective, the results suggest that suppliers' credit indicates signal dishonesty in firms with bigger market share and causes investors to revise their valuation downwards.

Table 4 (column 4) presents results for the value relevance of the trade payables-differentiated products interactions. In this section, we adopt the methodology of Hill et al. (2012) in order to separately control for the effects of firms producing standardised products (base case), services (Services) as well as producers of differentiated products (DiffProd). The results indicate that trade payables are not value relevant to service firms (-0.0002, T-Stat = -0.98). However, the coefficient of the interaction variable ($Tpay, indadj * \text{DiffProd}$) is positive and statistically significant (0.0004, T-Stat = 2.86). This result indicates that compared to producers of standardised products, producers of differentiated products benefit more from trade payables in terms of contribution to firm value. Several reasons may be given for the results. Theoretically, the finding is in consonance with the diversion theory argument that firms with differentiated products benefit from trade payables (Fabbri and Menichini, 2010). Mateut et al. (2015) document that differentiated products require unique inputs and producers have fewer alternative suppliers. Consequently, the results could imply that trade payables increase performance by ensuring timely and adequate supply of inputs to match production and sales. However, Mateut et al. (2015) note that the limited number of suppliers and buyers of inputs in differentiated product industries necessitates the formation of stronger customer relationships. These stronger relationships lead to reduced buyer opportunism and lower moral hazard (Bukart and Elingsen, 2004; Mateut et al., 2015), and ultimately reduce the cost of inputs. Wilson and Summers (2002) note that trade payables can facilitate stronger long-term customer relationships. Consequently, the results could imply that producers of differentiated products use trade payables to form stronger customer relationships in order to reduce the cost of inputs and increase performance.

Overall, existing studies document that suppliers' credit is the norm in industries that deal in differentiated products (Burkart and Ellingsen, 2004; Giannetti et al., 2011). Our finding suggests that this is the case because trade payables are value increasing in firms that produce

differentiated products. We follow the procedure by Aktas et al. (2015) and also test the joint significance of all the interaction variables. The letter β in Table 4 represents the coefficient of the corresponding variable as indicated in equations (3) to (5). In column 2, the sum of β_1 and β_3, which measures the marginal effect of trade payables on performance for firms with sales volatility, is statistically significant. In column 3, the sum of β_1 and β_3, which measures the marginal effect of trade payables on performance for firms with larger market share, is statistically significant. Column 4 also presents the results for the sum of β_1 and β_3 for the marginal effect of trade payables on performance of firms that produce differentiated products. It shows that the marginal effect of the interaction variable is statistically significant. These results further support our main findings.

In relation to the control variables, the coefficients of risk, sales growth, firm size, age and cash flow are all significant at conventional levels. Excess return decreases with an increase in risk (Kieschnick et al., 2013), firm size (Aktas et al., 2015), and age (Aktas et al., 2015). Results also indicate that excess return increases with increases in sales growth (Hill et al., 2012) and cash flow (Aktas et al., 2015).

[INSERT TABLE 4]

5. Further Analysis

5.1 Trade payables versus bank credit and firm performance

The relative value relevance of suppliers' credit versus bank credit has attracted attention in the literature (Giannetti et al., 2011; Du et al., 2012). However, the empirical evidence so far has produced mixed results. For example, whereas Marotta (2005) and Giannetti et al. (2011) suggest that trade payables could be cheaper than bank credit, others including Wilner (2000) and Kestens et al. (2012) argue in favour of bank credit. In this section, we investigate the relative value relevance of trade credit versus bank credit. To do that, we introduce a new

variable BKcredit, indadj, which captures industry adjusted bank credit (see, Lin and Chou, 2015). The results are presented in Table 5. In column (1), the results indicate that bank credit has higher firm performance than trade credit as indicated by the coefficients of trade payables (0.0281, T-Stat = 4.59) and bank credit (0.0303, T-Stat = 2.87). Economically, a 10% increase in trade payables leads to a 0.281% increase in firm performance; while a 10% increase in bank credit leads to a 0.303% increase in firm performance. Thus, bank credit is 0.022% more profitable than trade credit. This finding is also consistent with Ng et al. (1999).

We also re-examine this relationship by taking into account firms with sales volatility, differentiated products, and bigger market share. The results are presented in column (2). The coefficient of the interaction Tpay,indadj * CV_Sales is (0.0067, T-Stat = 3.41) and of BKcredit,indadj * CV_Sales is (-0.0022, T-Stat = -0.27), indicating that firms with sales volatility benefit from increases in trade payables but not bank credit. In column (3), the coefficients of Tpay,indadj * Mktshare is (-0.0261, T-Stat = -2.42) and that of BKcredit,indadj * Mktshare is (0.0091, T-Stat = 0.56). The findings suggest that when market share is bigger, increases in trade payables are value decreasing whilst those of bank credit are not value relevant. These indicate that firms with bigger market share may benefit more from bank credit relative to trade payables. The last column presents the results regarding the nature of products. Once again, the results indicate that firms with differentiated products benefit from trade payables (0.0004, T-Stat = 2.88) but not bank credit (0.0000, T-Stat = 0.15). Overall, the results indicate that the relative value relevance of bank credit versus suppliers' credit depends on the level of sales volatility, market share and the nature of product.

[INSERT TABLE 5]

5.2 Trade payables, financial crisis, and excess return

The existing literature argues that the value relevance of trade payables may differ in crisis periods (Lamberson 1995; Martínez-Sola et al., 2014). This is because financial crisis brings in

its trail a reduction in bank credit (Love et al., 2007). Others, including Kestens et al. (2012) and McGuinness and Hogan (2016), suggest that financial crisis leads to a decrease in trade credit supply (Kestens et al., 2012; McGuinness and Hogan, 2016). We examine the value relevance of suppliers' credit during the recent financial crisis and how this varies across firms with sales volatility, bigger market share and differentiated products.

To achieve this, we create a dummy variable Crisis, which identifies the crisis period and is equal to one for the years 2007-2009 and zero otherwise. We then create other interactions with the crisis variable. The results are presented in Table 6. Column (1) shows a positive and significant relationship for the interaction Tpay,indadj * crisis (0.0242, T-Stat = 5.97). This result suggests that suppliers' credit was value relevant during the financial crisis period. This is intuitive because financial crisis results in credit rationing (Love et al., 2007), and with supplier credit, firms can increase performance by continuing production to meet customer demands. Nevertheless, this finding is in contrast to Kestens et al. (2012) who reported a negative relationship between trade payables and performance during the crisis period in Australia. The contrasting results may be attributed to differences in the severity of the financial crisis in the UK and Australia. In the UK, the financial crisis resulted in bank collapses and huge government bailouts but this was not the case in Australia. In fact, Murphy (2011) argued that a combination of market conditions, pre-existing institutional practices and government policies sheltered Australian banks during the crisis. Consequently, trade payables may be important for the performance and even survival of UK non-financial institutions during the crisis period.

The results in column (2) show that firms with sales volatility benefit more from trade payables during a crisis period as indicated by the positive and significant coefficient of the interaction variable Tpay,indadj * CV_Sales * crisis (0.0191, T-Stat = 3.56). Interestingly, the results in column (3) show that during financial crisis, trade payables enhance the performance

of firms with a bigger market share (0.0323, T-Stat = 1.98), which is contrary to Hypothesis (3). This highlights the severity of the credit rationing in the UK during the financial crisis. Thus, even with their limited sales growth opportunities, suppliers' credit was still value relevant in firms with bigger market share because, without it, they would be unable to satisfy existing customer demands. This also indicates that firms' demand for trade payables during the crisis period was primarily to satisfy existing customers due to the limited access to bank financing. Lastly, the results presented in column (4) show that trade payables increased the performance of producers of differentiated products (0.0003, T-Stat = 3.95) and service providers (0.0003, T-Stat = 3.33) during the financial crisis periods.

[INSERT TABLE 6]

6. Robustness Test

6.1 Alternative measure of performance – ROA

The study investigates the value relevance of trade payables. Consequently, we followed Aktas et al. (2015) and Goto et al. (2015) and employed a market valuation measure (excess return) as a proxy for performance. We conduct a further test to evaluate the sensitivity of our results to our measure of firm performance. Specifically, we follow Li et al. (2016) and adopt ROA as an alternative measure of firm performance. The results presented in Table 7 are qualitatively similar to those in Table 4 and shows that trade payables impact positively on performance. Also, trade payables are value increasing in firms with sales volatility and differentiated products but value decreasing in firms with bigger market share. These imply that our results are robust to an alternative measure of firm performance.

[INSERT TABLE 7]

6.2 Alternative measures of trade payables – total assets and sales as deflators

We follow Petersen and Rajan (1997), Fisman and Love (2003), Giannetti et al. (2011), Wu et al. (2012) and Wu et al. (2014), and test the sensitivity of the baseline results in Table 4 to a change in the measurement of the main independent variable by scaling trade payables with total assets (in Table 8) and sales (in Table 9) instead of cost of goods sold. Once again, the industry/year adjusted trade payables to total assets and sales are used. Tables 8 and 9 report the regression results on excess return with the same econometric procedure and set of control variables as used in Table 4. The results reported in Tables 8 and 9 yield consistent evidence as reported in Table 4.

[INSERT TABLE 8]

[INSERT TABLE 9]

6.3 Three-year average excess return

In this section, we test the sensitivity of our baseline results to a long-run performance measure by employing a 3-year average excess return. Aktas et al. (2015) used the 3-year average excess return to assess whether the effect of trade payables on firm performance is persistent through time. Consequently, as a robustness test, we use a 3-year average excess return as a measure of long-run performance. The same econometric procedure and set of control variables are used as in Table 4. According to Table 10, the results of using a 3-year excess return as the dependent variable is qualitatively similar to the 1-year excess returns results reported in Table 4. This shows that the effect of trade payables on firms' excess returns is persistent through time.

[INSERT TABLE 10]

6.4 Oster test of endogeneity

Unobserved time-variant and time-invariant omitted variables are of major concern in the accounting and finance literature (Adams and Ferreira, 2009; Oster, 2017). In this paper, we address the issue of omitted variables by employing an innovative and influential procedure

developed by Oster (2017). This technique is new to the accounting and finance literature and has so far been applied in recent influential papers to deal with endogeneity concerns (see, Aktas et al., 2017; Jha, 2015; Frijns et al., 2016). This is a sensitive-type method used to gauge the robustness and validity of the results to omitted variables biases by testing the stability of the coefficients. It is based on the assumption that it is possible to determine how large the selection on unobservables must be in order to explain away the coefficient of interest, by measuring how much the regression coefficients and the model R-squared change with the inclusion of extra control variables. To potentially assess the impact of omitted variables on all the coefficients of interest in Table 4, we follow the procedure suggested by Oster (2017) and applied in Aktas et al. (2017) by assuming that omitted variables and included variables are of equal importance ($\delta = 1$), and the inclusion of omitted variables can lead to a maximum R-squared (Rmax) of 1.3 times the estimated R-squared in the full specification in Table 4.

Table 11 contains the results of the Oster (2017) test for all regressions, concentrating only on our main explanatory variables. Columns 1 to 3 show the coefficients, confidence intervals and R-squared from the main controlled regressions. Column 4 presents the identified set of bounds of the coefficient for the controlled set (β) and the full set (including omitted variables) (β^*), respectively. We calculate (β^*) based on the values of Rmax and $\delta = 1$. Columns 5 and 6 measure whether the results in the controlled regressions are susceptible to omitted variable bias by determining if the bias-adjusted coefficient (β^*) satisfies the two robustness criteria suggested in Oster (2017). Specifically, column 5 contains a test of whether (β^*) moves away from zero in both directions; whereas column 6 reports a test of whether (β^*) falls within the 95% confidence intervals of the estimated coefficient (β) in the main controlled regression.

According to the first criteria which test whether (β^*) moves away from zero in both directions, the results in column 5 indicate that is the case for all our main variables of interest. In relation to the second criteria which tests whether (β^*) is within the 95% confidence intervals

of the estimated coefficient in the main controlled regression, the results presented in column 6 show that (β*) for all our main variables of interest is within the 95% interval except for (Tpay,indadj*MktShare). Overall, the findings imply that the conclusions drawn from the main analysis (controlled regressions) are not affected by omitted variables bias, and therefore accurate. Altogether, our results indicate that our main results are robust to the coefficient stability methods because (β*) of almost all the variables of interest moves away from zero and falls within the 95% confidence intervals. This implies that the economic significance of our main variables of interest is not affected by the addition of unobserved omitted variables.

[INSERT TABLE 11]

7. Conclusion

Prior research has mainly focused on only one aspect of trade credit – trade receivables – to the neglect of the other aspect – trade payables. This is surprising, given that both types of trade credit form the trade credit channel of firms. In this study, we try to fill the gap in the literature by examining the relationship between trade payables and firm performance. The few prior papers that examined the relationship between trade payables and firm performance in the context of developing countries have also not considered how the product market dynamics may affect the relationship. First, we examine the relationship between trade payables and firm performance. Second, we explore how sales volatility impacts upon the trade payables and firm performance relationship. Third, we examine the market share effect on the relationship between trade payables and firm performance. Finally, we examine whether the nature of the product impacts on the value relevance of trade payables. To do that, we focus on a sample of UK firms over a 10-year period between 2005 and 2014.

Specifically, we find that an increase in trade payables is positively associated with firm performance. Gauging the value of trade payables distinguishes this paper from prior studies

which focus on trade receivables. The findings here also contribute to the working capital management literature. The salient result of this study is that trade payables enhance firm performance, which suggests that firms should be the recipients of trade credit. Moreover, the results show that firms with sales volatility or lower market share, and producers of differentiated products, have a higher excess return of trade payables. The findings that product market dynamics affect the value relevance of trade payables explains why some firms rely on trade credit more than others. In addition, it shows that trade payables are more value enhancing for some firms than others. Further analysis shows that bank credit is cheaper than trade credit, which suggests that prior to their engagement with suppliers' credit, firms must explore the opportunity of accessing bank credit. Finally, the results show that the effect of trade payables is heightened during the financial crisis period.

The findings have significant implications for corporate policy. Given the magnitude of trade payables on firms' balance sheets, the management of corporations should place certain importance on exploiting their benefits for the enhancement of shareholder value. Although firms should try and minimise the costs associated with relying on suppliers' credit, such as lost discounts, they should take full advantage of suppliers' credit when in consideration of bank credit.

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Table 1. Variable definitions

Variable		
Acronym	Name	Definition
ExcessRet	Excess return	Buy−and−hold excess excess return over the calendar year defined as: $\text{ExcessRet}_i = \prod_{t=1}^{T}(1 + R_{it})^{-} \prod_{t=1}^{T}(1 + R_{bt})$, where Ri,m and Rp,m are the return for firm I and the return of the benchmark portfolio for month m. Benchmark portfolios are the twenty−five Fama−French value−weighted portfolios based on size and book−to−market.
Tpay	Trade Payables	Trade payables scaled by cost of goods sold
Tpay,indadj	Industry adjusted trade payables	Trade payables minus industry average trade payables
BKcredit	Bank credit	The ratio of short-term debt to total assets
BKcredit,indadj	Industry adjusted bank credit	Bank credit minus industry average bank credit
CV_Sales	CV_Sales	The standard deviation of a firm's annual sales over the previous three years period. The sales volatility measure is scaled by total assets.
MktShare	Market share	Market share is firm sales divided by aggregate industry sales in a given year.
DiffProd	Differentiated Products	An indicator variable equal to one if the firm produces differentiated products, and zero otherwise.
Services	Services	Services is an indicator variable equal to one if the firm is a service provider, and zero otherwise.
StandProd	Standardised Products	StandProd is an indicator variable equal to one if the firm produces standard products, and zero otherwise.
Risk	Risk	The standard deviation of daily excess return. In the regression analyzes, I use the annualized standard deviation of daily excess returns.
Sales growth	Sales growth	One−year growth rate of sales at time t-1: $(SALE_t - SALE_{t-1})/ SALE_{t-1}$
Firm size	Firm size	Total assets of firms
Age	Age	Number of years between incorporation and the calendar year end of each firm.
Leverage	Leverage	Total debt, scaled by total assets.
Crisis	Financial crises	An indicator variable equal to one for the years 2007, 2008 and 2009 and zero otherwise.
Intangible assets	Intangible assets	Intangible assets, scaled by total assets.
Cash flow	Cash flow	Operating income before extraordinary items plus depreciation, scaled by total assets.

Table 2. Descriptive Statistics

Variable	N	Mean	Median	SD	p25	p90
ExcessRet	20087	1.4023	2.0378	3.8918	-0.6185	6.5035
$Tpay$, indadj	20891	0.0000	2.5751	73.9103	-4.3363	16.4555
CV_Sales	16887	16.7905	4.6349	50.7325	-2.6349	60.6848
MktShare	20891	0.1436	0.0488	0.5136	0.0282	0.2810
StandProd	20891	49.0020	0.0000	49.9912	0.0000	100.00
Services	20891	27.8062	0.0000	44.8055	0.0000	100.00
DiffProd	20891	23.1918	0.0000	42.2067	0.0000	100.00
Risk	20225	3.8369	3.9158	0.6423	3.5292	4.5432
Sales growth	20891	3.0627	3.0395	1.9021	2.5395	5.0013
Firm size (log)	20891	12.0975	12.2121	3.5555	9.6353	15.6346
Age	20733	12.0228	12.8927	2.2814	10.9434	14.0124
Leverage	17254	14.0401	10.0788	14.2124	0.3699	35.9433
Intangible assets	20720	10.9480	2.6760	13.0619	1.3410	24.1085
Cash flow	20472	-5.9006	-12.2252	17.6685	-16.9314	15.1844

This Table provides descriptive statistics for 2,559 UK listed firms over the period 2005–2014. All variables are as defined in Table 1.

Table 3. Pearson's Correlation Matrix

Variables	1	2	3	4	5	6	7	8	9	10	11
ExcessRet	1										
$Tpay$ indadj	0.2346*	1									
CV_Sales	0.0312*	0.0515*	1								
MktShare	–0.0223*	–0.0231*	–0.0758*	1							
Risk	–0.2384*	–0.2892*	–0.0209*	0.0041	1						
Sales growth	0.0595*	0.0330*	0.0684*	–0.0006	–0.0236*	1					
Firm size	0.3716*	0.0626*	–0.0075	–0.0022	–0.3274*	0.0696*	1				
Age	–0.1359*	0.0813*	–0.0408*	0.0262*	0.1867*	–0.0235*	–0.5138*	1			
Leverage	0.0809*	–0.1614*	–0.0429*	–0.0065	–0.4460*	0.0200*	0.3273*	–0.2568*	1		
Intangible assets	–0.1167*	–0.0746*	0.0303*	0.0028	0.3818*	0.0008	–0.2179*	0.1893*	–0.1656*	1	
Cash flow	–0.1827*	–0.0732*	–0.0218*	0.0023	0.2085*	–0.0219*	–0.3843*	0.2347*	–0.2709*	0.3350*	1

This Table presents the Pearson's correlation coefficients for the dependent and independent variables. All variables are as defined in Table 1. * indicates statistical significance at the 5%

Table 4. Trade payables and excess return

Variables	**(1)**	**(2)**	**(3)**	**(4)**
Tpay, indadj	0.0288***	0.0216***	0.0325***	0.0203**
	(4.72)	(3.05)	(4.95)	(2.52)
CV_Sales		0.0783		
		(0.91)		
Tpay, indadj * CV_Sales		0.0067***		
		(3.43)		
MktShare			−1.003***	
			(−3.62)	
Tpay, indadj * MktShare			−0.0258**	
			(−2.38)	
Tpay, indadj * Services				−0.0002
				(−0.98)
Tpay, indadj * DiffProd				0.0004***
				(2.86)
Risk	−0.5500***	−0.8710***	−0.5490***	−0.5510***
	(−4.14)	(−5.11)	(−4.13)	(−4.15)
Sales growth	0.0836***	0.0976***	0.0846***	0.0839***
	(4.75)	(5.86)	(4.78)	(4.78)
Firm size	−0.0518**	−0.0399	−0.0514**	−0.0521**
	(−2.34)	(−1.64)	(−2.32)	(−2.35)
Age	−0.0927***	−0.0575	−0.0936***	−0.0932***
	(−3.04)	(−1.15)	(−3.06)	(−3.06)
Leverage	−0.0062	−0.0081	−0.0058	−0.0064
	(−1.41)	(−1.48)	(−1.31)	(−1.44)
Intangible assets	−0.0034	−0.0024	−0.0035	−0.0027
	(−0.87)	(−0.55)	(−0.90)	(−0.68)
Cash flow	0.0187***	0.0213***	0.0189***	0.0185***
	(5.04)	(4.68)	(5.11)	(5.05)
Constant	5.6120***	7.001***	5.7190***	5.6230***
	(7.96)	(7.25)	(8.10)	(7.98)
Firm and year	Yes	Yes	Yes	Yes
Adjusted R−square	0.5295	0.5484	0.5299	0.5305
F–statistic	35.49***	33.92***	33.79***	32.37***
N	14,110	11,159	14,110	14,110
$\boldsymbol{\beta_1 + \beta_3}$		15.32***	12.32***	3.22**

This Table presents the results of the relationship between trade payables and excess return. All regressions are run with robust standard errors to reduce heteroscedasticity. The dependent variable in all regressions is excess return. All variables are as defined in Table 1. Standard errors are shown in parentheses. ***, **, and * indicate statistical significance at 1%, 5% and 10% levels, respectively. β refers to the coefficient estimates as defined in equations 2-5.

Table 5. Trade payables vs bank credit and excess return

Variables	(1)	(2)	(3)	(4)
Tpay, indadj	0.0281***	0.0208***	0.0318***	0.0194**
	(4.59)	(2.93)	(4.83)	(2.39)
BKcredit, indadj	0.0303***	0.0302**	0.0298***	0.0308***
	(2.87)	(2.52)	(2.79)	(2.73)
CV_Sales		0.1070		
		(0.78)		
Tpay, indadj * CV_Sales		0.0067***		
		(3.41)		
BKcredit, indadj * CV_Sales		−0.0022		
		(−0.27)		
MktShare			−0.9220***	
			(−2.72)	
Tpay, indadj * MktShare			−0.0261**	
			(−2.42)	
BKcredit, indadj * MktShare			0.0091	
			(0.56)	
Tpay, indadj * Services				−0.0002
				(−0.97)
Tpay, indadj * DiffProd				0.0004***
				(2.88)
BKcredit, indadj * Services				−0.0000
				(−0.02)
BKcredit, indadj * DiffProd				0.0000
				(0.15)
Risk	−0.6380***	−0.9470***	−0.6370***	−0.6400***
	(−4.63)	(−5.49)	(−4.63)	(−4.65)
Sales growth	0.0837***	0.0975***	0.0847***	0.0840***
	(4.76)	(5.84)	(4.79)	(4.80)
Firm size	−0.0530**	−0.0424*	−0.0526**	−0.0533**
	(−2.39)	(−1.74)	(−2.37)	(−2.41)
Age	−0.0970***	−0.0629	−0.0977***	−0.0976***
	(−3.19)	(−1.26)	(−3.21)	(−3.21)
Leverage	0.0236**	0.0210	0.0246**	0.0243**
	(2.16)	(1.63)	(2.25)	(2.20)
Intangible assets	−0.0021	−0.0014	−0.0022	−0.0014
	(−0.55)	(−0.32)	(−0.57)	(−0.35)
Cash flow	0.0186***	0.0211***	0.0188***	0.0184***
	(5.05)	(4.64)	(5.10)	(5.04)
Constant	5.5180***	6.9040***	5.6090***	5.5260***
	(7.88)	(7.17)	(8.00)	(7.87)
Firm and Year	Yes	Yes	Yes	Yes
Adjusted R−square	0.5300	0.5487	0.5304	0.5309
F–statistic	34.22***	31.06***	31.45***	28.52***
N	14,110	11,159	14,110	14,110

This Table presents the results of the effects of trade payables and bank credit on excess return. All regressions are run with robust standard errors to reduce heteroscedasticity. The dependent

variable in all regressions is excess return. All variables are as defined in Table 1. Standard errors are shown in parentheses. ***, **, and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

Table 6. Trade payables, financial crisis and excess return

Variables	(1)	(2)	(3)	(4)
Tpay, indadj	0.0458***	0.0229***	0.0335***	0.0201**
	(6.78)	(3.22)	(5.05)	(2.48)
CV_Sales		−0.0193		
		(−0.23)		
Tpay, indadj * CV_Sales		0.0138***		
		(4.81)		
Tpay, indadj * Crisis	0.0242***			
	(5.97)			
Tpay, indadj * CV_Sales * Crisis		0.0191***		
		(3.56)		
MktShare			−0.8580***	
			(−2.87)	
Tpay, indadj * MktShare			−0.0098	
			(−0.91)	
Tpay, indadj * MktShare * Crisis			0.0323**	
			(1.98)	
Tpay, indadj * Services				0.0000
				(0.57)
Tpay, indadj * DiffProd				0.0006***
				(4.15)
Tpay, indadj * Services * Crisis				0.0003***
				(3.33)
Tpay, indadj * DiffProd * Crisis				0.0003***
				(3.95)
Crisis	−0.1680	−0.6170***	−0.2270**	−0.1820*
	(−1.57)	(−6.39)	(−2.10)	(−1.71)
Risk	−0.5580***	−0.8670***	−0.5460***	−0.5630***
	(−4.18)	(−5.09)	(−4.11)	(−4.23)
Sales growth	0.0841***	0.0991***	0.0842***	0.0847***
	(4.77)	(5.91)	(4.77)	(4.82)
Firm size	−0.0537**	−0.0396	−0.0515**	−0.0535**
	(−2.42)	(−1.63)	(−2.33)	(−2.42)
Age	−0.0855***	−0.0562	−0.0933***	−0.0890***
	(−2.80)	(−1.13)	(−3.05)	(−2.92)
Leverage	−0.0066	−0.0080	−0.0058	−0.0067
	(−1.48)	(−1.46)	(−1.31)	(−1.52)
Intangible assets	−0.0034	−0.0025	−0.0035	−0.0028
	(−0.89)	(−0.58)	(−0.90)	(−0.72)
Cash flow	0.0189***	0.0213***	0.0190***	0.0185***
	(5.04)	(4.69)	(5.14)	(5.03)
Constant	5.7860***	6.3750***	5.9230***	5.8430***
	(7.96)	(6.49)	(8.12)	(8.04)
Firm and year	Yes	Yes	Yes	Yes
Adjusted R – square	0.5313	0.5487	0.5302	0.5318

F – statistic	34.38***	31.75***	31.33***	29.95***
N	14,110	11,159	14,110	14,110

This Table presents the results of the relationship between trade payables and excess return augmented with financial crisis. All regressions are run with robust standard errors to reduce heteroscedasticity. The dependent variable in all regressions is excess return. All variables are as defined in Table 1. Standard errors are shown in parentheses. ***, **, and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

Table 7. Trade payables and return on Assets

Variables	(1)	(2)	(3)	(4)
Tpay, indadj	0.1060***	0.0729**	0.1240***	0.0209
	(3.38)	(2.02)	(3.61)	(0.43)
CV_Sales		−0.230		
		(−0.22)		
Tpay, indadj * CV_Sales		0.0403**		
		(2.45)		
MktShare			0.0607	
			(0.04)	
Tpay, indadj * MktShare			−0.117**	
			(−2.13)	
Tpay, indadj * Services				0.0573
				(0.87)
Tpay, indadj * DiffProd				0.0027***
				(3.38)
Risk	−1.7970***	−2.7810***	−1.8020***	−1.8090***
	(−3.82)	(−4.24)	(−3.82)	(−3.85)
Sales growth	0.2980***	0.3670***	0.2970***	0.3000***
	(4.44)	(6.19)	(4.39)	(4.47)
Firm size	−0.1930**	−0.1850*	−0.1850**	−0.1880**
	(−2.30)	(−1.85)	(−2.21)	(−2.25)
Age	−0.4400***	−0.4040	−0.4420***	−0.4300***
	(−3.17)	(−1.63)	(−3.18)	(−3.13)
Leverage	−0.0218	−0.0193	−0.0213	−0.0217
	(−1.25)	(−0.94)	(−1.22)	(−1.25)
Intangible assets	−0.0069	−0.0020	−0.0071	−0.0061
	(−0.45)	(−0.11)	(−0.46)	(−0.40)
Cash flow	0.1250***	0.1370***	0.1250***	0.1240***
	(4.92)	(5.04)	(4.96)	(4.96)
Constant	23.4200***	28.5900***	23.3300***	23.2900***
	(8.33)	(6.53)	(8.33)	(8.33)
Firm and Year	Yes	Yes	Yes	Yes
Adjusted R–square	0.5412	0.5527	0.5414	0.5426
F–statistic	19.67***	19.03***	18.15***	18.52***
N	14,019	11,079	14,019	14,019

This Table presents the results of the relationship between trade payables and return on assets. All regressions are run with robust standard errors to reduce heteroscedasticity. The dependent variable in all regressions is return on assets. All variables are as defined in Table 1. Standard errors are shown in parentheses. ***, **, and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

Table 8. Alternative measure of trade payables (total assets as deflator)

Variables	(1)	(2)	(3)	(4)
Tpay, indadj	0.0209***	0.0192***	0.0234***	0.0156***
	(5.08)	(4.09)	(5.40)	(2.83)
CV_Sales		0.137*		
		(1.66)		
Tpay, indadj * CV_Sales		0.0043***		
		(3.14)		
MktShare			−0.8170**	
			(−2.57)	
Tpay, indadj * MktShare			−0.0181**	
			(−2.24)	
Tpay, indadj * Services				−0.0000
				(−0.20)
Tpay, indadj * DiffProd				0.0003**
				(2.43)
Risk	−0.5470***	−0.8540***	−0.5440***	−0.5410***
	(−4.10)	(−5.03)	(−4.09)	(−4.07)
Sales growth	0.0823***	0.0957***	0.0832***	0.0824***
	(4.64)	(5.64)	(4.66)	(4.67)
Firm size	−0.0531**	−0.0387	−0.0532**	−0.0528**
	(−2.40)	(−1.60)	(−2.40)	(−2.39)
Age	−0.0876***	−0.0545	−0.0880***	−0.0884***
	(−2.87)	(−1.10)	(−2.88)	(−2.87)
Leverage	−0.0064	−0.0079	−0.0060	−0.0060
	(−1.43)	(−1.44)	(−1.35)	(−1.36)
Intangible assets	−0.0022	−0.0016	−0.0023	−0.0021
	(−0.58)	(−0.38)	(−0.59)	(−0.55)
Cash flow	0.0179***	0.0210***	0.0180***	0.0180***
	(4.78)	(4.62)	(4.83)	(4.87)
Constant	5.4980***	6.8090***	5.5860***	5.4810***
	(7.75)	(7.04)	(7.86)	(7.71)
Firm and Year	Yes	Yes	Yes	Yes
Adjusted R−square	0.5296	0.5490	0.5300	0.5301
F–statistic	35.99***	34.64***	33.58***	32.42***
N	14,110	11,159	14,110	14,110

This Table presents the results of the relationship between trade payables and excess return augmented with a different measure of trade payables. All regressions are run with robust standard errors to reduce heteroscedasticity. The dependent variable in all regressions is excess return. All variables are as defined in Table 1. Standard errors are shown in parentheses. ***, **, and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

Table 9. Alternative measure of trade payables (sales as deflator)

Variables	(1)	(2)	(3)	(4)
Tpay, indadj	0.0194***	0.0139***	0.0220***	0.0178***
	(4.96)	(3.18)	(5.27)	(3.31)
CV_Sales		0.157**		
		(2.09)		
Tpay, indadj * CV_Sales		0.0048***		
		(3.01)		
MktShare			−1.1750***	
			(−4.05)	
Tpay, indadj * MktShare			−0.0174**	
			(−2.23)	
Tpay, indadj * Services				−0.0001
				(−1.46)
Tpay, indadj * DiffProd				0.0002*
				(1.83)
Risk	−0.5640***	−0.8840***	−0.5600***	−0.5650***
	(−4.22)	(−5.15)	(−4.20)	(−4.24)
Sales growth	0.0847***	0.1000***	0.0855***	0.0848***
	(4.72)	(5.82)	(4.74)	(4.74)
Firm size	−0.0557**	−0.0414*	−0.0554**	−0.0568**
	(−2.50)	(−1.69)	(−2.49)	(−2.56)
Age	−0.0925***	−0.0639	−0.0940***	−0.0933***
	(−3.04)	(−1.29)	(−3.08)	(−3.07)
Leverage	−0.0062	−0.0081	−0.0057	−0.0063
	(−1.37)	(−1.45)	(−1.28)	(−1.42)
Intangible assets	−0.0039	−0.0025	−0.0041	−0.0029
	(−1.00)	(−0.57)	(−1.06)	(−0.74)
Cash flow	0.0189***	0.0215***	0.0190***	0.0187***
	(5.06)	(4.71)	(5.10)	(5.01)
Constant	6.0120***	7.3290***	6.1510***	6.0240***
	(8.51)	(7.56)	(8.69)	(8.52)
Firm and year	Yes	Yes	Yes	Yes
Adjusted R−square	0.5297	0.5481	0.5301	0.5302
F–statistic	35.36***	33.46***	34.16***	32.31***
N	13,949	11,010	13,949	13,949

This Table presents the results of the relationship between trade payables and excess return. All regressions are run with robust standard errors to reduce heteroscedasticity. The dependent variable in all regressions is excess return. All variables are as defined in Table 1. Standard errors are shown in parentheses. ***, **, and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

Table 10. Trade payables and 3−year excess return

Variables	(1)	(2)	(3)	(4)
Tpay, indadj	0.0248***	0.0202***	0.0285***	0.0157**
	(4.85)	(3.35)	(5.20)	(2.40)
CV_Sales		0.0732		
		(1.48)		
Tpay, indadj * CV_Sales		0.0027*		
		(1.93)		
MktShare			−0.9490***	
			(−4.25)	
Tpay, indadj * MktShare			−0.0256***	
			(−3.40)	
Tpay, indadj * Services				−0.0000
				(−0.00)
Tpay, indadj * DiffProd				0.0003***
				(2.70)
Risk	−0.2000*	−0.3250**	−0.1970	−0.2030*
	(−1.65)	(−2.29)	(−1.63)	(−1.68)
Sales growth	0.0780***	0.0782***	0.0785***	0.0782***
	(6.58)	(6.11)	(6.64)	(6.57)
Firm size	−0.0268	−0.0020	−0.0263	−0.0267
	(−1.49)	(−0.11)	(−1.46)	(−1.49)
Age	−0.0902***	−0.0279	−0.0908***	−0.0900***
	(−3.37)	(−0.70)	(−3.38)	(−3.38)
Leverage	−0.0091**	−0.0107***	−0.0086**	−0.0093***
	(−2.56)	(−2.72)	(−2.43)	(−2.61)
Intangible assets	−0.0044	−0.0019	−0.0045	−0.0042
	(−1.41)	(−0.64)	(−1.43)	(−1.30)
Cash flow	0.0179***	0.0215***	0.0180***	0.0178***
	(6.18)	(6.56)	(6.24)	(6.20)
Constant	4.0380***	4.2140***	4.1300***	4.0510***
	(6.55)	(5.32)	(6.69)	(6.58)
Firm and year	Yes	Yes	Yes	Yes
Adjusted R−square	0.7477	0.7935	0.7483	0.7482
F–statistic	34.96***	29.36***	33.47***	31.46***
N	11,985	9,180	11,985	11,985

This Table presents the results of the relationship between trade payables and excess return. All regressions are run with robust standard errors to reduce heteroscedasticity. The dependent variable in all regressions is excess return. All variables are as defined in Table 1. Standard errors are shown in parentheses. ***, **, and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

Table 11. Coefficient Stability Method – Omitted Variable Bias Test

			Controlled regression			Uncontrolled regression		Interpretation	
			(1)	(2)		(3)	(4)		(5)	(6)
Table	Regression	Variables	Coefficient from the regression	95% confidence intervals of the estimated coefficient		R−squared of the regression	Identified set of bounds (controlled – Full set)		Coefficient moves away from zero	Coefficient falls within the 95% confidence intervals
4	Column 1	Tpay,indadj	0.0288	0.0169	0.0408	0.5295	0.0288	0.0362	Yes	Yes
	Column 2	Tpay,indadj*CV_Sales	0.0067	0.0028	0.0105	0.5484	0.0067	0.0100	Yes	Yes
	Column 3	Tpay,indadj*MktShare	−0.0258	−0.0471	−0.0046	0.5299	−0.0258	0.0104	Yes	No
	Column 4	Tpay,indadj*Services	−0.0002	−0.0005	0.0002	0.5305	−0.0002	0.0001	Yes	Yes
	Column 4	Tpay,indadj*DiffProd	0.0004	0.0001	0.0007	0.5305	0.0004	0.0006	Yes	Yes

This Table presents the results of the test for potential omitted variables following the approach of Oster (2017). As recommended by Oster (2017). We run the methods of coefficient stability for our main regressions in Table 4. Columns (1), (2) and (3) show the coefficients, confidence intervals and the R-squared from the main regressions. Columns (5) and (6) report whether the bias-adjusted coefficient β^* in the identified set bounds meets the two robustness criteria in Oster (2017), specifically column (5) reports if the bias adjusted coefficient moves further away from zero and column (6) reports whether the changes in the adjusted coefficient fall within the 95% confidence intervals of the estimated coefficient β in the main regression. All variables are as defined in Table 1.