Determinants of Trade Credit: A Study of Listed Firms in the Netherlands

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Preface

This thesis is implemented to fulfill the last step of my master study "Master of Science in Business Administration specialized in Financial Management". During my study period, I got a part time job in a company which is doing export business with China. From business transactions, I noticed that there are always delays of payments to suppliers and from customers. Inspired by this, I would like to obtain more knowledge about trade credit: what are the relationships between determinants and trade credit within a firm.

This thesis is the first attempt to investigate the determinants of trade credit based on listed firms in the Netherlands. Most previous researches in this field are mostly based on United States and United Kingdom. There is no this kind research related to the Netherlands contributing to science. Therefore, this thesis will contribute to research related to the field of the determinants of trade credit in the future.

The process of writing a thesis is a great experience of growing up intellectually. From that, I have learned to be independent and critical on my own report and the way of analyzing questions.

Acknowledgements

First, I want mention that I would not have this opportunity to come to the Netherlands without financial support from my parents. I give my deepest gratitude to my family for their constant love, unconditional support and encouragement to pursue my interests. Second, I give my appreciation to the University of Twente for offering this study opportunity and its specific platform and scientific atmosphere.

Furthermore, my special gratitude is expressed to all the teachers of Department of Management and Governance who contributed towards my knowledge base. And for my thesis, I appreciate all the help from Prof. Dr. R. Kabir and Ir. Henk Kroon for their push and valuable encouragement, guidance and most important of believing in my capability.

During this period, my friends gave me their most valuable guidance on writing, analyzing skills and helped me to deal with difficulties in my life. I would like to thank all of them for helping me and enduring my boring complaints; also thank them for making my life colorful and giving me a memorable social life.

Abstract

This thesis investigates the determinants of trade credit relating to firm-specific characteristics based on listed firms in the Netherlands. There are 76 firms analyzed with 5-year observations from 2006-2010.

Trade credit is the separation between delivery of goods and services and their payments to suppliers (Brennan et al., 1988). Because of its specific nature of not belonging to bank sectors, trade credit is not controlled by authorities (Nieuwkerk, 1979); its measurement is defined as accounts receivable (belonging to current assets) and accounts payable (belonging to current liabilities) in this thesis. According to Petersen & Rajan (1997), the motives of using trade credit are classified into three categories: financial advantage theory, price discrimination theory (commercial motives), and transaction costs theory (operational motives).

The factors influencing the level of trade credit can be considered as macroeconomic and firm-specific factors. Demirguc-Kunt & Maksimovic (2001) explain that it is out of control of firms to improve macroeconomic factors. Therefore, only relationships between trade credit and factors relating to firms are investigated in this thesis.

From our analysis results, we observe that older firms grant less trade credit and resort more to trade credit. Smaller firms grant more credit to customers as a way of marketing strategy to increase sales and build long-term relationship with customers; larger firms resort more financing to suppliers as their good reputation and large economic scales. It is observed that firms with high capacity of generating internal cash, offer less trade credit to customers and borrow less from suppliers.

Firms with access to cheaper external financing, offer less credit to customers and resort less on financing from suppliers. With regard to sales growth and growth profit margin, firms offer more trade credit as a marketing strategy to increase sales as the costs of extra trade credit can be offset by high profit margin. The more short-term financing, the lower accounts receivable is in our analysis. Firms with higher turnover (low product quality), offer less trade credit as they are afraid of losing trade credit sales after product quality assessment.

While relating to accounts payable, firms with high growth resort less financing from suppliers, because they have capability of obtaining external financing including short-term financing debt and long-term debt. In our analysis, the more current assets, the less accounts payable. The result for variable purchase appear to support the theory that describes the level of accounts payable is positively influenced by the amount of purchase of materials.

Our conclusions are interesting and important for Dutch listed firms, as our results give a summary of determinants of trade credit and their relationship with trade credit. It is useful for firms to consider our results during the procedure of establishing trade credit policy. At the end, a few limitations about this thesis research are mentioned.

Table of content

1 Introduction

Businesses cannot live without capital; they need money to invest in plant, inventories, machinery and other assets. Brealey et al. (2008) explain that the sources of capital are classified into long-term financing and short-term financing. And trade credit belongs to short-term financing. The following sections will give explanation of trade credit.

1.1 Definition of trade credit

As stated by Brennan et al. (1988), apart from financial supports from financial institutions, the separation of payment and supply of goods and services can also be considered as a way of financial support. This form is referred to as vendor financing, which is also known as trade credit. Most firms try to delay their payments to suppliers to alleviate credit constraints in a short period. Therefore trade credit is considered as an important short-term external financing for firms, especially for small and medium-sized firms (Boyery & Gobert, 2007). Guariglia & Mateut (2006) state that trade credit is extended by firms during tight monetary period. In another words, firms with access limitation to bank credit or the cost of bank credit is high, they make use of trade credit.

Because of trade credit's specific nature of not belonging to bank sectors, trade credit is not controlled by authorities (Nieuwkerk, 1979); and it is represented in both sides of balance sheet as accounts receivable (belonging to current assets) and accounts payable (belonging to current liabilities). Therefore the measures of the level of trade credit in this thesis are accounts receivable and accounts payable (we emphasize this because trade credit is also defined as accounts payable only by some firms). It is stated that the use of trade credit is influenced by the development of a country's legal and financial system (Demirguc-Kunt & Maksimovic, 2001; Biais & Gollier, 1997; Frank & Maksimovic, 2004). Demirguc-Kunt & Maksimovic (2001) further state that in a country with imperfect financial system, firms can suffer financial access limitation easily; therefore, the source of funds needed is shifted to suppliers who are non-financial institutions. In this situation, trade credit acts as a substitution to credits from financial intermediaries. They also argue that in a well-developed legal infrastructure country, there is more legal protection for creditors against default by borrowers. As a result, a negative relationship is expected between the use of trade credit and the level of efficiency of legal system of a country.

1.2 Terms of trade credit

Ng et al. (1999) and Smith (1987) describe that there are two terms of trade credit: the first one is a simple net term, which only depicts the due date of full payment after delivery. For example, "net 30" means full payment is due with 30 days after the invoice date; the buyer is considered in default after 30 days. The second term is more complicated which consists of three basic elements: the discount rate on invoice, the discount period and the effective interest rate. It is normally represented as a term of 2/10 net 30 (Smith, 1987). This term indicates that there is a discount of 2% for payment realized within 10 days and the full amount is required for the rest of 20 days within the total 30 days. Ramey (1992) argues that most low liquidity firms realize payment longer than 30 days; however, this behavior results in a little loss of firms' reputation.

Moreover, Nadiri (1969) argues that when firms face high costs of bank credit, they probably take a step to reduce the level of trade credit, while not the terms of trade credit. Smith (1987) states the use of the second term of trade credit indicates a risk of lending to customers. Because a firm giving up discounts represents its financial difficulties otherwise the high interest will be taken. This is a signal of need for close monitoring from suppliers. Therefore, the use of two-part terms can be considered as an early signal of financial health of firms.

1.3 Costs & benefits of trade credit

Petersen & Rajan (1994, 1997) describe that trade credit is much more expensive compared with bank loans. In their research, the average interest cost of bank loans is 11.3%; while for trade credit, in order to encourage customers to realize their payment on time, a term of 2/10 net 30 is granted to customers frequently. As mentioned in section 1.2, this term indicates an interest saving of 2% of purchase for customers realizing payment within 10 days; otherwise full payment is required for the rest of 20 days. And measured by annual interest percentage, 2% discount equates to 44.6% annual rate[1].

Even though the high costs of trade credit, there are still many firms choosing it as their short-term financing. Schwartz (1974) presents that trade credit makes transactions between suppliers and customers easier and more efficient in the way of reducing the uncertainty of deliveries and simplifying cash management.

Petersen & Rajan (1994, 1997) also try to explain the reasons of why firms would take trade credit rather than alternatives with cheaper costs. They argue that trade credit is mostly

[1] The interest rate is 2%/98% for period of 20 days, therefore the annual rate is $(1+2/98)^{365/20}$ -1=44.6%.

used by firms who cannot easily get financial support from traditional channels even it costs more than bank credit; trade credit is more granted during tight monetary period, as the risk for suppliers to grant trade credit is less compared with bank credit issuance. Furthermore, there are several financial advantages for suppliers: first, they can evaluate financial performance of customers and their creditworthiness easily from business relationship, as well as assessing the default of customers promptly and efficiently (Ono, 2001). They have the power of controlling repayment of customers by reducing supply of goods and repossess goods in case of nonpayment. Second, the separation of goods delivery and payment can reduce the costs of transaction as well as providing guarantee for product quality. Third, a price discrimination theory is mentioned by Petersen & Rajan (1994, 1997). They argue that suppliers normally provide discount for customers who had early payment, like the term of 2/10 net 30; therefore, the prices are different for early payment and late payment customers; these theories are supported by many literature (Garcia-Teruel & Martinez-Solano, 2010a; Atanasova, 2007; Guariglia & Mateut, 2006; Cunningham, 2004; Delannay & Weill, 2004; Deloof & Jegers, 1996).

To summarize advantages of trade credit, from the supply side, Wilson & Summers (2002) argue trade credit is an important marketing tool, as trade credit can help suppliers to obtain new businesses and build good customer relationships, especially for new entrants in market who do not have many relations. New entrants grant trade credit to appeal potential customers who probably have access difficulties to banks or short-term shortage of cashes. From the side of buyers, Schwartz (1974) discusses that trade credit makes buyers have enough time to prepare payment for unplanned purchase. Meanwhile, buyers can estimate future purchase according to trade credit amount and simplify their cash management by taking periodic credit payment.

1.4 Objectives of this study

Because of the essential role of trade credit to firms, and its advantages compared with other financing alternatives, factors influencing trade credit are needed to be investigated by researchers. Petersen & Rajan (1997) and Emery (1984) also suggest that more research is needed to examine the relationships between determinants and trade credit over time. Based on the most recent research of Garcia-Teruel & Martinez-Solano (2010a), they suggest some factors for trade credit: first, firm's capacity to get external financial support and its ability to generate internal resources are positively related with trade credit provision; second, firm's creditworthiness can determine how much trade credit a firm will offer; third, the cost of finance and firm's growth are also reasons for granting trade credit. These research results are consistent with each other (Niskanen & Niskanen, 2006; Delannay & Weill, 2004; Garcia-Teruel & Martinez-Solano, 2010b).

Previous research is mostly based on small and medium sized firms which normally do not have access to capital market and often get financing problems (Garcia-Teruel & Martinez-Solano, 2007; Garcia-Teruel & Martinez-Solano, 2010b; Petersen & Rajan, 1997; Huyghebaert, 2006). Also, Demirguc-Kunt & Maksimovic (2001) state that development institutions have concentrated on credit provision by banks and other financial intermediaries to small and medium sized firms, the investigation to the role played by listed firms (here listed firms are considered as large firms.) is necessary during the process of credit provision to small and medium sized firms. Therefore it will be interesting to investigate the relationships between trade credit and firm–specific characteristics of listed firms.

In addition, most previous researches are based on USA (Petersen & Rajan, 1994; Petersen & Rajan, 1997) and UK (Garcia-Teruel & Martinez-Solano, 2010b; Wilson & Summers, 2002). Only a few are based on Europe (Garcia-Teruel & Martinez-Solano, 2010a; Delannay & Weill, 2004; Huyghebaert, 2006) and Asia (Ono, 2001). Because the financial environments are different from each other, financial systems of US and UK are market oriented (De Bondt, 1998) and most European countries are bank oriented, the research results are not consistent with each other. Niskanen & Niskanen (2006) have summarized a few advantages of bank oriented system over market oriented system. A closer monitoring of borrower's performance is the first advantage for banks in bank oriented system; the second advantage is that most banks probably possess certain amount of shares in large corporations, therefore, influencing the decision of the level of credit. This is the case for Germany. However, there is a difference between Germany and the Netherlands. In the Netherlands, banks normally do not possess shares of corporations; instead, insurance companies take shares of them. This phenomenon indicates that countries even have similar social systems, their influence on financial structures of firms are different.

As discussed by Biais and Gollier (1997), Frank & Maksimovic (2004) and Demirguc-Kunt & Maksimovic (2001), in a country with a well-developed financial market, firms would like to resort external financing from financial intermediaries, as financial intermediaries can monitor borrowers easily. While they further explain that in some countries, it is more efficient for suppliers to monitor the borrowers and they have more power to enforce borrowers to realize payments; in that case, it is preferred by financial intermediaries to lend money to suppliers who can in turn relend to buying firms. Relating to the development of a country's legal infrastructure, the authors argue in a well-developed legal infrastructure country, there is more legal protection for creditors against default by borrowers.

Petersen & Rajan (1997) investigate research based on the data of American firms. They state that there are positive relationships between the level of trade credit and firm age and sales growth. The authors further explain older firms have more ability to offer trade credit

and high sales growth firm grant more trade credit to achieve its high sale aim. However, the research of Garcia-Teruel & Martinez-Solano (2010a) based on European data obtains contradictory results. They state older firms have more reputation among business partners, there is no need to grant trade credit to attract business partners; this is also the reason for the opposite results of the relationship between sales growth and trade credit. Even in the same research of Garcia-Teruel & Martinez-Solano (2010a) investigating in different European countries, different results are found by authors because of different financing systems, economic situations and firm-specific factors. Realizing that theories researched in other countries cannot give explanation on relationship of trade credit and firm-specific characteristics in the Netherlands. Therefore, this thesis is investigated based on firms of the Netherlands.

The purpose of this thesis is to find the relationships between determinants and trade credit in the Netherlands by analyzing the coefficients of determinants with trade credit, specifically focusing on listed companies. Understanding the relationship between trade credit and firm's characteristics can give a firm's financial summary on one hand; on the other hand, firms can utilize trade credit more efficiently.

The research question of this thesis is:

What are the relationships between determinants and trade credit for Dutch listed firms?

The reminder of this thesis is organized as follows: Chapter 2 provides a literature overview of trade credit. Chapter 3 gives hypotheses about trade credit relating to firm-specific factors. Chapter 4 presents research methods chosen in previous literatures and the one selected in this research. Chapter 5 describes data information including sample and variables applied in this thesis. Finally, results and conclusions will be given and explained, and limitations of this thesis will be mentioned at the end.

2 Literature review

This chapter first gives explanation on the importance of trade credit. Its financial intermediary role, easy access and information asymmetry advantage between suppliers and customers make trade credit as a popular alternative to bank credit. Second, the aspects influencing trade credit use is described. Relationships between suppliers and customers, relationships between banks and customers, monetary policy and savings in monitoring costs are all influencing trade credit usage and its level. Third, the most discussed topic in literatures, the motives of using trade credit. The most important three motivation theories include financial advantage theory, price discrimination theory and transaction costs theory. Finally, the relationships between determinants and trade credit discussed in previous researches are demonstrated, including macroeconomic and firm-specific factors.

2.1 The role of trade credit

A question examined in literature is: why trade credit is used by firms even in the case of existence of financial intermediaries. Jain (2001) has answered this question by suggesting that trade creditor plays a role as the second layer between financial intermediaries (here mainly banks) and borrowers. Because both suppliers and banks need information to evaluate the creditworthiness of customers and their default risks, and suppliers have easier and cheaper channels to obtain financial information of customers compared with banks. As a result, in an industry with many customers, banks prefer to lend money to suppliers instead of customers to save evaluating costs. Frank & Maksimovic (2004) also indicate this special second layer role is helpful for both suppliers and buyers to reduce their needs for external finance, especially in inefficient financial market and market where suppliers have more power.

Moreover, the research results of Alphonse et al. (2003) confirm an assumption, which states that an increase in bank debt lowers the level of trade credit of a firm. As explained by the authors, firms with credit constrained and access limitation to bank credit, may use trade credit. Schwartz (1974) emphasizes the effect of monetary control is mitigated by trade credit. During monetary restriction period, firms with access to other financing resources are willing to offer trade credit to customers; those customers are likely to use trade credit provided because bank interest is higher than trade credit costs.

Rodriguez-Rodriguez (2006) emphasizes information asymmetry problems between firms and financial institutions. The author argues that suppliers have information advantages compared with banks, in aspects of assessing a firm's financial performance and reselling products in case of non-payment. Therefore, trade credit is considered as a method to mitigate

information asymmetry problems, because the level of trade credit is a signal of firm's creditworthiness for banks. On the other hand, the quality of product can be indicated by the amount of trade credit to buyers, which results in information asymmetry reduction between suppliers and buyers (Burkart & Ellingsen, 2004).

Fisman & Love (2003) believe that firms depending on trade credit grow faster than those without access to trade credit. Wilson & Summers (2002) also find that trade credit is particularly used by fast growing but with financial problem firms.

Ng et al. (1999) and Wilson & Summers (2002) state two-part terms of trade credit can indicate problems of firm's financial situation in advance, and credit terms offered by suppliers can help buyers to mitigate financial difficulties temporarily. Therefore, those authors argue that even though trade credit is a short-term financing method, it is considered as part of long-term strategy by suppliers to maintain customer relationship.

2.2 The use of trade credit

From the view of Burkart & Ellingsen (2004), suppliers are critical players in trade credit financing. Supported by Petersen & Rajan (1994), they emphasize that the relationships between suppliers and customers have impact on the level of trade credit. Nilsen also (2002) states that trade credit is determined at the time around the sale of goods both by suppliers and customers, and influenced by the relationship between them. Moreover, suppliers provide trade credit with attractive discount so that they can receive payment as early as possible.

Petersen & Rajan (1994, 1997) find that small firms in the United States, those do not have strong relationships with banks and other financing institutions, possess higher amount of accounts payable. They imply that trade credit is the last choice of financing for constrained firms. Wilner (2000) also investigates the relationship between suppliers and customers, and he suggests that large customers with suppliers depending on them, taking more trade credit compared with bank credit when they face financial constraints.

Furthermore, Nilsen (2002) argue that the use of trade credit is related to monetary policy. In his view, trade credit is a substitution to bank credit even it is not the best choice. It is supported in his research that small firms resort more trade credit during monetary constrains, as trade credit is the only alternative for them to raise money; also, the author predicts that large firms with more channels of getting financing supports will avoid trade credit, however, the results of research are opposite to this prediction, the amount of trade credit of large firms also increase during tight monetary period, even greater than small firms'.

Nilsen (2002) states that most firms try to avoid trade credit as its high costs compared with bank credit. Only in situation of financial constraints and no alternative financial credit available, firms resort trade credit from suppliers. Because the terms and interests of trade credit keep constant over time, in the case of monetary constraints, bank credit cost is probably higher than trade credit cost. Therefore, firms will shift their financial sources to trade credit.

As discussed previously, both suppliers and banks need to collect information of firms to evaluate their risk bearings and monitor borrower's financial performance. The monitoring costs incurred are various. Jain (2001) indicates that the use of trade credit is related to monitoring costs. First, Jain (2001) discusses that an industry with perfect information access to sellers will lead banks to provide finance through suppliers. This is profitable for banks to save monitoring costs from buyers compared with lending to buyers directly; however, in market with few buyers, banks lend funds directly to buyers because the monitoring cost saving is not attractive to them. Second, Jain (2001) points out that trade credit is extended in industries with higher bankruptcy costs and industries with fixed monitoring costs. Generally speaking, the research results of Jain (2001) demonstrate the use of trade credit is depending on the savings in monitoring costs.

All those aspects aforementioned in this part are summarized in table 2.1.

Table 2.1 Aspects influencing trade credit usage

Literatures	Aspects influencing trade credit usage
Burkart & Ellingsen (2004), Petersen & Rajan (1994), Nilsen (2002)	Relationships between suppliers and customers
Petersen & Rajan (1994, 1997) Wilner (2000)	Relationships between customers and banks and other financing institutions
Nilsen (2002)	Monetary policy
Jain (2001)	Savings in monitoring customer costs for banks

2.3 Motivation of trade credit

Several theories are discussed to explain why suppliers are willing to offer credit to buyers, and why buyers would like to use the expensive form of trade credit. Frank & Maksimovic (2004) explain the motivation of trade credit concentrates on two aspects: the first facet is related to real operations. It indicates the motives of using trade credit, and it includes the

theory of transaction minimization, price discrimination and quality guarantees; the second facet is about financial function of trade credit. The authors believe suppliers would like to provide trade credit to their buyers those are constrained in finance, so that they could keep long-term relationships with them. Emery (1984) states in a not well-developed financial market, suppliers need reserves in liquidity in order to extend trade credit to make profits. In addition, in a market with less competition, suppliers have strong market power; they are attempting to sell goods as much as they can, especially in the case with higher profit margin. Therefore, they extend trade credit as a marketing strategy to their buyers.

Fisman & Love (2003) argue that the use of trade credit is related to industry's characteristics. They have outlined trade credit provision into four categories based on industry characteristics of the United States: the liquidation of industry, price discrimination, guarantee for product quality and customized products. While from another research of Biais & Gollier (1997), firms depending on trade credit indicate that they possess enough creditworthiness from suppliers, and they are trusted by them. Therefore, outside investors can take this as a signal to provide finance to buyers.

Based on theory of Cheng & Pike (2003), there are big differences in motivations of using trade credit between firms. In between, most firms take trade credit as an opportunity to improve its corporate image and build strong relationship with customers. Moreover, trade credit is considered as a tool to achieve higher sales in researches of Shiraishi & Yano (2010), Ng et al. (1999) and Petersen & Rajan (1997). Nilsen (2002) argues some customers rely on trade credit even they can easily obtain bank credit with reasonable costs, because they do not want to depend too much on banks. Meanwhile, they would like to have the same growth of accounts payable and accounts receivable to keep balance sheet equal. To be summarized, suppliers make use of trade credit to establish customer loyalty (Ng et al., 1999) and customers can also get attractive benefits from trade debt.

Several empirical researches have indicated more motives for using trade credit. According to Garcia-Teruel & Martinez-Solano (2007), for firms operated in a bank-dominated financial system, firms have very few options for external financing. Therefore, they rely more on short-term finance and especially on trade credit; the research of Schwartz (1974) indicates that suppliers with access to financial market can offer more trade credit and make profits on customers who have limited access to other external financing; moreover, Deloof & Jegers (1996) have done research based on product quality theory, which indicates trade credit can allow buyers have time to evaluate product quality before paying, and the theory is partly confirmed by their research results; more importantly, Cunat (2007) discusses that for certain industry fields, it is very expensive to change suppliers and customers. Therefore, customers incline to pay their trade debt and suppliers also would like to extend trade credit to customers

who experience liquidity problems; firms with access to capital market would help those without capital market access by extending trade credit (Kohler et al. 2000).

To summarize previous theories, the most prevalent motives are classified by Petersen & Rajan (1997) into three categories which are shown in figure 2.1: financial advantage theory, price discrimination theory (commercial motives), and transaction costs theory (operational motives).

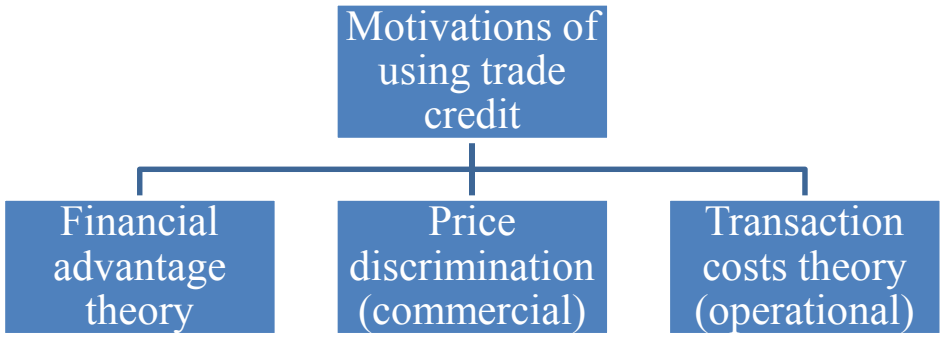

Figure 2.1 Classification of motivations of using trade credit

2.3.1 Financial advantage theory

Petersen & Rajan (1997) and Huyghebaert (2006) prove that firms with external financing limitations prefer to resort to trade credit, which means firms with high financial constraints use more trade credit. Several studies (Petersen & Rajan, 1997; Kohler et al. 2000; Garcia-Teruel & Martinez-Solano, 2010a; Emery, 1984; Demirguc-Kunt & Maksimovic, 2001) demonstrate that suppliers have some advantages on providing trade credit compared with other financing institutions.

These advantages are represented in three aspects. First, suppliers can easily evaluate buyer's financial performance and its creditworthiness through their business (Petersen & Rajan, 1997; Garcia-Teruel & Martinez-Solano, 2010a). Therefore they have less risk for granting trade credit compared with bank credit. Second, suppliers have more power to enforce repayment by threaten buyers to reduce its future supply of goods and services, especially in market of less competition, because buyers will depend significantly on the limited suppliers. In contrast, financial institutions may be restricted by bankruptcy law when draw back its past financial lending (Emery, 1984; Demirguc-Kunt & Maksimovic, 2001). This advantage allows suppliers to provide more trade credit beyond the amount that banks are willing to offer (Cunat, 2007). Third, there is another advantage for suppliers in certain

industries, they can repossess goods easily in case buyers cannot realize payment, and those goods can be resold to other customers. Summarized by Garcia-Teruel & Martinez-Solano (2010a), whether to offer trade credit, will depend on the creditworthiness of buyers, and their ability to get other less cost external financing. It is assumed that firms with access to capital markets will extend more trade credit to those who do not.

However, there are some theories contradicted to the financial advantages of suppliers aforementioned. First, argued by Burkart & Ellingsen (2004), there are two main shortcomings of monitoring advantages of suppliers. The first shortcoming is that they believe banks are more specialized in assessing the creditworthiness of borrowers compared with suppliers, and why banks cannot obtain enough information about financial situation of borrowers. The second shortcoming is that if suppliers have more financial information about borrowers, why they do not lend cash to them directly instead only granting the value of inputs as trade credit.

Second, in the view of Frank & Maksimovic (2004), in the default situation of borrowers, sellers can only repossess and resell their goods if the goods are not processed to finished goods, otherwise, it is not allowed to do like that way. This means that the collateral advantage of suppliers is diminished. Fisman & Love (2003) emphasize that the process of reselling goods is related to the characteristics of inputs, such as depreciation and firm-specificity. Therefore, the implications of Burkart & Ellingsen's (2004) research indicate that industries requiring many raw materials can easily get and hold large amount of trade credit.

Third, Nilsen (2002) suggests that trade credit is a poor alternative for bank credit. The first reason is that trade credit is only applied to inputs of borrowers, while bank credit is not restricted. And more importantly, Emery (1984) argues that trade credit is normally only granted to borrowers who have regular contracts with them; also, trade credit is typically granted within 30 days for full payment, which is much shorter than bank loans; finally, borrowers who cannot realize trade credit payment on time or pay back quite late are facing punishment from suppliers and even damaging their relationships which probably need long time to rebuild.

2.3.2 Price discrimination theory

Ng et al. (1999) find evidence supporting that supplier can extend trade credit period or offer unearned discount rate to buyers with long-term relationships. This is in line with price discrimination theory. The research results of Petersen & Rajan (1997) are also consistent with this theory. Brennan et al. (1988) emphasize that firms with strong market power offer

more trade credit. Such firms operating with high profit margin have incentive to achieve high sales without reducing price to buyers. As a result, they offer the same credit terms to all buyers. However, Brennan et al. (1988) further explain that those buyers with access to other cheaper financing sources realize payment before discount date to obtain discount savings. The buyers without access to other sources are also likely to pay on due date to avoid expensive interest costs.

Wilson & Summers (2002) state credit terms provided determine the effective price of products. Brennan et al. (1988) also discuss that extending payment period and giving discount for immediate payment are methods of reducing price for customers. However, Fisman & Love (2003) explain that trade credit can only be used as price discrimination in the following situations: first, the flexibility of demanding from credit customers is lower than cash customers. Low flexibility indicates constant demand therefore stable supplier and customer relationship; second, information asymmetry exists in the credit market. In the case of information inefficiency of customers about product, suppliers extend trade credit to increase sales; third, trade credit is used to compete with other competitors in the same industry. Petersen & Rajan (1997) demonstrate that firms with higher profit margin would like to grant more trade credit as they rely significantly on trade credit to achieve higher continuous sales. Consequently, it is expected that firms with higher profit margins would like to grant more trade credit.

Another argument is that trade credit in certain degree ascertain product quality in the way of allowing customers to have time to evaluate (Garcia-Teruel & Martinez-Solano, 2010a; Smith, 1987). The authors discuss that firms with products which need more time to evaluate prolong payment period for their customers. Therefore, it is predicted firms with high product quality offer longer trade credit period to customers to confirm with quality, this is especially the case for new entrants to a market.

2.3.3 Transaction costs theory

Transaction costs theory is considered as an operational motive which is mentioned by Emery (1984) and Frank & Maksimovic (2004). There are two basic transaction costs theories. First, Kohler et al. (2000) state that the nature of trade credit of separation of delivery of goods and payments can reduce the costs of administration expenses both for customers and suppliers in comparison of payment of each delivery. Schwartz (1974) further explains that customers with trade credit have enough time to prepare payment in case of cash shortage and unexpected purchase. In this way, they can summarize future cash outflows with higher certainty and improve cash management. Second, firms with sales seasonality face two large costs: warehousing costs and financing costs of inventory. According to theory of Bougheas

et al. (2009), inventory may not be sold for cash in the next period and loosing trade credit level can save inventory costs for suppliers by stimulating sales during low demand period. It is also expected that for firms with high sales growth, will resort more on trade credit to invest in inventory.

Furthermore, Emery (1984) argues that this operational motive only exists when demands from customers are not constant. Because of uncertainty and seasonality, demands of product is not regular, suppliers have to respond properly to demand fluctuations by changing price and the level of production. This will lead extra costs to both suppliers and customers. A better alternative is to offer trade credit. As trade credit allows more flexibility in operations. Wilson & Summers (2002) state the purpose of trade credit provision is not to make profit for suppliers but for pursuing a return on the combination of goods and finance, and long-term relationship with customers.

Fisman & Love (2003) categorize four types motives of using trade credit based on previous literatures. In addition to the aforementioned theories, they emphasize that the liquidation of buyer firms and customized products also influence the provision of trade credit by suppliers. They state that the easier of a buyer to be liquidated, the higher probability of trade credit granted to the buyer, as it is easier for supplier to resell goods in case of buyer default. This is consistent with part of financial advantage theory. However, customized product is a new theory for researchers. Fisman & Love (2003) suggest that the relationship between suppliers and customers built during the processes of tailoring products can last longer. Thus, suppliers would like to offer more trade credit because of their specialty to customers. Furthermore, trade credit is considered more flexible than bank loans (Danielson & Scott, 2004), because of its fluctuation with business activities. Danielson & Scott (2004) also believe that a temporary delay in trade credit payment is less expensive compared with bank loans delay.

Relating to those theories of trade credit motivation, there are some shortcomings apart from merits for firms. Burkart & Ellingsen (2004) argue in a competitive market, price discrimination theory is not applied. As in that case, trade credit is mainly used as a marketing tool for increasing sales. Moreover, the advantage for suppliers to repossess and resell goods is not applicable in service industry; product quality theory is useless in homogeneous market.

2.4 Determinants of trade credit

According to research results investigated previously, many factors are considered to be related to trade credit (Nilsen, 2002; Niskanen & Niskanen, 2006; Demirguc-Kunt & Maksimovic, 2001; Garcia-Teruel & Martinez-Solano, 2010b; Huyghebaert, 2006; Petersen & Rajan, 1997). Some of those factors are related to economy development of a country, such as GDP, market interest rate and monetary policy; financial systems and legal structures are also considered as factors influencing trade credit. All these factors belong to macroeconomic factors which are not controlled by firms (Demirguc-Kunt & Maksimovic, 2001). Continued with that, the focus of this thesis, the firm-specific factors are discussed.

2.4.1 Macroeconomic factors

From macroeconomic perspective, trade credit is influenced by monetary policy, development of financing systems, and legal infrastructure of a country. Nilsen (2002) demonstrates that small and medium sized firms rely more on trade credit during tight monetary policy as they easily face financial problems during that period. Niskanen & Niskanen (2006) state a theory that there is a positive relationship between market interest rate and accounts receivable. Because of the higher market interest, there is more probability of trade credit taken as an alternative. In fact, their findings do not support this theory.

Meanwhile, Demirguc-Kunt & Maksimovic (2001) state that in a country with well-developed financial market, financial intermediaries can monitor borrowers easily, so it is convenient for firms to get funds from financial intermediaries. However, in a country with imperfect financial systems, firms can suffer financial access limitation easily. Therefore, the source of funds is shifted to suppliers who are non-financial institutions. They also argue that in a well-developed legal infrastructure country, there is more legal protection for creditors against borrowers default. As a result, it is expected a negative relation between trade credit utilization and the level of efficiency of legal system of a country.

Huyghebaert (2006) and Garcia-Teruel & Martinez-Solano (2010b) demonstrate that a decrease in macroeconomic results in firms to increase accounts payable as firm's ability of obtaining bank credit is limited, and their ability of generating internal cash is also reduced. Contrary to this theory, Niskanen & Niskanen (2006) justify that accounts payable is still increased during high developed macroeconomic situation. The explanation is that more investment opportunities are available during that period, therefore, firms resort more trade credit to support their operations. The mostly used proxy of macroeconomic is the growth of gross domestic product (GDP). However, this thesis is only based on the Netherlands, it is not necessary to consider the impact of GDP.

Demirguc-Kunt & Maksimovic (2001) further explain that it is out of control of firms to improve macroeconomic factors. As a result, those factors are not considered in this thesis. Another two determinants are ignored in this thesis is the monitoring costs of banks to its borrowers and its bankruptcy costs. Because as argued by Jain (2001), higher bankruptcy and monitoring costs lead banks to reject the borrowing request from borrowers, and it is more attractive for banks to lend money to suppliers with lower costs. Those costs cannot be controlled by firms neither and abandoned in this thesis.

Fisman & Love (2003) and Ng et al. (1999) demonstrate that the use of trade credit is differed across industries, while with little diversification within industries. Because some industries without tangible inventories do not need trade credit, such as technology service companies and restaurants, it is totally different from industries with tangible inventories (Niskanen & Niskanen, 2006). Jain (2001) states that in industries with many sellers, trade credit is not used often, as the savings of monitoring cost for banks are not attractive and banks would like to lend money to buyers directly. While in industries with higher bankruptcy costs and industries with fixed monitoring costs, trade credit is the mostly used.

Smith (1987) indicates that within the same industry, the terms of trade credit keep constant as both suppliers and customers face the same market conditions. Trade credit provision is therefore the same for buyers within the same industry. As a result of previous discussion, a research is needed to investigate the determinants of trade credit to understand the relationships between trade credit provision and firm-specific characteristics. Industry is defined as a dummy variable in this thesis because of its determinative role in influencing the level of trade credit and it has been chosen as dummy variables in most researches (Huyghebaert, 2006; Delannay & Weill, 2004).

2.4.2 Firm-specific factors

Wilson & Summers (2002) state the two-way nature of trade credit, indicating that companies use trade credit as receivers as well as suppliers. This is in line with theory of Petersen & Rajan (1997; see figure 2.2). Therefore, trade credit is measured both by accounts receivable and accounts payable, the following discussion are given based on accounts receivable and accounts payable separately.

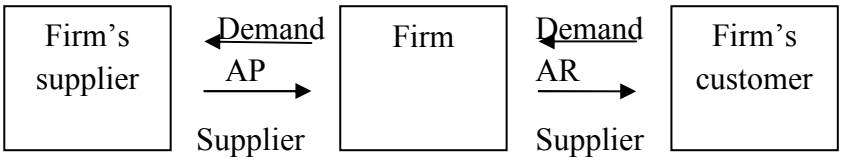

Figure 2.2 The trade credit relationships[2]

From figure 2.2, it is clear that the level of trade credit is not only decided by customers but also suppliers. On one hand, the level of accounts receivable depends on a firm's ability to extend as well as how much its willingness to provide to its customers; on the other hand, the accounts receivable is also determined by the demand of customers, their willingness of resort on trade credit.

According to Petersen & Rajan (1997), Garcia-Teruel & Martinez-Solano (2010a) and Wilson & Summers (2002), a couple of firm characteristics are suggested as determinants of trade credit. The first factor is firm's creditworthiness, which indicates a firm's credit capacity and reputation, as well as its ability of obtaining alternative finance. Creditworthiness is measured by firm age and size in this thesis. Because Schwartz (1974) states that old and large firms have better credit reputation to pay their obligations as their long-term history and large economic scales. Moreover, Petersen & Rajan (1997) also believe that large and old firms issue more trade credit to their customers, as they have better access to bank credit, compared with small and young firms; even small firms have access to financial funds, they can neither offer much trade credit because of their economies of scale. This is consistent with the research results of Ng et al. (1999) and Danielson & Scott (2004). They demonstrate that large firms can achieve trade credit requirements easily.

The second factor is the ability of internal cash generation. It is defined as how much profit a firm can generate by itself during a period. It is measured by net profit plus depreciation over sales (Garcia-Teruel & Martinez-Solano, 2010a). It is expected a negative relationship between internal cash generation and accounts payable while positive with accounts receivable. Because firms with great internal cash need less on external finance therefore less accounts payable; those firms also have ability to extend more accounts receivable to customers.

[2] Source: Petersen & Rajan (1997, p668).

The third factor is availability of obtaining financial debt, measuring the capacity of a firm to access to external financing. This factor can be interpreted in much the same way as the first factor of creditworthiness. Namely, a firm with access to financial debt resort less on trade credit and has ability to extend more credit to customers.

The fourth determinant is cost of financial debt. It is defined as the cost of finance divided by total liability minus accounts payable (Garcia-Teruel & Martinez-Solano, 2010a). High financial costs lead firms to have less incentive to offer trade credit while more incentive to resort on credit from suppliers. Nilsen (2002) further argues that during monetary tight period, the cost of bank loans could be higher than trade credit; the level of trade credit can be increased because of this.

The fifth factor is relating to sales growth. The definition of sales growth is calculated by the current year sales minus previous year and divided by previous year sales. Petersen & Rajan (1997) suggest firms who would like to achieve high sales, accept more trade credit transactions, indicating a positive association between sales growth and account receivable. Emery (1984) demonstrates a firm with low sales, can grant more trade credit as a marketing tool to increase sales. Wilson & Summers (2002) find that trade credit is particularly used by fast growing firms.

The last factor is gross profit margin. It is measured as the gross profit over sales. This factor is used to test the influence of a firm with high profit margin on the level of trade credit. Emery (1984) finds that firms with high gross profit margin attempt to achieve high sales by granting more trade credit. This can be interpreted in the same way with the fifth factor.

2.4.3 Determinants of accounts receivable

The following table 2.2 summarizes both theoretical predictions and empirical results for relationship between each determinant and accounts receivable.

Table 2.2 Relationship between determinants and accounts receivable

Determinants of firms		Theoretical predictions[3]	Empirical results
Creditworthiness	Age	(+) Niskanen & Niskanen (2006) Petersen & Rajan (1997)	(+) Petersen & Rajan (1997) (+) Niskanen & Niskanen (2006) (Not significant) Garcia-Teruel & Martinez-Solano (2010a)
	Size	(+) Petersen & Rajan (1997) Garcia-Teruel & Martinez-Solano (2010a)	(+) Petersen & Rajan (1997) (+) Garcia-Teruel & Martinez-Solano (2010a) (+) Bougheas et al. (2009)
Internal cash generation		(+) Garcia-Teruel & Martinez-Solano (2010a) Niskanen & Niskanen (2006)	(+) Garcia-Teruel & Martinez-Solano (2010a) (Not significant) Niskanen & Niskanen (2006)
Financial debt		(+) Petersen & Rajan (1997)	(+) Petersen & Rajan (1997)
Cost of financial debt		(-) Petersen & Rajan (1997)	(-) Petersen & Rajan (1997)
Sales growth		(+) Petersen & Rajan (1997) Garcia-Teruel & Martinez-Solano (2010a)	(+) Petersen & Rajan (1997) (-) Garcia-Teruel & Martinez-Solano (2010a)
Turnover		(-) Garcia-Teruel & Martinez-Solano, (2010a)	(+) Garcia-Teruel & Martinez-Solano, (2010a)
Gross profit margin		(+) Petersen & Rajan (1997) Garcia-Teruel & Martinez-Solano (2010a)	(+) Petersen & Rajan (1997) (+) Garcia-Teruel & Martinez-Solano (2010a)

[3] "+" represents positive relation and "-" represents negative relation.

From this table, firm age and size represent the creditworthiness of a firm. It is explained that the age of a firm indicates that they have survived for a long time and large firms have ability to obtain external financing from financial institutions. Therefore, both old and large firms provide more trade credit to their customers, meaning that there are positive relationships between firm's age and size and accounts receivable. This is demonstrated by research results investigated by Petersen & Rajan (1997), Garcia-Teruel & Martinez-Solano (2010a), Bougheas et al. (2009) and Niskanen & Niskanen (2006). The only difference is that Garcia-Teruel & Martinez-Solano (2010a) find the relationship between firm age and accounts receivable is not significant for some countries of their sample. The reason is probably because that this research is based on European countries, and the rest is based on America. The different financial situations and systems can influence the analysis results.

Theoretical prediction on internal financing generation expects a positive relationship with accounts receivable. As can be seen from table 2.2, the research findings of Garcia-Teruel & Martinez-Solano (2010a) and Niskanen & Niskanen (2006) are in line with theoretical prediction. However, the result of Niskanen & Niskanen (2006) is not significant. In their research, Niskanen & Niskanen (2006) first define the measure of internal cash generation as the ratio of net profit and sales, and further divide net profit into profit and loss to recheck, the result still keeps the same. Therefore, the determinant role of this variable is still disputed and it is expected to obtain explicit evidences on this factor in this thesis.

From theoretical perspective, it is expected a positive relationship for financial debt and negative relation for financial cost with accounts receivable. Because Petersen & Rajan (1997) state that firms with higher financial debt have ability to grant more trade credit to help their customers; and firms facing high financial costs reduce the amount of financial debt borrowed.

Another factor discussed is sales growth. In theory of Niskanen & Niskanen (2006), firms pursuing high growth offer more trade credit and longer due periods over competitors; moreover, in order to increase sales, firms facing sales inadequate take the strategy of granting more trade credit to customers. Petersen & Rajan (1997) discuss whatever sales growth is positive or negative, there is a positive relationship with accounts receivable. However, Garcia-Teruel & Martinez-Solano (2010a) find a negative relationship for positive sales growth and accounts receivable, indicating firms with high sales growth grant less trade credit. While for negative sales growth, it keeps the same positive association with accounts receivable.

As far as the determinant turnover is concerned, Garcia-Teruel & Martinez-Solano (2010a) argue that the turnover of sales over assets deducting accounts receivable is negatively related to accounts receivable. This is because firms would like to grant more trade credit to transmit the information of their high product quality. It is explained that lower turnover indicates higher product quality and long production cycle. Firms with high quality products offer more trade credit to allow customers to evaluate their product quality.

There is one factor mostly mentioned in literature is gross profit margin. The findings of Petersen & Rajan (1997) and Garcia-Teruel & Martinez-Solano (2010a) support the theory of more trade credit is offered to customers when suppliers have high profit margin. They explain that higher profit makes suppliers easier to accept lower earnings or even loss on credit terms they provide.

Niskanen & Niskanen (2006) and Petersen & Rajan (1997) summarize that the level of accounts receivable is not only determined by financial situation of suppliers, but also the demand from customers. While they also discuss that it is hard to measure the demand amount, as those customers have different demands for trade credit. In addition, the relationship between firms and banks and the location of firms are also considered to influence the amount of accounts receivable. It is clear that good relationship with banks allow firms to have easier access to bank credit, therefore, probably granting more trade credit to customers; on the other hand, firms located in rural area have difficulty in obtaining bank credit, and less trade credit is granted as a result. However, these are not considered in this thesis, as the focus of this research is only on the firm specific characteristics.

2.4.4 Determinants of accounts payable

The following table 2.3 summarizes both theoretical predictions and empirical results for relationship between each determinant and accounts payable.

Table 2.3 Relationship between determinants and accounts payable

Determinants of firms		**Theoretical predictions**	**Empirical results**
Creditworthiness	Age	(-) Petersen & Rajan (1997) Niskanen & Niskanen (2006)	(+) Petersen & Rajan (1997) (+) Garcia-Teruel & Martinez-Solano (2010a) (-) Niskanen & Niskanen (2006) (-) Rodriguez-Rodriguez (2006)
	Size	(+) Petersen & Rajan (1997) Garcia-Teruel & Martinez-Solano (2010a) Rodriguez-Rodriguez (2006)	(+) Petersen & Rajan (1997) (+) Garcia-Teruel & Martinez-Solano (2010a) (+) Niskanen & Niskanen (2006) (-) Rodriguez-Rodriguez (2006) (+) Bougheas et al. (2009)
Internal cash generation		(-) Garcia-Teruel & Martinez-Solano (2010a)	(-) Garcia-Teruel & Martinez-Solano (2010a) (-) Atanasova (2007). (-) Niskanen & Niskanen (2006)
Financial debt		(-) Petersen & Rajan (1997) Rodriguez-Rodriguez (2006)	(-) Petersen & Rajan (1997) (-) Rodriguez-Rodriguez (2006) (-)Niskanen & Niskanen (2006) (-) Demirguc-Kunt & Maksimovic (2001)
Cost of financial debt		(+) Garcia-Teruel & Martinez-Solano (2010a) Rodriguez-Rodriguez (2006)	(+) Garcia-Teruel & Martinez-Solano (2010a) (+) Rodriguez-Rodriguez (2006) (+) Niskanen & Niskanen (2006)
Sales growth		(+) Garcia-Teruel & Martinez-Solano (2010a)	(+) Petersen & Rajan (1997) (+) Garcia-Teruel & Martinez-Solano (2010a) (No relation) Niskanen & Niskanen (2006)
Current assets ratio		(+) Alphonse et al. (2003)	(+) Alphonse et al. (2003)
Purchase		(+)Niskanen & Niskanen (2006)	(+)Niskanen & Niskanen (2006)

The first determinant considered for accounts payable is firm age, Rodriguez-Rodriguez (2006) argues younger firms need more trade credit because of its short-time relationship with financial institutions. However, other researchers find positive relation for firm's age and accounts payable (Petersen & Rajan, 1997; Garcia-Teruel & Martinez-Solano 2010a). Because older firms have better reputation compared with younger ones. Considering another factor of firm size, it is expected a positive relationship for this variables. Because large firms have better creditworthiness compared with smaller ones and this point is supported by findings of Petersen & Rajan (1997), Garcia-Teruel & Martinez-Solano (2010a), Niskanen & Niskanen (2006), and Bougheas et al. (2009). In contrast, Rodriguez-Rodriguez (2006) argues that smaller firms rely more on trade credit as its ability limitation of getting other financing.

Garcia-Teruel & Martinez-Solano (2010a) demonstrate that firms with more ability of generating internal cash borrow less from suppliers. This is in line with theory and results from other empirical researches (Niskanen & Niskanen, 2006; Atanasova, 2007).

For the factor of financial debt, it is expected a negative relation. In table 2.3, firms with access to other financial resources reduce the level of trade credit. There are consistent results indicating a positive relationship between financial costs and accounts payable (Petersen & Rajan, 1997; Rodriguez-Rodriguez, 2006; Niskanen & Niskanen, 2006; Demirguc-Kunt & Maksimovic, 2001). As high financial costs make trade credit a more competitive resource of short-term financing.

From theoretical perspective, it is discussed that firms with growth opportunity would like to take more financing from suppliers. Therefore, there is a positive relationship for sales growth and accounts payable. This theory is testified in researches of Garcia-Teruel & Martinez-Solano (2010a) and Petersen & Rajan (1997). However, Niskanen & Niskanen (2006) find there is no relation for this variables and account payable. This is probably because of different country systems.

Several theories emphasize current assets are financed by current liabilities (Alphonse et al., 2003; Niskanen & Niskanen, 2006). It is argued by authors most current liabilities are needed to support firm's current assets. They both are short-term items and can be easily reversed. This indicates the level of current assets influences the level of accounts payable positively. Both Alphonse et al. (2003) and Niskanen & Niskanen (2006) advocate this theory and provide empirical evidence on this argument. Niskanen & Niskanen (2006) have also argued that the supply of trade credit influences a firm's accounts payable. Purchase is considered to measure the supply of trade credit. From theoretical view, more purchase associates with more accounts payable. This is consistent with findings of Niskanen & Niskanen (2006).

3 Hypotheses

Considering factors discussed in chapter 2 (see table 2.2 and 2.3), hypotheses about relationships between firm-specific characteristics and trade credit are given in the following sections.

3.1 Hypothesis 1: The relation with firm's creditworthiness

As mentioned in chapter 2, a firm's creditworthiness represents the firm's credit reputation and its capacity of obtaining external financing. Firm's age and size are considered as measures of creditworthiness in most literatures (Petersen & Rajan, 1997; Huyghebaert, 2006; Garcia-Teruel & Martinez-Solano, 2010a; Niskanen & Niskanen, 2006). Because Schwartz (1974) states that old and large firms have better credit reputation to pay their obligations as their long-term history and large economic scales. Petersen & Rajan (1994) discuss that the level of trade credit depicts the trustiness between suppliers and customers. Suppliers grant more trade credit to customers with high creditworthiness and those they trust during business. Ng et al. (1999) argue that sellers with good reputation of their products are mostly chosen by buyers; buyers with good reputation are more likely to get trade credit from sellers.

Schwartz (1974) emphasizes that during period of tight monetary policy, interest rates and credit rationing increase. The primary effect of tight monetary is spread to smaller firms who obtain funds with higher costs from capital markets. On one hand, this leads smaller firms to take trade credit instead of bank credit. On the other hand, larger firms make use of their borrowing ability to support their customers.

Overall, large firms have better access to financial debt, better creditworthiness and bargaining power compared with smaller ones. Therefore, they have ability to lend money to customers who have financial problems. In contrast, Rodriguez-Rodriguez (2006) argues that smaller firms rely more on trade credit as its limitation of obtaining other financing. Furthermore, old firms imply that firms can survive well in case of market imperfections and probably have better access to financial resources. Rodriguez-Rodriguez (2006) states old firms may have lower financial needs and higher ability of internal financing generation. It is expected a negative relationship for old firms and accounts payable. However, other researchers find positive relation for firm's age and accounts payable (Petersen & Rajan, 1997; Garcia-Teruel & Martinez-Solano 2010a). Because they believe older firms have better reputation compared with younger ones. We believe the first expectation that old firms need less payable. The hypotheses are represented as:

H1a: There is a positive relationship between firm's age and accounts receivable; there is also a positive relationship between firm's size and accounts receivable.

H1b: There is a negative relationship between firm's age and accounts payable; there is a positive relationship between firm's size and accounts payable.

3.2 Hypothesis 2: The relation with firm's internal cash generation

Consisting with the pecking order theory, Rodriguez-Rodriguez (2006) and Alphonse et al. (2003) emphasize to consider internal financing as the first funding method during financial difficulties. The higher the internal cash generated, the less the external finance, especially trade credit. From table 2.2, it depicts that firms with high internal cash generation possess more accounts receivable (Garcia-Teruel & Martinez-Solano, 2010a).

Niskanen & Niskanen (2006) define the measure of internal cash generation as the ratio of profit and sales, and they do get positive relation but not significant. They further divide net profit into profit and loss to recheck, the result still keep the same. As a result, the determinant role of this variable is still disputed. In this thesis, it is assumed a positive relationship for this variable and accounts receivable. Moreover, Garcia-Teruel & Martinez-Solano (2010a) and Niskanen & Niskanen (2006) demonstrate that firms with more ability of generating cash borrow less from suppliers. So there is a negative relationship between internal cash generation and account payable. However, there is also another possibility that firms invest internal cash in non-current assets and projects with growth opportunity which is consistent with pecking order theory. In that case, the influence of internal cash generation on the level of trade credit is reduced. Nevertheless, hypotheses related to internal cash generation are:

H2a: There is a positive relationship between firm's internal cash generation and accounts receivable.

H2b: There is a negative relationship between firm's internal cash generation and accounts payable.

3.3 Hypothesis 3: The relation with firm's financial debt and costs

The ability of raising external financing of a firm, both including long-term and short-term debt, influences the level of trade credit. In the view of accounts receivable, Petersen & Rajan (1997) state that firms with higher financial debt grant more trade credit to their customers. In the aspect of accounts payable, Garcia-Teruel & Martinez-Solano (2010a) explain firms with ability of accessing bank loans, resort less on trade credit. As it is emphasized that trade credit is more expensive than bank credit. This is in line with the research results of

Rodriguez-Rodriguez (2006). Rodriguez-Rodriguez (2006) further explains that firms relied on institutional financing are generally larger and more profitable compared with firms financed by trade credit.

It is considered that higher debt costs will lead firms to resort funds from alternative finance, including trade credit from suppliers (Rodriguez-Rodriguez, 2006 Garcia-Teruel & Martinez-Solano (2010a) argue that firms have incentives to reduce the level of accounts receivable when the costs of borrowing from banks is expensive. Moreover, firms attempt to extend more accounts payable in that case. The hypotheses related to these two variables are:

H3a: There is a positive relationship between firm's financial debt and accounts receivable; there is a negative relationship between firm's financial costs and accounts receivable.

H3b: There is a negative relationship between firm's financial debt and accounts payable; there is a positive relationship between firm's financial costs and accounts payable.

3.4 Hypothesis 4: The relation with firm's sales growth

Petersen & Rajan (1997) find there is a positive relation between firm's sales growth and accounts receivable. They argue that firms with positive sales growth have more incentives to grant trade credit. While for negative sales growth, those firms attempt to grant more trade credit to increase sales. This is also supported by Niskanen & Niskanen (2006), they explain that firms with high growth try to prolong due credit period than competitors. Therefore, Petersen & Rajan (1997) suggest trade credit can be considered as a signal of firm's financial situation and a marketing tool. It is reasonable that firms attempting to achieve high sales offer more trade credit to make them competitive and attractive to customers.

From the perspective of accounts payable, Garcia-Teruel & Martinez-Solano (2010a) discuss that firms with growth opportunity would like to take more financing from suppliers. While Niskanen & Niskanen (2006) find there is no relationship for this variable and accounts payable. We believe that firms need more trade credit to invest in projects with growth opportunity. Therefore, the hypotheses related are:

H4a: There is a positive relationship between firm's sales growth and accounts receivable.

H4b: There is a positive relationship between firm's sales growth and accounts payable.

4 Research method

In order to test hypotheses on the factors determining the level of trade credit described in chapter 3, based on data collected, a regression method will be chosen for analyzing. Table 4.1 presents a summary of regression methods and literatures those methods have been applied in.

Table 4.1 Summary of research methods

Research methods	Literatures applied in
Pooled Ordinary Least Squares (OLS)	Petersen & Rajan (1997), Huyghebaert (2006) Delannay & Weill (2004) Garcia-Teruel & Martinez-Solano (2007) Garcia-Teruel & Martinez-Solano (2010a)
Generalized least squares (GLS)	Rodriguez-Rodriguez (2006)
General method of moment (GMM)	Garcia-Teruel & Martinez-Solano (2010b) Bougheas et al. (2009) Cunat (2007)

4.1 Research method 1: Pooled OLS

Pooled OLS is the mostly used and simplest method; OLS method minimizes the sum of squared residuals. The simple regression model is defined as:

$$y_{it} = \beta_0 + \beta_1 x_{it} + \lambda_t + e_{it} \quad (4.1)$$

where y_{it} is dependent variable, such as accounts receivable and accounts payable; x_{it} is independent variable. In this thesis, x is the proxy of firm age, size, internal cash generation and variables discussed in table 2.2 & 2.3; β_0 is intercept; β_1 is coefficient of independent variable; λ are dummy variables like industry sectors and years in this thesis; and e is the random error; i is the individual firm and t is the time.

It is stated in the literature that pooled OLS cannot obtain consistent estimation in case e is correlated with independent variable which is defined as endogeneity problem. This is considered as a shortcoming of pooled OLS (Ono, 2001; Huyghebaert, 2006). Heteroskedasticity also presents in the case of random error having different variances. It is argued that pooled OLS no longer has the smallest variance in the presence of heteroskedasticity. Wooldridge (2009) further states that there should be no exact linear

relationships among independent variables when one applies pooled OLS method. This point explains that it is allowed to be correlated among independent variables, but not perfectly collinearity. Several researchers apply pooled OLS in their researches (Petersen & Rajan, 1997; Huyghebaert, 2006; Delannay & Weill, 2004; Garcia-Teruel & Martinez-Solano, 2007; 2010a). Those model principles are consistent with equation 4.1.

4.2 Research method 2: GLS

GLS is specifically used in the case of endogeneity problem exists. The equation model is similar to OLS equation 4.1. GLS can also solve problems of heteroskedasticity and autocorrelation of random errors. Rodriguez-Rodriguez (2006) argues GLS is efficiently estimated when individual effects are uncorrelated with independent variables. In that case, it is defined as a random effects model and individual effects are considered as part of error term e. However, in another model of fixed effects, individual effects are considered as component of coefficient β. This is in line with the principle of pooled OLS.

4.3 Research method 3: GMM

Because of advantages of providing unified estimation approach and extending methods from linear to nonlinear models easily, GMM is emphasized in several literatures (Garcia-Teruel & Martinez-Solano, 2010b; Cunat, 2007; Bougheas et al., 2009). Cunat (2007) states GMM can address issues of correlation between independent variables and the foreseeable endogeneity problems. Endogeneity cannot be controlled by OLS (Rodriguez-Rodriguez, 2006).

Taking the research of Garcia-Teruel & Martinez-Solano (2010b) as an example, because this research is measuring dynamic panel data, authors argue that autocorrelation exists between random errors. In this case, OLS cannot be applied. Another reason OLS cannot be applied is that independent variable is related to e. Therefore, GMM is the optimal choice in this research. Garcia-Teruel & Martinez-Solano (2010b) further argue that if the residuals are homoscedastic, only the 1-stage GMM is applied. If they are heteroskedasticity, the 2-stage is preferred to apply to improve efficiency after 1-stage.

4.4 Method selected in this thesis

A correlation analysis is first performed which examines the linear correlations between variables. The result of high correlation suggests collinearity which will affect the results of relationship between independent and dependent variables (this test is applied in Garcia-Teruel & Martinez-Solano, 2007; 2010a).

If correlations between independent variables are not high, a Hausman test is needed to examine the correlation between random errors and independent variables of the model. The correlation between random errors within groups (Moulton, 1990; Hausman & Taylor, 1981) can cause biased estimation. If there is a correlation, it is defined as fixed effects, otherwise random effects. Continued with that, tests of autocorrelation between random errors and heteroskedasticity of variances of random errors have to be constructed. Autocorrelation and heteroskedasticity can be solved by generalized least squares. The procedures of analyzing methods in this thesis are explained as follows:

1. Collinearity test →2. Hausman test →3. Autocorrelation test →4. Heteroskedasticity test →5. GLS regression.

The following models are considered for this thesis according to variables summarized in table 5.2:

$$RECEIV_{it} = \beta_0 + \beta_1 LAGE_{it} + \beta_2 LSIZE_{it} + \beta_3 CFLOW_{it} + \beta_4 FCOST_{it} + \beta_5 GROWTH_{it} + \beta_6 STLEV_{it} + \beta_7 TURN_{it} + \beta_8 GPROF_{it} + \lambda_t + e_{it} \quad (4.2)$$

$$PAYAB_{it} = \beta_0 + \beta_1 LAGE_{it} + \beta_2 LSIZE_{it} + \beta_3 CFLOW2_{it} + \beta_4 FCOST_{it} + \beta_5 GROWTH_{it} + \beta_6 STFIND_{it} + \beta_7 LTDEB_{it} + \beta_8 CURRAS_{it} + \beta_9 PURCH_{it} + \lambda_t + e_{it} \quad (4.3)$$

Based on models, RECEIV measures the level of trade credit a firm grant and PAYAB represents the level of trade credit a firm receive; LAGE is firm age; LSIZE is firm size; CFLOW measures internal cash generation; FCOST is financing costs; GROWTH is sales growth over previous year; STLEV is defined as short-term financing; TURN is turnover of assets; GPROF is gross profit margin; STFIND is short-term financing from financial institutions; LTDEB is the long-term debt; CURRAS is the ratio of current assets over total assets; PURCH is the level of purchase amount of materials. Furthermore, λ are dummy variables including industry sectors and years in this thesis; e is random errors.

According to previous discussion and hypotheses, for equation 4.2, it is expected positive relationships for accounts receivable and LAGE, LSIZE, CFLOW, GROWTH, STLEV and GPROF. Therefore, the coefficients of those variables β_1, β_2, β_3, β_5, β_6 and β_8 are expected to be positive number, and the rest is considered to be negative. Considering 4.3, variables of LSIZE, FCOST, GROWTH, CURRAS and PURCH are estimated to be positively related to accounts payable. As a result, coefficients of β_2, β_4, β_5, β_8 and β_9 are also estimated to be positive numbers. The rest is expected to be opposite.

5 Sample and data

5.1 Sample selection

A 5-year panel data from 2006-2010 is analyzed in this thesis. Defined by Hsiao (2007, p1), "Panel data or longitudinal data typically refer to data containing time series observations of a number of individuals." Panel data is chosen in most researches (Niskanen & Niskanen, 2006; Ono, 2001; Demirguc-Kunt & Maksimovic, 2001; and among others) because of its most important advantage: panel data can diminish the influence of a single variable, therefore eliminating the unobservable heterogeneity problem. Time series and cross section researches have risk of achieving biased results. Furthermore, Garcia-Teruel & Martinez-Solano (2007) state panel data indicating more information on variables and providing less collinear variables. In this thesis, industry sectors will be analyzed as dummy variables. Industries are classified into construction, manufacturing and services sectors according to two-digit SIC code (Standard Industrial Classification) which is a way of classifying businesses activities in statistics.

The research period of 2006-2010 is the mostly recent data years. Researching on these years is expected to contribute more new implications in this study field. Ono (2001) and Nadiri (1969) have collected quarterly data from their sample period. Because they believe that trade credit is a short-term financing and changed frequently in a short time period, and it can be presented well by quarterly data. In this thesis, the yearly data is collected as the database is published by annual report.

As mentioned in very beginning, this research specifically focuses on Dutch listed companies; therefore, Euronext Amsterdam is the main database. Euronext consists of stock exchange of Amsterdam, Brussels and Paris. Euronext Amsterdam provides stock market information for around 101 capitalized firms. During those listed firms, financial firms, insurance firms and firms that do not issue report accounts receivable and accounts payable are excluded. According to research of Garcia-Teruel & Martinez-Solano (2010b), the first step of sample selection is to eliminate firms with data errors in annual reports. They state the values of assets, liabilities and some other variables should be positive. Therefore, negative values indicate errors in reports. The second step is to abandon extreme values, in order to avoid their influence on final analysis. As a result, 74 firms are left with 370 observations after the selection processes.

The following table 5.1 gives summary of industry sectors of sample data. From this table, it is clear that there are 3 industrial sectors included in the sample. More than 58% firms belong to manufacturing sector, continued with 35.14% services firms and the smallest sector is construction which occupies only 6.76%.

Table 5.1 Percentages of industry sectors in the sample

Industry

		Frequency	Valid Percent
Valid	Construction	25	6.76%
	Manufacturing	215	58.11%
	Services	130	35.14%
	Total	370	100.00%

5.2 Variables

In this thesis, several firm-specific characteristics have been examined on the relationships with trade credit. According to theory of Petersen & Rajan (1997), Huyghebaert (2006), Garcia-Teruel & Martinez-Solano (2010a; 2010b), Niskanen & Niskanen (2006) and Rodriguez-Rodriguez (2006), trade credit is measured by accounts receivable (RECEIV) and accounts payable (PAYAB). RECEIV is calculated as the ratio of accounts receivable to sales, the higher the RECEIV, the higher the portion of sales is issued as trade credit; PAYAB is defined as the ratio of accounts payable to total assets, which measures the position of trade credit in financing firm's business. However, in research of Nilsen (2002), he takes the ratio of accounts payable to sales as dependent variable. He states that this calculation is not affected by transaction costs. Such a definition of PAYAB can indicate the use of trade credit and credit constraint better. In this thesis, the first definition of PAYAB is chosen because it demonstrates that how important of trade credit in financing firm's assets. The second definition will be used as PAYAB2 in robust check.

The following table 5.2 summarizes all independent variables, their abbreviations and definitions which will be used in this thesis. The sources are from literatures of Petersen & Rajan (1997), Rodriguez-Rodriguez (2006) and Garcia-Teruel & Martinez-Solano (2010a; 2010b).

Table 5.2 Summary of independent variables

Independent variables	Abbreviations	Definitions
Firm age	LAGE	Firm age is used to measure the creditworthiness of firm, and defined as natural logarithm of (1+age).
	LAGE2(robust)	Square of natural logarithm of (1+age).
Firm size	LSIZE	Firm size is also used to measure the creditworthiness of firm, and defined as natural logarithm of total assets.
	LSIZE2(robust)	It is measured as natural logarithm of annual sales.
Internal financing generation	CFLOW (For RECEIV)	It is defined as net profit plus depreciation divided by sales.
	CFLOW22(robust)	This measurement is net profit over sales.
	CFLOW2 (For PAYAB)	It is defined as net profit plus depreciation divided by total assets.
Cost of financing	FCOST	It is defined as the ratio of financing costs divided by total liabilities minus PAYAB.
Sale growth	GROWTH	The definition is the change of sales over previous year.
Specific variables for RECEIV		
Short-term finance	STLEV	It is the ratio of current liabilities over sales.
Turnover	TURN	Equating to sales over assets deducting RECEIV.
Gross profit margin	GPROF	The ratio of gross profit to sales.
Specific variables for PAYAB		
Short-term financing debt	STFIND	Calculated as short-term bank loans over total assets.
	STFIND2(robust)	Calculated as short-term bank loans over current liabilities.
Long-term debt	LTDEBT	It is also calculated as long-term debt over total assets.
Current assets over total assets	CURRAS	It is calculated as current assets over total assets.
Purchase	PURCH	It is the ratio of purchase of raw materials over total assets.

This table gives a clear overview of independent variables which are going to be analyzed. The relationships between specific variables and accounts receivable and accounts payable are emphasized in below.

Considering the specific variables to accounts receivable, the first variable included is short-term finance (STLEV), it is defined as the ratio of current liabilities over sales. It is justified that the higher the STLEV, the higher the RECEIV firms offer to customers, because firms with ability to get external financing have incentives to grant trade credit. The second variable is turnover (TURN), equating to sales over assets deducting RECEIV. Argued by Garcia-Teruel & Martinez-Solano (2010a), TURN can transmit information about product quality. Lower TURN indicates higher quality of products, because high quality products need longer production cycle. Firms with high quality products offer more trade credit and longer due period allowing customers to examine product quality. Therefore, there is a negative relationship with RECEIV for TURN. The third variable included is gross profit margin (GPROF), measured as gross profit to sales. This is consistent with the theory of price discrimination, firms with higher profit margin grant more RECEIV to customers.

Referring to accounts payable, the first variable discussed is short-term financing debt ratio (STFIND), calculated as short-term financial debt over total assets. It is argued that firms with higher STFIND have more capacity of accessing short-term bank debt, therefore accounts payable is minimized. The second one is long-term debt ratio (LTDEBT), calculated as long-term debt over total assets. From theoretical view, there is a negative relationship between LTDEBT and PAYAB, indicating firms with access to long-term debt resort less on trade credit. This is interpreted in the same way as STFIND. Current assets over total assets (CURRAS) is also one of the variables, it is predicted that firms investing more in current assets will resort more on short-term debt, therefore, more on trade credit if necessary. The last variable discussed is the purchase of raw materials divided by total assets (PURCH), since the quantity of purchase will influence the amount of supply of trade credit.

Table 5.3 depicts statistic summary of financial factors. From table 5.3, one can find that the average firm age is 67.85 years old and the oldest firm is more than 391 years (the name of the oldest firm is VOPAK which is the leader in providing conditioned storage facilities for bulk liquids). The second factor is sales revenue of firms, the mean is 3151.86 million euro and median is only 583.57 million euro. And the 99^{th} percentile is much bigger compared with those two values, which is 39928 million euro. The biggest values of factors purchase, gross profit and financial cost are about 15 times of their mean. Especially for values of net profit, the 99^{th} percentile is about 4599 million euro while mean is only 213 million euro. Considering the rest factors, it is noteworthy that means are all bigger than medians. This indicates that mean values are influenced by big outliers. In order to minimize the influence of

outliers, we give summary statistic of variables (table 5.4) described in table 5.2 which are defined as ratios of financial factors (Osborne & Overbay, 2004).

From table 5.4, we can find that most values of mean and median are close to each other but there are still extreme ratios in variables. For variable CFLOW, its mean and median are -1.76 and 0.069. The big difference is influenced by its 1st percentile of -96.27; moreover, the mean and median of STLEV are (1.38 and 0.33 respectively) affected by its 99th percentile of 39.59; comparing the mean and median of GPROF, the effect of 1st percentile of -46.05 exist; the variable CFLOW22 has similar situation with CFLOW. Its mean and median are affected by its 1st percentile of -96.27. Osborne & Overbay (2004) state a method of truncation to deal with those extreme ratios. This method recode extreme ratio into the lowest or highest reasonable ratio. In this thesis, we recode the ratios of extreme 1st percentile into the ratios of 25th and the extreme ones of 99th into the ratios of 75th.

Table 5.3 Summary statistic of financial factors

Statistics

	N				Percentiles			
	Valid	Mean	Median	Std. Deviation	1	25	75	99
Firmage	370	67.85	36.00	75.461	4.00	16.00	101.25	391.29
Sales	370	3151.86	583.57	6855.808	.20	109.05	2503.18	39928.56
Purchase	370	2058.18	472.82	5259.503	.08	45.23	1262.66	34397.59
Grossprofit	370	1093.67	138.18	2272.874	-27.76	29.96	935.50	11798.14
Financialcost	370	60.18	9.02	147.165	.00	.81	43.58	741.33
Netprofit	370	212.87	20.11	672.321	-274.74	2.01	113.08	4598.87
Receivable	370	467.32	95.81	848.114	.02	16.83	483.00	4198.35
Currentassets	370	1175.53	200.86	2510.705	2.29	42.42	872.74	14702.85
Totalassets	370	3398.05	742.49	7135.062	6.44	83.13	2511.50	37138.70
Payable	370	533.91	59.63	1194.205	.00	8.48	350.53	7828.06
Shortfinance	370	192.67	17.44	532.318	.00	1.56	100.53	2873.09
Currentliability	370	1022.13	206.36	2175.584	1.66	29.59	755.36	13572.63
Totalliability	370	2145.42	419.78	4570.195	2.11	41.99	1527.75	24748.93
Longtermdebt	370	2378.60	426.89	5064.854	3.59	52.36	1775.60	25791.97
Depreciation	370	107.00	9.21	338.975	.00	1.60	46.20	2358.82

Except firm age, the unit of factors is in millions of Euro.

Firm age is from the years a firm incorporated; sales are the revenue a firm received in a year; purchase is the cost of raw materials; gross profit is the sales minus purchase; financial cost is the cost of external financing; net profit is earning after interests and taxes; receivable is accounts receivable; current assets are assets which can be converted to cash or used to pay current liabilities; total assets include current and non-current assets; payable is accounts payable; short finance is short-term financing from banks; current liability is a firm's debts or obligations that are due within one year; total liability is current and non-current liability; long term debt is non-current liability plus equity and depreciation is value loss of assets.

Table 5.4 Summary statistic of defined variables

Statistics

	N				Percentiles			
	Valid	Mean	Median	Std. Deviation	1	25	75	99
LAGE	370	1.612396	1.568202	.4543778	.698970	1.230449	2.009659	2.593607
LSIZE	370	2.745312	2.870673	.9382131	.808618	1.919731	3.399934	4.569825
CFLOW	370	-1.756342	.068775	12.8610989	-96.273634	.032652	.136896	2.361973
CFLOW2	370	.074711	.082687	.3260037	-.608431	.039577	.127552	.361585
FCOST	370	.044271	.034053	.0803846	.000000	.022439	.047429	.301431
GROWTH	296	.507203	.036032	7.1591332	-.739725	-.041762	.134173	3.097323
STLEV	370	1.384201	.328339	7.4417764	.099574	.239200	.465931	39.591034
TURN	370	1.604818	1.383371	1.4110540	.004200	.783463	2.145919	8.009815
GPROF	370	-.525448	.378540	8.7223261	-46.048417	.207827	.662104	.975814
STFIND	370	.059191	.042059	.0696172	.000000	.010998	.082895	.314678
LTDEBT	370	.654030	.674861	.1531639	.291379	.559319	.754489	.956146
CURRAS	370	.465894	.444639	.2313411	.006392	.304130	.658040	.937990
PURCH	370	.709374	.609630	.5585918	.002401	.231165	1.067474	2.308981
RECEIV	370	.292129	.186391	1.0395610	.000000	.137736	.346969	3.021087
PAYAB	370	.162674	.134049	.1190199	.000000	.073392	.233122	.482011
LAGE2	370	2.805722	2.459257	1.4933165	.488559	1.514805	4.038734	6.726797
LSZIE2	370	2.636131	2.766082	1.0684263	-.525291	2.037465	3.398459	4.601280
CFLOW22	370	-1.855359	.040636	13.2470880	-96.273634	.009223	.090073	2.357682
STFIND2	370	.182582	.125629	.1873628	.000000	.029509	.276204	.790640
PAYAB2	370	.573875	.14994.5	3.3571596	.000000	.078529	.241665	14.514432

LAGE is the natural logarithm of (1+age), LSIZE is the natural logarithm of total assets, CFLOW is calculated as net profit plus depreciation over sales, CFLOW2 is calculated as net profit plus depreciation over total assets, FCOST is defined as financing costs over total liabilities minus PAYAB, GROWTH is the growth of current sales over previous year, STLEV is the ratio of current liabilities over sales, TURN is defined as sales over assets deducing RECEIV, GPROF is the ratio of gross profit to sales, STFIND is calculated as short-term bank loans over total assets, LTDEBT is the ratio of long-term debt over total assets, CURRAS is defined as current assets over total assets, PURCH is measured as cost of raw materials divided to total assets, RECEIV is the ratio of accounts receivable over sales, PAYAB is the ratio of accounts payable over total assets, LAGE2 is the square of natural logarithm of (1+age), LSIZE2 is natural logarithm of annual sales,CFLOW22 is measured by net profit over sales, STFIND2 is short-term bank loans over current liabilities and PAYAB2 is the ratio of accounts payable over annual sales.

6 Results and discussions

This chapter reports our empirical results. First, Pearson correlation matrix (table 6.1) is conducted to examine the linear relationships between variables. Analyzing table 6.1, the coefficient between LAGE and RECEIV is -0.049 which is not significant; however, the coefficient between LAGE and PAYAB is 0.15 at 5% significant level. This indicates a positive relationship for firm age and accounts payable. Namely, the older the firm is, the more accounts payable it owns. The relationship between LAGE and LSIZE is significantly positive with the value of 0.266. The coefficients for LAGE with other independent variables are all in small level which cannot influence the linearity with dependent variables. However, the strongest correlations exist between STLEV and CFLOW (-0.899 at 5% significant level), STLEV and GPROF (-0.779 at 5% significant level), TURN and PURCH (0.706 at 5% significant level). These high coefficients demonstrate linear relationship between those three pairs of independent variables.

As a result, a further robust check has been constructed for those three linear relationship problems by using method of variance inflation factor (VIF), see appendix table A1 and A2, which is required to less than 10, and the lower, the better for non-collinearity. From those two tables, the biggest VIF value is 2.71 and 1.87 respectively; both of them are less than 10, demonstrating that there is no multicollinearity problem.

Considering dependent variables, the highest coefficient for RECEIV is -0.279 with PURCH at 5% significant level. One thing needed to bear in mind is that PURCH is not defined to relate to RECEIV in this thesis. Thus, the most important factors influencing RECEIV are firm size (-0.155 at 5% significant level) and short-term finance (0.14 at 5% significant level). As far as the dependent variable of PAYAB is concerned, variables of LTDEBT, CURRAS and PURCH are the most correlated ones, the coefficients are -0.553, 0.318 and 0.294, all at 5% significant level.

Overall, table 6.1 demonstrates that all variables defined in model 4.2 and 4.3 are satisfying the requirement of non-collinearity. Continued with that, Hausman test, heteroskedasticity test and autocorrelation test report that models 4.2 and 4.3 are both fixed effects and having heteroskedasticity and autocorrelation problems between random errors. Finally, GLS method is applied to solve those problems.

Table 6.1Pearson correlation matrix

Pearson Correlation Matrix

	LAGE	LSIZE	CFLOW	CFLOW2	FCOST	GROWTH	STLEV	TURN	GPROF	STFIND	LTDEBT	CURRAS	PURCH	RECEIV	PAYAB
LAGE	1	.266**	.203**	.087	-.046	-.089	-.220**	.111	.132	.112	-.128	-.017	.249**	-.049	.150**
LSIZE	.266**	1	.146**	-.031	-.111	-.111	-.143**	-.109	.067	-.039	.191**	-.339**	.024	-.155**	.025
CFLOW	.203**	.146**	1	.217**	-.057	.007	-.899**	.140**	.515**	-.016	-.042	-.112	.059	-.075	.081
CFLOW2	.087	-.031	.217**	1	-.258**	.011	-.269**	.085	.115	-.078	.049	.128	.148**	-.170**	.039
FCOST	-.046	-.111	-.057	-.258**	1	-.024	.106	-.115	.031	-.039	.027	-.090	-.059	.018	.102
GROWTH	-.089	-.111	.007	.011	-.024	1	-.013	.012	.028	-.051	.017	.047	-.052	.095	.045
STLEV	-.220**	-.143**	-.899**	-.269**	.106	-.013	1	-.217**	-.779**	-.006	.104	.072	-.178**	.140**	-.116
TURN	.111	-.109	.140**	.085	-.115	.012	-.217**	1	.076	-.080	-.382**	.514**	.706**	-.094	.267**
GPROF	.132	.067	.515**	.115	.031	.028	-.779**	.076	1	.058	-.073	-.076	-.016	.084	.040
STFIND	.112	-.039	-.016	-.078	-.039	-.051	-.006	-.080	.058	1	-.386**	-.025	.016	.128	.017
LTDEBT	-.128	.191**	-.042	.049	.027	.017	.104	-.382**	-.073	-.386**	1	-.390**	-.302**	-.107	-.553**
CURRAS	-.017	-.339**	-.112	.128	-.090	.047	.072	.514**	-.076	-.025	-.390**	1	.412**	.063	.318**
PURCH	.249**	.024	.059	.148**	-.059	-.052	-.178**	.706**	-.016	.016	-.302**	.412**	1	-.279**	.294**
RECEIV	-.049	-.155**	-.075	-.170**	.018	.095	.140**	-.094	.084	.128	-.107	.063	-.279**	1	.054
PAYAB	.150**	.025	.081	.039	.102	.045	-.116	.267**	.040	.017	-.553**	.318**	.294**	.054	1

**. and *. indicate significant at the 5% and 1% level, respectively (2-tailed).
LAGE is the natural logarithm of (1+age), LSIZE is the natural logarithm of total assets, CFLOW is calculated as net profit plus depreciation over sales, CFLOW2 is calculated as net profit plus depreciation over total assets, FCOST is the ratio of financial costs over total liabilities minus PAYAB, GROWTH is the growth of current sales over previous year, STLEV is the ratio of current liabilities over sales, TURN is defined as sales over assets deducing RECEIV, GPROF is the ratio of gross profit to sales, STFIND is calculated as short-term bank loans over total assets, LTDEBT is the ratio of long-term debt over total assets, CURRAS is defined as current assets over total assets, PURCH is measured as cost of raw materials divided to total assets, RECEIV is the ratio of accounts receivable over sales and PAYAB is the ratio of accounts payable over total assets.

6.1 Results for accounts receivable

Table 6.2 gives regression results for model 4.2. Model I describes coefficients of each independent variable without dummy variables. Model II includes industry and year dummies based on Model I. Model III and IV are robust check with different measurements for a few variables.

From Model I and II, we find out that firm age has a negative relationship with accounts receivable at significant level. This is in contrast to our expectation H1a. It is explained that young firms take accounts receivable as a marketing strategy to increase sales. Therefore, young firms have higher accounts receivable compared with old ones. The relationship between firm size and accounts receivable is similar to that found with firm age. This demonstrates that large firms grant less trade credit to their customers compared with small ones. It is considered that small firms would like to increase sales by offering trade credit, especially in market with fierce competition.

With regards to variable of internal cash generation, the result is opposite to H2a. A negative and significant relationship is found. It is assumed that the internal cash is consumed by non-current assets and other business opportunities.

The positive relationship between financing costs and accounts receivable does not support H3a. We expect that firms provide less trade credit in situation with high financial costs. Because firms attempt to minimize their borrowings from financial institutions to reduce

financing costs; therefore, the level of credit issued to customers is reduced at the same time. However, the result is not at significant level. Considering variable of sales growth, the result is consistent with H4a which is positively related to accounts receivable but not at significant level. Petersen & Rajan (1997) emphasize whatever positive or negative sales growth; firms would like to increase sales by granting more trade credit.

As far as the variable short-term finance is concerned, the result is contrary to our idea H3a. A negative relationship is found in our analysis. However, in our expectation, firms have access to short-term finance, would like to offer more trade credit to their customers. Relating to variable of turnover, the result does confirm our prediction. Garcia-Teruel & Martinez-Solano (2010a) state that turnover can transmit information about product quality. Lower turnover indicates higher quality of products, because high quality products need longer production cycle. Firms with high quality products offer more trade credit and longer due period allowing customers to examine product quality. Therefore, there is a negative relationship between turnover and accounts receivable. Furthermore, and as we expect, accounts receivable is positively related to variable gross profit margin at significant level. Petersen & Rajan (1997) and Garcia-Teruel & Martinez-Solano (2010a) state firms with high profit margin provide more trade credit to increase sales. Because the high profit margin can offset the interest costs of offering extra trade credit. In this case, trade credit is used as a price discrimination strategy; this can also help firms to keep long-term relationship with customers.

With regards to the effect of industry on determining the level of accounts receivable, manufacturing sector has a negative relationship with dependent variable at significant level. While services sector is positively related to dependent variable but not at significant level. As a result, we conclude that manufacturing industry sectors do have influence on the level of accounts receivable. As far as year dummy is concerned, it is observed that there is positive influence of year on accounts receivable although it is not at significant level. A conclusion drawn from this is that during our research period, the economic development of the Netherlands encourages listed firms to grant more accounts receivable during their business transactions.

In robust check of Model III and IV, most results are in line with our first analysis. There are only several differences. The first one is that the negative relationship for firm age is not at significant level in robust analysis. The second difference is service sector has a negative influence on dependent variable but not at significant level in robust check. The influence of year dummy is totally opposite to the first analysis result. We believe that this difference comes from the changes of firm sales, because new measurement of firm size and internal cash generation are divided by sales.

Table 6.2 Determinants of accounts receivable

Cross-sectional time-series GLS Regression for RECEIV				
			Robust	
	Model I	Model II	Model III	Model IV
LAGE	-0.0426*	-0.02696***		
	(-3.530)	(-1.89)		
LAGE2			-0.00266	-0.00238
			(-0.800)	(-0.57)
LSIZE	-0.0373*	-0.01804***		
	(-6.770)	(-2.57)		
LSIZE2			-0.0538*	-0.03493*
			(-8.540)	(-4.42)
CFLOW	-0.0656*	-0.07812*		
	(-6.010)	(-6.49)		
CFLOW22			-0.0611*	-0.07207*
			(-5.510)	(-6.01)
FCOST	0.139	0.1074	0.0997	0.099
	(1.300)	(0.66)	(0.780)	(0.59)
GROWTH	0.00511	0.0065	0.00389	0.00468
	(1.100)	(1.05)	(0.840)	(0.82)
STLEV	-0.0163	-0.0259	-0.00752	-0.02103
	(-1.020)	(-1.46)	(-0.450)	(-1.15)
TURN	-0.0216*	-0.01905*	-0.0158*	-0.0155**
	(-3.690)	(-3.12)	(-2.930)	(-2.43)
GPROF	0.0680*	0.06998*	0.0661*	0.0689*
	(6.230)	(5.68)	(5.640)	(5.44)
MANUFAC		-0.0509**		-0.0581**
TURING		(-2.05)		(-2.26)
SERVICES		0.01245		-0.0069
		(0.47)		(-0.25)
YEAR2006		0.03185**		
		(2.52)		
YEAR2007		0.02617**		-0.0037
		(2.22)		(-0.37)
YEAR2008		0.00959		-0.0217***
		(0.97)		(-1.76)
YEAR2009				-0.0325**
				(-2.46)
YEAR2010		0.01194		-0.0232***
		(1.23)		(-1.69)
Constant	0.402*	0.3246*	0.372*	0.3663*
	(12.15)	(6.58)	(12.98)	(7.89)
Num. of Obs.	370	370	370	370
Adjusted R^2	0.8486	0.8499	0.8429	0.8437

Z statistics are in parentheses.
* Significant at 1%; ** significant at 5%; ***significant at 10%.
Notes: LAGE is the logarithm of (1+age), LSIZE is the logarithm of total assets, CFLOW is calculated as net profit plus depreciation over sales, FCOST is defined as financing costs over total liabilities minus PAYAB, GROWTH is the growth of current sales over previous year, STLEV is the ratio of current liabilities over sales, TURN is defined as sales over assets deducing RECEIV, GPROF is the ratio of gross profit to sales, RECEIV is the ratio of accounts receivable over sales, LAGE2 is the square of logarithm of (1+age), LSIZE2 is logarithm of annual sales,CFLOW22 is measured by net profit over sales, MANUFACTURING, CONSTRUCTION and SERVICES are industry dummy variables; YEAR 2006-2010are time dummy variables.
Industry dummy variable construction is excluded because of collinearity.

6.2 Results for accounts payable

Table 6.3 gives regression results for model 4.3. Model I describes coefficients of each independent variable without dummy variables. Model II includes industry and year dummies based on Model I. Model III and IV are robust check with different measurements for a few variables.

From Model I and II, we first observe that firm age has a positive relationship with accounts payable and it is at significant level in Model I. This is in contrast to our expectation H1b. It is explained that older firms make use of financing from suppliers more than younger ones. Contrary to our results, Niskanen & Niskanen (2006) state that there is a negative relationship for this variable and accounts payable; because younger firms need more external financing especially from suppliers to support their businesses. This argument can be left for future research. The signs for coefficients of firm size are the same with the ones of firm age but at significant level. Thus, it supports H1b. Our results are similar with the findings of Petersen & Rajan (1997) and Garcia-Teruel & Martinez-Solano (2010a). It is explained that larger firms receive more trade credit from their suppliers compared with small ones; because larger firms have more reputation in obtaining trade credit and ability to realize payment in time than smaller ones.

With regards to variable of internal cash generation, the result is opposite to H2b. A positive and non-significant relationship is found in our analysis. From our prediction, high internal cash generation firms have ability to support financing by themselves, it is not necessary to borrow from suppliers. However, this is not the case for our analysis. It needs further research on this variable.

The positive relationship between financing costs and accounts payable at significant level does support H3b. This result indicates firms use higher trade credit when the costs of other financing are higher. We expect that firms provide less trade credit in situation with high financial costs. Considering variable of sales growth, the result is inconsistent with H4b. we observe a negative relationship for this variable and accounts payable but not at significant level. Petersen & Rajan (1997) emphasize the theory of firms with high growth, using more trade credit; because firms with growth opportunities need more trade credit to invest in their projects. However, our results do not support this theory.

As far as the variables short-term financing debt and long-term debt are concerned, negative relationships at significant level are obtained in our analysis. Consisting with H3b, firms decrease their financing for suppliers when they have access to financial institutions, whatever short-term or long-term. Relating to variable of current assets, the result does not confirm our prediction. Alphonse et al. (2003) state that most current liabilities are needed to

support firm's current assets. However, our result suggests current assets are negatively related to accounts payable. It can be interpreted that current assets are supported by other sources of finance. Furthermore, the variable of purchase obtains a consistent result with our expectation. The relationship found between variables purchase and accounts payable is positive. Niskanen & Niskanen (2006) state that purchase from suppliers can influence the supply of trade credit positively. From theoretical view, more purchase associates with more trade credit.

With regards to the effect of industry on determining the level of accounts payable, manufacturing and service sectors both have negative relationships with dependent variable at significant level. Thus, we conclude that manufacturing and service sectors have influence on the level of accounts payable. Different from the results of accounts receivable, the year 2007 and 2008 have a positive effect on accounts payable, and in contrast, 2009 and 2010 have opposite effect.

In robust check of Model III and IV, most results are not at significant level. There are a few differences. The first one is that the relationship between internal cash generation and accounts payable is negative at significant level in robust analysis. This is in line with our prediction and contrary to analysis result of Model I and II. This can be explained by that firms generating more internal finance need less debt from external, especially from suppliers. The second difference is that variable purchase has a negative influence on dependent variable but not at significant level in robust check. The last difference is that the influences of industry and year dummy are all positive but not significant in robust test. We realize that the level of accounts payable is affected by changes of firm sales, as sales measures new variables in robust test.

Table 6.3 Determinants of accounts payable

Cross-sectional	time-series	GLS	Regression for	PAYAB
			Robust	**for PAYAB2**
	Model I	Model II	Model III	Model IV
LAGE	0.0107***	0.0065		
	(1.890)	(1.13)		
LAGE2			0.0168	0.00055
			(1.260)	(0.04)
LSIZE	0.0168*	0.0152*		
	(4.610)	(4.2)		
LSIZE2			0.000991	0.0260
			(0.0300)	(0.79)
CFLOW2	0.00689	0.0096		
	(0.910)	(1.2)		
CFLOW22			-0.133*	-0.1488*
			(-4.070)	(-4.83)
FCOST	0.0491**	0.0483**	0.198	0.6388
	(2.260)	(2.220)	(0.340)	(0.91)
GROWTH	-0.000595	-0.00073	-0.00146	-0.0014
	(-0.960)	(-1.14)	(-0.310)	(-0.34)
STFIND	-0.465*	-0.4315*		
	(-14.19)	(-12.74)		
STFIND2			-0.0253	0.0995
			(-0.260)	(0.80)
LTDEBT	-0.451*	-0.4227*	-0.196	-0.1337
	(-17.96)	(-16.29)	(-1.140)	(-0.68)
CURRAS	-0.00622	-0.0211	-0.183	-0.1688
	(-0.550)	(-1.51)	(-1.130)	(-1.04)
PURCH	0.0330*	0.0331*	-0.0640	-0.0553
	(4.770)	(4.67)	(-1.390)	(-1.11)
CONSTRUCION				0.0648
				(0.81)
MANUFACTURING		-0.0660*		0.0351
		(-3.96)		(0.69)
SERVICES		-0.0841*		
		(-4.7)		
YEAR2006				0.0406
				(0.88)
YEAR2007		0.00062		0.0270
		(0.28)		(0.66)
YEAR2008		0.00059		0.0045
		(0.20)		(0.13)
YEAR2009		-0.00054		
		(-0.16)		
YEAR2010		-0.0029		0.0088
		(-0.78)		(0.26)
Constant	0.392*	0.458*	0.384***	0.2234
	(13.98)	(14.38)	(1.800)	(1.05)
Num. of Obs.	370	370	370	370
Adjusted R^2	0.4003	0.3942	0.7667	0.7664

Z statistics are in parentheses.
* Significant at 1%; ** significant at 5%; ***significant at 10%.
Notes: LAGE is the logarithm of (1+age), LSIZE is the logarithm of total assets, CFLOW2 is calculated as net profit plus depreciation over total assets, FCOST is defined as financing costs over total liabilities minus PAYAB, GROWTH is the growth of current sales over previous year, STFIND is calculated as short-term bank loans over total assets, LTDEBT is the ratio of long-term debt over total assets, CURRAS is defined as current assets over total assets, PURCH is measured as cost of raw materials divided to total assets, PAYAB is the ratio of accounts payable over total assets, LAGE2 is the square of logarithm of (1+age), LSIZE2 is logarithm of annual sales,CFLOW22 is measured by net profit over sales, STFIND2 is short-term bank loans over current liabilities and PAYAB2 is the ratio of accounts payable over annual sales. MANUFACTURING, CONSTRUCTION and SERVICES are industry dummy variables; YEAR 2006-2010are time dummy variables.

7 Conclusions

This thesis attempts to find the relationships between determinants and trade credit based on a sample of 74 Dutch listed firms with 5 year observations. According to the definition of trade credit, analysis of this research is divided into accounts receivable and accounts payable.

Only firm-specific factors are considered in this research as firm data is only based on one country. The answers for research question are explained as follow. First, the determinant creditworthiness does influence the level of trade credit. It is measured by firm age and size. Firms established for many years, grant less trade credit and resort more to trade credit. This does not support predictions. Smaller firms grant more credit to customers as a way of marketing strategy to increase sales and build long-term relationship with customers; larger firms resort more financing to suppliers as their good reputation and large economic scales. We observe that firms with high capacity of generating internal cash, offer less trade credit to customers and borrow less from suppliers.

Firms with access to cheaper external financing, offer less credit to customers and resort less on financing from suppliers. The relationship for this variable and accounts receivable is not in line with theoretical prediction. With regard to sales growth and growth profit margin, firms offer more trade credit as a marketing strategy to increase sales as the costs of extra trade credit can be offset by high profit margin. This is in line with the theory of price discrimination. Contrary to prediction, the access to short-term financing does not help firms to offer more trade credit. The more short-term financing, the lower accounts receivable is in our analysis. The use of trade credit as a mechanism of transmitting quality information of products is confirmed in our analysis. Firms with higher turnover (low product quality), offer less trade credit as they are afraid of losing trade credit sales after product quality assessment.

While relating to accounts payable, firms with high growth resort less financing from suppliers, because they have capability of obtaining external financing including short-term financing debt and long-term debt. The result of current assets observed is opposite to expectation. In our analysis, the more current assets, the less accounts payable. It is assumed that current assets are financed by other short-term liabilities or long-term liabilities. The result for variable purchase appear to support the theory that describes the level of accounts payable is positively influenced by the amount of purchase of materials.

Our results reveal that manufacturing industry influences trade credit negatively and significantly. Moreover, services industry also has negative influence on accounts payable. Therefore, the level of trade credit can be affected by industry sectors. We also conclude that time of years does have impact on the level of trade credit because of the changes of economic situation in the Netherlands.

Our conclusions are interesting and important for Dutch listed firms, as our results give a summary of determinants of trade credit and their relationship with trade credit. It is useful for firms to consider our results during the procedure of establishing trade credit policy. Therefore, they can manage their assets and liabilities efficiently and effectively.

This thesis has a few limitations even though there is a detailed planning and execution of the research: first, the sample dataset only includes listed firms in the Netherlands which cannot represent the whole firm population of this country. Second, in the process of data collecting, there is no clear separation for some variables in firm's annual report (such as, I need the value of depreciation; while most firms only have the sum of depreciation and amortization). This leads to imprecise dataset and imprecise analysis results. Third, the purpose of this thesis only focuses on firm-specific factors, to be honest, macroeconomic factors also play an important role in determining the level of trade credit. For future research, I hope there will be more similar researches done based on the Netherlands. In that case, one can judge which determinants are the most important ones for trade credit and how they can influence trade credit.

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Appendixes

A. Variance inflation factor (VIF) test for multicollinearity

Table A1 Variables related to RECEIV

Variable	VIF	1/VIF
CFLOW	2.71	0.369508
STLEV	2.36	0.423924
GPROF	1.47	0.679031
TURN	1.28	0.780439
LSIZE	1.14	0.873715
LAGE	1.08	0.926069
GROWTH	1.02	0.977602
FCOST	1.01	0.986920
Mean VIF	1.51	

Table A2 Variables related to PAYAB

Variable	VIF	1/VIF
CURRAS	1.87	0.534866
LTDEBT	1.86	0.536931
PURCH	1.38	0.724940
LSIZE	1.31	0.765760
LAGE	1.19	0.840443
STFIND	1.17	0.852211
FCOST	1.10	0.913110
CFLOW2	1.09	0.916792
GROWTH	1.03	0.974519
Mean VIF	1.33	