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The Impact of the Financial Crisis of 2008 on Corporate Trade Finance

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1. INTRODUCTION

The global financial crisis had far-reaching repercussions for cross-border economic activity. After a sharp and sudden collapse in international trade in the last quarter of 2008, world trade flows declined by about 12% in 2009 according to the WTO. This exceeded the estimated loss of 5.4% in world GDP during the same period. Two aspects of the global financial crisis are believed to be behind this large decline in international trade. One is determined by the producer side, as the financial crisis reduced the availability of bank loans for small and medium size firms. At least the credit costs were much higher. The higher credit spreads was as well the disadvantage for big corporates. In sum all firms and corporates were affected. As a direct consequence this situation negative influenced firms' production capacities. On the consumer side, the gloomy economic outlook led to a slowdown in global demand in general, and for imports in particular. The effects of these forces may very well have been amplified by disruptions to global production lines, and by inventory adjustments made by import firms and distributors. Both aspects together are based on the same fact: Globally, the banks reduced the credit capacity to the corporate strongly as they were very pessimistic in their credit evaluation about the future and had themselves liquidity problems. This reduced globally in the real economy the possibilities to finance the operation and growth (Campello et al. 2009).

1.1.Bank crisis

As banks in the developed countries had since decades no problems to get enough market liquidity or central bank financing, the impact was a new situation for the real economy world. Furthermore banks and credit insurers had no global sector insolvency risk and therefore were the financing source for the expansion of world trade. IMF-BAFT calculated the banks share in delivering short-term trade credit at 80 % of total trade finance (2009). This was done by offering letters of credit or guarantees with the merchandise as the collateral or financing open account receivables. This was routine business for the financial sector with low-default and therefore low-risk. But the situation was only new for firms in the “old world”

(OECD-countries). Africa, Latin-America even Asia had seen with the Indonesia crisis 1999 before a credit crunch. The effect was hard for the inhabitants of the relevant countries as both exports and imports had a time of stoppage. In the financial crisis 2008 in all counties globally the financial and trading communities were very much concerned about the availability of trade finance. To avoid the experienced local developments for the global world, the World Bank, IMF, regional development banks and private sector actors worked to identify possible market failures, developed spot best practice and had cooperative actions in crisis response (IMF 2003). WTO Members were already before aware of a possible banking crisis and documented at the fifth WTO Ministerial Conference in Cancún (2003) that "based mainly on experience gained in Asia and elsewhere, there is a need to improve the stability and security of sources of trade finance, especially to help deal with periods of financial crisis. Further efforts are needed by countries, intergovernmental organizations and all interested partners in the private sector, to explore ways and means to secure appropriate and predictable sources of trade finance, in particular in exceptional circumstances of financial crises".

1.2. Global action

Furthermore, the IMF and WTO analyzed the reasons for the financial crisis of emerging economies in Asia and Latin America in the years from 1997 to 2001 and the reducing in trade finance. The IMF attributed such declines to "the response by banks as leveraged institutions, to the lack of insurance when it was needed, and to herd behaviour among banks, official export credit agencies (ECAs), and private insurers". Moreover, the banking systems in those countries were weak and were therefore not able to solve critical market and political situations. In addition trade finance was not deeply developed by the banks in the emerging countries: The IMF found therefore "the consolidation of the international banking sector in recent years may also have had a bearing on the decline in trade finance during recent crises".

As the contraction in international trade finance was as well globally the case, the financial crisis 2008 lead to an oligopolistic behaviour of the banks with less capacities in trade finance and an increase in its cost (Malouche 2009). This

market condition has worsening the situation particularly for corporates that have low-margin products conjunct with a high export rate and those that need banking trade finance to handle ex- and imports. With limited access to securing and financing as well as due to higher trade finance costs, these producer and distributors have problems in maintaining in the existing markets.

1.3.Economic aspects of corporate trade finance

On the macro-level, the financial crisis of 2008 showed that trade volumes depended not only on the political situation and market structure of the physical products, but also on the health of the financial markets. Although the physical markets did not change their products, the banks and credit insurers were no longer able to support trade credit as they had done before the crisis. Therefore, the banks reduced their funding to the corporate world, particularly trade financing (ICC 2010). Furthermore, credit insurers reduced many credit limits; in fact, the insurers sometimes reduced the limits of all of their customers in a specific sector, region or country. Non-bank investors also reduced their exposure, thus making it very difficult for corporates to obtain new equity. The negative development of the financial crisis could not be explained by the internal view of trade finance because the basic trade finance situation was unchanged. Furthermore, in comparison with corporate credit, trade credit still had at least three advantages:

- It became a normal part of business in most product markets;
- It was and remains available to companies of all sizes although small companies, especially those that are fast-growing, have a limited range of bank financing sources (Arnold p. 424); and
- There is a low default rate in trade finance.

Concerning the last point, the International Chamber of Commerce, the ICC, designed in 2010 a register to collect performance data on trade and finance. The ICC register evaluated the trade finance instruments volume and performance between 2005 and 2009. Basis data are 5.2 million transactions with a face worth over USD 2.5 trillion. First results are that the guarantee and letter of credit trade

finance transactions had an average duration of about 80 days, and an insignificant default rate of close to zero. This did even not change in the global economic crisis: Out of 2.8 million transactions were 500 defaults counted. Furthermore, when a default happened, the recovery rate was in average 60% for all deliveries (ICC 2011 p. 15).

1.4. The micro aspect

On the micro-level the in-house management of corporates must be re-evaluated due to the experience of trade finance during the financial crisis. Before the financial crisis, nearly half of the companies never scored or comprehensively analyzed their portfolios of trade receivables, and less than 20 % of corporates performed this analysis on a systematic basis. Since the crisis, companies worldwide are missing opportunities to maximize their cash reserves and reduce their borrowing costs because of a failure to analyze and manage their customers' overall creditworthiness and payment history (Wimley, S.C. study of the technology company Sungard and approximately 300 companies worldwide). Wimley stated that "Savvy CFOs (Chief Financial Officers) and corporate treasurers consider trade receivables as part of the capital structure of the organization. But how do you maximize the return on that capital and use trade receivables to generate cash? You have to start with some intelligence, some visibility and transparency as to what's happening across the portfolio" (Wimley C.J. 2011). The micro optimization of trade receivables can be organized under three main topics: credit risk evaluation, avoidance of late payments, and outsourcing.

1.5. First motivation for the paper: the micro level

The motivation for the paper is to evaluate the changes that have taken place for corporate trade finance due to the financial crisis. To explore these it is necessary to document the historic development in that area as well as to understand the current use and values of corporate trade with its inherent economic values, risks and possibilities for improvement. A further motivation is the impact of the actual situation for the management of firms, which is explained by Joy as follows: "Management must evaluate the risk-return trade-off alluded to in the ratios. For

any particular sales level or range of sales levels, in general, the greater the firm's current assets (CA)/ total assets (TA) ratio, the lower the firm's risk and return. If the firm maintains a relatively high level of current assets (a high CA/TA ratio), it will have sufficient cash to pay all its bills as they come due" (Joy 1977 p. 410). Third, the interest in corporate trade finance is based on its macro-level impact for global trade. In detail, it is a question of whether the new banking regulations, Basel III, are an adequate reaction to the financial crisis.

Based on these topics, the following research questions could be answered as well through this research study:

A. Corporate trade finance on the micro level: How should corporates analyze the credit risk of their customers to avoid making unpaid deliveries? Is there a fixed mathematical model to evaluate the credit limit, or can bank models be used or adopted? How can a seller best use trade credits for internal handling, and when should they be outsourced? The manual handling of credit analysis and collections is very expensive. In addition, the inherent accounting procedures used to undertake the management of receivables in accordance with security and legal requirements are not inexpensive. They can add up to about 3 % of the sales' face value (Bolero). The easiest way to avoid these costs is to outsource the process. This has already been done in the past, as trade finance or trade credit is historically and currently a bank business and corporates accept this split in order to concentrate on selling their products. However, corporates have better product knowledge and have the option of selling a product to another customer if the first buyer fails to honor payment. To date, there is no proven result as to whether the trade credit solution by a bank is better than that developed by a corporation. The markets are currently testing new solutions such as reverse factoring, in which banks add a credit line to short-term payments and thus enable the product buyer to receive a longer payment term. In reality, there are many options regarding the internal handling and outsourcing of these processes and best practice will differ with each seller. Beside the costs, the risk appetite, the size of the company, the market in which it operates, the customer portfolio, the sales strategy, the regional structure and the outsourcing price will all have an influence on the best option.

How can the seller avoid late payment? Late payment is a common phenomenon in all parts of the world; the only exception for punctual payments is Scandinavia, as it is the only region where interest on late payments is accepted by the market. Twenty years ago, it was nearly impossible for sellers anywhere in the world to prevent the late payment phenomenon because paper reminders were sent by post and the reason for the late payment was always uncertain; in fact, it was often possible that the bank simply did not transfer the money on time. However, today, the reasons are different because late payment is seen more as a free source of liquidity for the buyer.

1.6 Second motivation for the paper: the portfolio level

B. Corporate trade finance for a firm's open receivables portfolio: Even before the beginning of the financial crisis, sellers started to recognize the impact of late payments and employed professional actions to minimize them. Standard ERP systems enabled sellers to identify customers with overdue payments. Trained specialists were able to effectively remind late payers of their payment due dates by using phone reminders. These changes positively affected the costs associated with assessing late payments and reduced bank credit lines. The financial crisis emphasized the importance of (the avoidance of) late payments because bank credit lines were difficult to obtain, even for large producers and wholesalers. Therefore, every amount received helped to improve net working capital, thus reducing the need for credit lines. Further motivation is the micro-level analysis of trade finance and its link to the financing of a company. A negative working capital has to be financed; therefore, working capital is part of the creditworthiness process and has an impact on financing costs. The future impact of corporate trade finance on the profitability of a corporate is a further motivation and will therefore be addressed in more detail in the manuscript, considering that trade finance for trade liabilities and receivables represents large assets and liabilities for retail and wholesale companies. An adequate return on these positions is necessary. Furthermore, through its influence on sales and purchasing volume, trade finance has an even higher influence on the profitability of firms.

1.7. Third motivation for the paper: the macro level

C. Corporate trade finance on the macro level: The motivation is to evaluate how the corporate sector can react to enable the financial trade flow to continue, in spite of any financial crisis in the future. This includes an evaluation of the actions of certain public bodies that actually try, through strict guidelines, to avoid new banking crises. Further motivation is the impact of economic globalization, which has resulted in increased interest in credit risk management, and is therefore of sufficient competition to trade financing through banks and credit insurers, and is a necessity for firms, as trade credit has three unique conditions. These are:

1. Sales do not result in a source of significant financial leverage because the underlying transactions are driven by genuine economic activity;

2. Significantly increased financial leverage hardly to archive because it can only occur with the help of a client; and

3. Trade-related exposures are not likely to contribute to volatile asset prices because of their short-term nature and the fact that they are liquidated by payment upon their maturity.

At the end of the research a new solution will be shown: how corporates can handle trade finance today by using the internet and having better market connections.

1.8. Structure of the manuscript

This research will evaluate in detail the consequences of the financial crisis of 2008 for the financial activities of production companies. As the consequences of the crisis in corporate finance and treasury manifested in (too) many different ways, this research will focus on the trade financing between corporates. This separation was performed because one, corporate trade finance is a fundamental part of buying and selling products and two, corporate trade finance, as opposed to other credit products, has some specific characteristics.

The manuscript first analyzes the basics of corporate trade finance, which have previously been reviewed in the literature. This analysis starts with the theories that are readily available in the literature, followed by a hypothesis development. The analysis begins with the identification of the financial strategy that corporates have used in recent years, to broadly analyze the state-of-the-art processes in corporate treasuries. The internal and external implications of the actual corporate trade finance actions are then examined through several empirical studies. The impact of the financial crisis as it is understood by experts in treasury and corporate trade finance is also evaluated. This analysis enables a study of the future of corporate trade finance and a discussion of the global regulation plans for trade finance. The regulators want higher bank equity to reduce banking default risk, which will in turn impact corporate financing costs. The fundamental question that is evaluated concerns the economic justification of the higher financing costs. A more detailed question raised is the evaluation of the costs to the corporates. Finally, after assessing the various impacts, a novel concept to improve the process is proposed and discussed in the final chapter: Discussions and Conclusions.

2. LITERATURE REVIEW

This section reviews a company's basic methods and capabilities for handling financial trade, in the literature. To further understand the process of trade flow and trade credit, the following sections further review the concepts and theoretical background of working capital management. The structure follows the three research topics, starting with the micro level A: Corporate trade finance on the micro level:

Although the term "credit management" is usually used, the more precise wording is credit risk management. The following section briefly discusses the concept and features of credit management.

The word "credit" has its source in the Latin word "*credere*", which means "to believe". However, belief is not a certainty in business, where credit generally leads to a risk of default when lending money to someone for a set period. In the context of corporate finance, risk means uncertainty. The methods that is developed to determine corporate finance risk involve the method of probability distribution in many situations (Woolley 2009, p. 147), a decision tree for the all-or-nothing events (Woolley 2009, p.151) and the sensitivities (i.e., strong/weak risk; Woolley 2009, p. 156). Using the same method like a medicine doctor to test the health of a patient, a trained financial analyst has his tools and knowledge to test the health of a firm (Fitzgerald 2002, p. 129). This analysis is also necessary when a company considers giving trade credit to a corporate.

2.1. Definitions of credit management features

Business-to-business (B2B) transactions are those that take place between at least two companies, in contrast to a business relationship between firms and other market groups (e.g., B2C, which refers to business-to-consumer or -government agencies).

The methods that are used for forecasting of insolvency analyze different

indicators that are relevant in the assessment of the probability that a company is facing financial difficulties. These indicators are not always clear signals, therefore the first step is to sort out indicators with uncertain signals. There are many signals and methods for insolvency forecasting, and these reflect the fact that economic conditions, and thus the trust in a company's future ability to pay its debt, continually changes, because the steadily changing political and economic conditions influence an individual company strongly. Economic developments and the actions of its competitors affect the ability of any business. It is therefore necessary to combine the company's data (annual report) with an evaluation of the environment in which the firm conducts business (Fraser and Ormiston 2010, p. 202). Thus, there is a different data structure for each corporate debtor. In common is that insolvency forecasting methods are often use historical data and norms. When the environmental conditions change rapidly, economic forecasting becomes more important. However, these forecasts are not particularly reliable indicators on their own. Riccio mentions that "the degree of a firm's business risk sets the expectations for the financial risk it can afford at a particular credit level" (Ganguin et al. 2005, p.80). To date, only the scoring procedures have prevailed in the market because the other procedures, although not methodologically poor, are simply more difficult to use.

2.1.1. Discriminate analysis and default rates

The discriminate analysis uses the fact that companies that become insolvent show certain characteristics, mainly from the annual report. These characteristics are different from a "normal" company, which is successful. The discriminate analysis that was tested uses only the annual report data. However, the use of other data in business-to-business credit analysis is also important, as is discussed later in the manuscript. The initial determination of the discriminate calculation uses samples of insolvent and solvent firms. The discriminate calculation is dependent on the composition of the samples and the plausibility of the individual ratios of the sampled companies. The results usually have an accuracy of 80 %, which retains a residual risk (Rösler et al. 2002, p. 650).

The probability of default is the likelihood that a receivable, such as an unpaid trade account, will not be paid because the debtor does not have the necessary funds. The probability of default affects the theoretical interest rate that is used in the vendor credit, and which forms part of the product pricing. The historical data that provides an insight into the probability of default in business-to-business transactions is increasingly available. This data is shown on a per annum basis; therefore, it has to be converted from turnover and payment periods. As a result of recent IAS accounting requirements, international corporations in particular, now publish details of their default rates. The information of the default rates that can be used to assess the credit risk in business-to-business transactions is then used in the analysis in combination with data on payment performance, and the usual financial data that is available to banks. Less research has been performed on stress scenarios (Hughes and Steward 2008, p. 25). These studies analyze scenarios for the development of various underlying data constellations and the identification of potential default rates. Such scenarios have gained in importance as a result of the financial crisis because the default risk affects entire sectors (e.g., the automotive sector). These scenarios place suppliers in a position in which they have to determine whether or not to accept the attendant risk.

A distinction is necessary to separate the default probability and the risks that arise from unexpected events. The probability of default is calculated on historical insolvency trends and therefore on expected events. They are extrapolated to the future. The unexpected events and their risk of returning also needs to be considered. This can be done, for example, through the use of risk buffers. Another method is to evaluate stress scenarios (Homburg & Krohmer 2006, p.925 and Hughes & Steward 2008, p.25ff). Convincing insolvency forecasting data is very important for the determination of default rates, which are the basis to find adequate credit limits, set prices, which are risk-based, and enables best practice processes. It has even an impact to the borrowers as efficient insolvency forecasting support them to adopt the same appropriate risk-aware practices.

2.1.2. Credit rating and credit spread

In credit risk management, the credit assessment data is increasingly aggregated in a standardized way. The assessment of the credit data is implemented to obtain a practical interpretation (analysis) of the data and the weight of the different data, in an evaluation scale. It is also important to systematically select the data that will be used in the analysis depending on the weight. This applies not only to the data obtained from single borrowers but also for the data of an overall portfolio (Rösler et al. 2002, p. 647). The default probability is then converted into an easily readable scale, as with the credit score (Zahn 1986, p. 125).

Credit rating has been widely performed for countries, multinationals and bonds by ratings agencies and banks for many years and is therefore well established. Creditworthiness is of paramount importance for obtaining finance, either for the public or the private sector, affecting both the volume and the interest rate of debt finance. At the same time, along with the issue of debt, a financial instrument was created, the credit default swap (CDS), which deals with protection against risk in the case of an emerging inability of debt repayment. A CDS refers to a swap contract in which the protection buyer of the CDS makes a series of payments, often referred on CDS fee or spread, to the protection seller and, in exchange, receives a payoff if a credit instrument – a bond or a loan – experiences a credit event. CDS spreads arise when there are signs that those repayments cannot be met, increasing the fear of a default by the entity that issued the underlying debt instrument. A default is referred to as a credit event and includes such events as failure to pay, restructuring and bankruptcy (Papaioannou 2011).

Credit spread is defined as the additional amount of interest paid by a risky asset over the yield of a risk-free investment (Trück, Laub & Rachev, 2004). Credit spread was originally used to describe the default risk of bonds. The yields of corporate bonds differ from risk-free bonds (government bonds) depending on the creditworthiness of the borrower. This yield difference is called the credit spread. Although the ratings are not a linear scaling of the default probabilities, the credit spread between the ratings is more exact (Koller et al. 2005, p. 490).

2.1.3. Credit scoring

Credit scoring is an application of a classification technique that evaluates the default risk of debtors into different risk groups. Because the classification techniques are based on data mining, the process of credit scoring can be considered a data mining application that utilizes new techniques to pre-process the input data and build classification models (Liu 2002, p.1 and Baetge et al. 1994, p. 327ff). The aim of credit scoring is to use an analytical technique to standardize the pre-emptive diagnosis of the difficulties of an enterprise. This technique was developed in the US in 1960 by E. Altman and was rapidly customized in France by the National Bank of France (Quiry & Vernimmen 2011, p. 177). The basic concept that was used to develop this method involves the use of the company account ratios, which are the leading indicators of business difficulties. Once these ratios are established, they can be compared to those of firms that have experienced difficulties or failures. The comparison is performed in an overall framework rather than ratio by ratio. In effect, the ratios are aggregated into a Z-score function that gives each company a score. The calculation of the Z-score has the general form

$$Z = \sum_{i=1}^{n} \alpha + \beta i \, Ri$$

where α is a constant, R_i refers to each ratio, β_i corresponds to the relative weight that is attached to R_i and n is the number of ratios that are used in the analysis (Vernimmen 2011, p. 178). Depending on whether the value of the function is near or far from the normative values that were determined for a sample of companies that have experienced difficulties, the probability that the company that is being studied will experience difficulties in the next two or three years can be estimated.

A business-to-business credit score works with numerical values based on a statistical analysis that indicates the default probability of a firm. Credit scoring is based on procedures that are pre-defined and standardized for a portfolio of

debtors. The aim for the using firm is to assess the creditworthiness of their customers. The advantages of credit scoring are as follows:

- It eliminates the analyst's personal preferences;
- It facilitates making an objective decision;
- It lowers credit analysis costs; and
- It enables faster credit decisions.

The disadvantages of credit scoring are the following:

- The analyst's personal experience of the customer in question and the risk environment are seldom taken into account
- Special credit relevant points for the respected customer cannot be included;
- The data are not available as they may be confidential;
- Scoring is seldom used with adequate attention to qualitative data; and
- The scoring methods back-testing need to be regularly done.

In addition to the scoring system described, further computational and/or mathematical methods are used to facilitate the assessment of credit and creditworthiness. As with credit scoring, these methods ensure that the decisions are easier to control. Furthermore, the worsening risks of company activities can be recognized faster through the use of these procedures.

2.1.4. Credit limit

Credit limit defines the maximum level of receivables for a specific customer (Fitzgerald 2002, p. 192). The credit limit should include any open orders if the goods are produced specifically for the customer. These limits should be regularly reviewed to determine if any changes in the credit limit are needed due to changes in the buyer's creditworthiness. In addition to the identification of individual limits for each customer, credit limits may be set for groups of companies, entire countries or sectors.

To generate additional sales, suppliers may be prepared to grant trade credit, even when the default rate is above the financially viable credit limits that were

determined for the individual customers. From a business viewpoint, these credit limits are part of the marketing mix (Homburg and Kohmer 2006, p.61 and Weiß 2007, p. 18f) that is determined in an attempt to increase overall profits (Broens 2010 b). If a company accepts marketing limits, the sales department is included in the approval process for the determination of this limit. This can be performed through the addition of a marketing limit without the performance of any finance/credit analysis, or through a common process between both departments (Fitzgerald 2002, p. 199).

2.1.5. Further definitions

Some of these aspects have already been partially defined in the introduction of receivables management. Risk appetite is further defined as "the amount of risk, on a broad level, that an organization is willing to accept in the pursuit of stakeholder value. Risk tolerances are the levels of variation that the entity is willing to accept for specific objectives" (COSO 2011). The terms "risk appetite" and "risk tolerance" are frequently used, but sometimes in different meanings. Risk appetite describes the planned level of risk that an entity will take in accordance with other targets of the firm. Risk tolerance focuses on the outcomes that are possible. The risk tolerance should considers only results which are within the targets of a corporate (COSO 2011). Ernst & Young have a different perspective which they document in its paper "Risk Appetite: The strategic balancing act". In this report, they define multiple terms:

- Risk capacity: the volume per kinds of risk that an organization can support within its business objectives;
- Risk appetite: the volume per kinds of risk that an organization is willing to support within its business objectives;
- Risk tolerance: the maximum volume for a specific risk that an organization is willing to take;

- Risk target: the planned amount of risk that an organization wants to take, as that amount is seen to best support a specific business goal; and

- Risk limit: the threshold that a company installs to avoid that the actual risk exposure does deviate too much from the risk target. Furthermore, the risk limit is within an organization's risk appetite. The exceeding of risk limits will typically lead to manual management action (Ernst &Young 2010). Ernst & Young's definition for risk limit can also be used to define credit limit.

An expert system consists of a collection of facts and decision rules that represent the knowledge of experts in a particular subject area. In addition, an expert system is capable of learning, which means that it can recognize patterns from different layers and consider these patterns in the decision-making process. However, an expert system is complex and hard to use and is therefore expensive.

"Neural networks" are often referred to as "artificial intelligence". These make it possible, in certain respects, for an (initially) inaccurately described problem structure to adapt on the basis of empirical observations. Neural networks used to require high memory capabilities and were therefore expensive (Rösler et al. 2002 p. 652). However, these are no longer as expensive, although the software costs are not acceptable compared to the default volume of business-to-business credit management.

2.2. Credit analysis

The next topics discussed in this manuscript are the relevant sources and methods that can be used to more efficiently analyze credit:

There are various types of data in business-to-business credit management that form the basis of a credit decision. Data can first be divided into internal and external data. The internal information is obtained from the company of the seller/creditor, whereas the external data is information that is received or acquired by the seller through other sources. Both these categories can then be subdivided

into quantitative and qualitative data. Quantitative data can be represented numerically, whereas qualitative methods in credit management involve the description, interpretation and understanding of other economic circumstances (Jährig and Schuck 1982, pp. 181ff).

The primary source for information on a buyer's creditworthiness is the year-end accounts (Vernimmen 1976, p. 174). These reports contain the basic data that many analysts feel is required for a thorough statistical default prediction. During the calculation of the default prediction, several individual pieces of data from the year-end accounts are converted into ratios, which are then combined with a comparison of several periods (trend analyses) and with industry trends and averages (Leffson 1984, p. 205ff). The age of the client company and the duration of the business relationship have also been suggested as additional quantitative company data (Weiss 2007, p. 5).

2.2.1. Quantitative data and their sources

The quantitative data on the buyer's payment behavior history also plays an important role in the evaluation of their creditworthiness. In fact, the payment behaviour of the buying company over the past twelve months is considered particularly important for the company to be adjudged creditworthy or not. The profit margin from the sale of goods (not including the credit risk costs) is also an important internal criterion for a credit decision. If the inherent credit risk costs exceed the profits from a business transaction, the forecasted revenue is negated and thus this type of sale should be avoided. The qualitative company data includes the assessments of the condition of buildings, machines and warehouses and an evaluation of the debtor's product range. Furthermore, the qualitative company data involves an assessment of the debtor's company management with respect to the ability of the company's leadership to ensure the company's financial success (Böhnisch et al. 2004, p. 348).

Commercial credit agencies are an alternative source of information because these provide details of the economic and legal situation of a company for a fee (Brealey et al. 2009, p. 558 and Gallinger and Healey 1991, p. 356). Credit agencies do not guarantee the quality of their data; therefore, it is possible that some individual figures are incorrect. These agencies often collect their data from self-investigation by the company in question. Moreover, credit agencies do not disclose the methodology used in their estimation of a company's credit scores and limits. Therefore, there is always a risk that the use of credit agency data could lead to a false assessment. Banks also play a vital role for the credit manager. "With the customer's permission, the customer's bank can be approached as a credit source either directly or through the credit managers' bank" (Gallinger and Healey 1991, p. 358). Furthermore, the ratings agencies, such as S&P and Moody's, publish benchmark ratios that can be used to compare companies. These are presented both in verbal form and in the form of a credit score. The ratings agencies analyze a company's annual reports and evaluate the company's financial obligations and growth expectations during the calculation of these ratios. These companies also analyze the quality of the management by addressing questions directly, asking for transparent information, and discussing strategy and other activities openly with the board (Gallinger and Healey 1991, p. 90ff).

2.2.2. The important of annual report data

As stated by Keown, the most common form of credit analysis uses the information that is provided in the financial statements to measure a company's performance and make financial projections of their future performance. In general, Keown considers "financial analysis a tool for not just financial managers but also investors, lenders, suppliers, employees, and customers" (Keown 2006, p. 102).

An income statement is a summary of the profitability of a firm over a period of time, such as a year. It therefore presents the revenues that were generated during the operating period, the expenses that were incurred, and the firm's net earnings, which are simply the difference between the revenues and the expenses (Bodie et al. 2009, p. 429). In addition, the balance sheet, which is a list of the firm's assets

and liabilities at a specific moment, provides a situational report of the firm as at the end of the period. The difference between the assets and the liabilities is the net worth of the firm (Bodie et al. 2009, p. 431). Financial statements are used by credit analysts to determine a number of features: a) the financial reserves, b) the effectiveness of the management, c) the business attractiveness, d) the payment behaviour, and e) the firm's securities.

2.2.3. Credit analysis of the financial reserves of a company

Financial reserves are needed for times of financial instability. There are two forms of protection against instability: operational security, which is judged by the interest cover; and structural security, which is judged by the gearing (Bodie et al. 2009, p. 431). Operational security is the ability of a firm to create cash that can be used to repay bank and trade loans and the conjunct interests. The security ratio is the comparison of the operating profit before interest and tax, with the net interest payable. The financial ratio "interest coverage" provides a good understanding of a firm's ability to pay the interest charges on its finance liabilities. Koller describes interest coverage as the most significant single indicator. "The coverage aspect of this ratio indicates how many times the interest could be paid from the available earnings, thereby providing a sense of the safety margin a company has for paying its interest in any period. A company that sustains its earnings well above its interest requirements is in an excellent position to weather possible financial storms. In contrast, a company that barely manages to cover its interest costs may easily fall into bankruptcy if its earnings suffer for even a single month" (Koller 2005, p. 488).

In general, an interest coverage ratio under two investors is a warning signal for investors. An interest coverage ratio below one gives a hint that the business concerned generate not sufficient cash to pay its interest payment. In addition, the history and consistency of its earnings is tremendously important. More consistent earnings are reflected by lower interest coverage ratios. The second protection of the financial reserves in a company is related to the financing structure of the firm (Fraser and Ormiston 2010, p. 210). This question can be answered in part by the

gearing ratio, which is the relationship between net borrowing and equity. Net borrowing refers to all the external bank debt deducted by the available cash. In some cases, the trade receivables and liabilities are included in the gearing calculation. The gearing shows the %age of the debt financing, and the %age of equity as the financial source. The equity is helpful in a critical profit situation because there is then no need to pay any dividend.

2.2.4. Credit analysis of the gearing of a company

Financing of companies with a debt-to-equity gearing ratio of over 10 can be difficult. An evaluation of the 2009 financial statements of approximately 4.3 million European companies shows that there are significant differences in the gearing ratios between countries. A gearing over 10 is typical in southern Europe, such as in Italy (36 %), Portugal (27 %) and Spain (26 %), but also in Great Britain and Ireland, where approximately 33 % of companies have an equity ratio of less than 10 %. More stable funding, however, is apparent in companies in Scandinavia. In Sweden, for example, only 14 % of the companies have a gearing higher than 9. The proportion of weakly capitalized companies in Germany is 23 %, which places Germany in the middle of the countries that were analyzed, based on their %age of weak companies. Overall, approximately one in four companies (26 %) in western Europe have a gearing ratio of over nine and thus depend on external creditors, which results in the company having a corporate stability risk (Creditreform 2011, p. 19f). Excessive gearing arises through an increase in interest costs, payment of higher dividends as the so-called dividend cover, acquisitions that are financed by debt, and operating losses, which can be the (negative) result of a lack of management effectiveness.

2.2.5. Credit analysis of the effectiveness of management

Management effectiveness can be evaluated first-hand through financial results. Shareholders consider financial results as indicators of management effectiveness; in this context, high profits are a documentation of effectiveness. Therefore, most shareholders judge management effectiveness by the profits. According to an

analysis of the accounts in Europe in the year 2009, 27.8 % of the three million companies that were surveyed did not report profits. In 2008, the year of recession all over the world, this figure fell to 26 %. In 2007, only 24 % of the companies were negative. However, other companies performed better. In 2008, 16 % of companies had a profit of over 10 %, and 10 % of the total companies exhibited a profit of over 25 %. In 2007, even more companies were successful. In contrast, the %age of companies that exhibited a profit margin over 10 % in 2009 was 15 % (Creditreform 2011, p. 19f).

Management effectiveness can also be analyzed through the use of other profitability ratios. Of the various possible ratios, the returns on equity and on total assets ratios are most widely used. Investors will typically consider the return on equity, and lenders (banks or trade partners) will usually analyze the total assets return on equity and on sales. In 2010, the return on equity in Europe (27 countries) was 4.96 % (ECB). There are many additional indirectly measurable items that can signify the effectiveness of management. In addition to financial data, shareholders analyze other data, such as productivity ratios, which are expressed as the amount of sales per employee. Although the number itself is not helpful, its development over time and its comparison with other firms of the same sector enables an evaluation of management effectiveness. As an example, the sales per employee of a wholesaler must be significantly higher than the sales per employee of a production company, because there is a bigger chain of additional economic value in a production company. In addition, the effect of external factors, that cannot be influenced by the management, such as changes in the inflation rate and economic changes (i.e., general demand/GDP development), should be considered.

The effectiveness of the management can also be indirectly evaluated through the analysis of soft factors, because the board ultimately determines the result. The evaluation mainly concerns the formal criteria of the board members, such as their experience in the business, their education, the necessary changes that might arise due to the retirement of a manager, and the link between the management and

other companies, organizations, employees and government. In addition, the personal integrity of the board can be considered.

2.2.6. Credit analysis of the attractiveness of a business

For a credit lender, the attractiveness of a business refers to its profit stability in the sector. Because every company faces many distinct risks, it is hard to identify the most important ones. The risk of default is a conglomerate of all the possible risks, such as those associated with the product, country, market, competition, tax, pollution, and personnel. The diversity can refer to a reduction of risk, but a single risk can also be such that it can result in the total failure of the company. Large, advanced corporates handle all of their risk through the installation of an enterprise risk management organization system (Fraser and Ormiston 2010, p. 112). Although the "normal" credit interest does not affect the positive developments of a company, it is indirectly important for the lender because it will influence the company's investors. Typical situations include the recovery of a company such as the following: A company has valid assets that can be sold; however, these are usually sold at a poor profit or even at a loss. The credit analysts consider either the value of asset stripping, especially if the market prices are higher than the book value, or they evaluate the changes that are required of the company, if it is well-managed and the industry has reached the bottom of its cycle (Fitzgerald 2002. p. 167).

For start-ups/high-growth companies, the prediction of future cash-flows varies greatly and includes the risk of default. The development of the US-based NASDAQ index is an example of this prediction. Investors buy technology shares without using normal valuation methods. Instead they consider deeply the product and growth rate planning. However, in addition to the risk that the competitors might be better, the profit of high-growth companies does not often increase to the same degree as sales. Many of these companies never achieve a comparable profit, but trade on over-average price-earning-ratios (Fitzgerald 2002. p. 166).

2.2.7. Credit analysis of business payment behaviours

The monitoring of the payment behaviours of a portfolio of credit exposures generally has the aim of obtaining prompt cash payments. However, along with the nominal credit size, there is a need to monitor the portfolios of credit balances more effectively, incorporating an evaluation of the actual portfolio as well as the planning and execution of policies for each of its sub-segments. This monitoring only makes sense if the seller is certain of the timely and accurate dispatch of invoices, and the subsequent enforcement of the credit terms. Traditionally, credit and disbursement managers use turnover ratios (or the complementary DSO) and aging schedules to analyze outstanding credit balances. In this analysis, credit managers continue to employ aggregate models, which are easy to use, to calculate these performance indices (Damodaran 2006. p. 425). Furthermore, these indices are a tool that can be used to compare two different periods.

The aging of accounts receivable is another traditional method that is used to analyze these balances. An aging schedule attempts to show the proportion of the current outstanding balance that originates from sales made in previous periods. Considerable controversy exists on whether the DSO and aging procedures are acceptable methods to monitor the accounts receivable. Although these methods are still widely used, their results may be misleading and are frequently erroneous (Damodaran 2006, p.432). The difficulty with using DSO and aging schedules arises from the fact that an upward sales trend gives the impression of improved customer payment behaviour when, in fact, the behaviour may have worsened or not significantly changed. In addition, when sales are falling, both monitoring techniques give the impression that the receivables are less current than they actually are.

2.2.7.1. Days sales outstandings theory and practical

Furthermore, any changes to any of the conditions that govern the accounts receivable balance make the interpretation of the DSO index difficult. If the DSO index does not change, but the corporate adds new customers or changes the sales price, the significance of the DSO index is obscured. In addition, the DSO measure

simply does not take into account the impact that credit sales have on the cash flow and the profit from the investments in receivables (Stone 1976, p. 65). Consequently, most analysts recognize the influence of this sales pattern and consider an extra factor. A technique that can be used to overcome the problems associated with these traditional techniques is the use of a weighted-DSO scheme. This technique allows the calculation of the DSO to be independent of both the sales averaging period and the sales pattern. Furthermore, it provides a comparison with a standard, such as the budget or last year's results, and thus also gives the information that is provided by aging schedules in addition to the DSO (Damodaran, 2006, p. 433). The collections experience variance (CEV) is a direct measure of collections efficiency. The CEV is calculated at the sales level and is linked with the corresponding new receivables budget, which allows recognition of whether the outstanding receivables should increase or decrease directly with any changes in sales (Damodaran 2006, p. 435). The collections experience variance is therefore not influenced by any changes in the sales pattern, which would typically hinder the traditional DSO and aging schedules measures.

The sales pattern variance (SPV) is another major component of the receivables variance. This variance indicates the effect that a change in the sales pattern has on the receivables balance. One might argue that credit analysts cannot be held accountable for any variance in the sales pattern. Although this is generally true, this variance should be considered when credit decisions are made. Companies in Europe have significantly different open invoice times that depend on the country in which they are based. For example, companies in Greece (average 140 days) and Italy (105 days) have to wait the longest for the payment of any outstanding receivables, whereas companies in Germany (26 days), Finland (26 days), and Austria (28 days) receive their money much faster. In fact, the average in Western Europe is 54 days. Mid-sized suppliers and service providers in particular can have a long period of outstanding payments, which has a significant impact because these companies often supply goods in advance. These payment delays or even failures lead to severe liquidity shortages. Therefore, export-oriented companies have to establish a per country approach to collections (Creditreform 2011, p. 20f).

2.2.7.2. Days sales outstanding parts

The time from the creation of the invoice to the receipt of cash can be split into two parts: the payment term granted and the overdue period. These are reported in an "aging schedule" (Fitzgerald 2002, p. 197), which breaks down the receivables by the age of the account. This is normally performed for overdue periods of between 0 to 10 days, 10 to 30 days, 31 to 60 days and longer. It is interesting to observe the value of the accounts in each period and the %age in relation to the total open receivables of each customer (Brigham and Gapenski 1997, p. 882). This type of structure is often shown in annual reports under IRS and US-GAAP accounting rules (for an example, please refer to the annual reports from BASF SE and Bayer AG). The aging schedule should be regularly analyzed, taking into account the absolute figures and any developments that have occurred since the previous analysis. However, deterioration in the figures does not necessarily indicate that collections are more inefficient, but can be due to varying market trends, different sales strategies or seasonal effects.

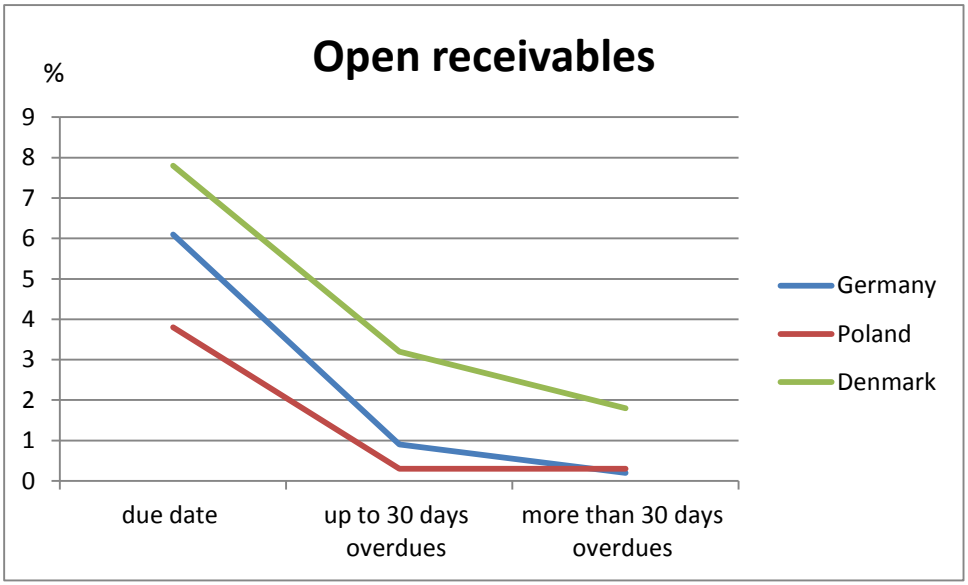


Figure 1: Aging schedules of companies in different European countries (adapted from data reported by Dun & Bradstreet for 2009).

Corporates typically deal with overdue payments in one or a combination of the following ways:

1. Sending reminder letters, which inform the buyer about the overdue debt. These letters are necessary for the start of legal proceedings in some countries.

2. Calling the customer and informing him about the situation.

3. Appointing a collections company (outsourcing the action to specialists).

4. Starting legal procedures.

5. Stopping further deliveries of goods until all overdue payments over a set limit are paid.

The use of any of these actions has the inherent risk of conflict between the finance and sales departments because these actions make further sales to the customer difficult. In addition, not all customers can be treated equally. The best practice is to define customer groups that can be handled similarly. For example, some customers should receive reminders rapidly, whereas this action would disturb sales with other customers. In addition, some customers react to mailings, whereas others are better reached by phone. The European Commission has implemented a directive to help prevent late payment of commercial sales. This was designed to alleviate administrative and financial burdens for small and medium enterprises, which are most affected by late payments. The directive is also binding for public authorities. Basically, the directive refunds the interest to the buyer for any delay of over 30 days. The interest rate that is used is well above the minimum rate of the European Central Bank. Furthermore, the creditors, in the case of uncontested claims, can undertake legal action, which must be initiated within 80 days (EU 2000).

2.2.8. Credit analysis and securities

The securing of loans by appropriate legal measures was started in the difficult economic times after World War I and received further practical importance

during the Depression of 1929/1930. Before World War 1, an unsecured credit was mostly used (Jährig and Schuck 1982, p. 272). The use of securities could almost be considered a refusal to undertake a commercial credit risk. Even when a company trusts the creditworthiness of a debtor, these securities are often requested because the credit situation of the buyer could change. Furthermore, trust in a debtor's morality and creditworthiness is not always sufficient for the granting of a loan. In both these situations, an additional certainty of debt repayment positively affects the credit agreement for both sides because it reduces the credit risk and the margin.

The business cycle is reflected in credit securities. During a rising economy, the use of credit by the economy increases because the increased sales, inventories and investments must be financed through the appointment of the appropriate collateral. However, a decline in the economy, particularly during the onset of a recession, inevitably tests the loan securities. The value of the loan collateral proves the lender's credit risk in terms of their rights and their value, which means that the loans have to be legal and their value has to be as high as the part of the loan that is secured by the security. Companies and banks have problems if the creditworthiness of debtors without securities decreases. If these companies and banks were careless with their risk-taking during times of economic boom, they will have higher defaults if their debtors do not have securities. The national law is relevant and covers, in addition to the usual conditions that are defined by private laws, issues of excessive credit protection, bankruptcy laws, the relationship with other creditors, and credit fraud.

2.2.8.1. Credit data interpretation

Corporate credit managers must be able to make fast credit decisions, which are usually based on limited information because the sales departments want to rapidly execute the sale by sending the product and writing an invoice (Dennis 2000, p. 323). Because there is no certainty that payment will be made, the credit-giving company and its credit analysts should make a basic decision regarding the amount of risk they want to take. The credit manager can choose to take a conservative approach and give credit only when the facts confirm a high probability of

payment, which makes sense if the margin of the product is low or if the market is very risky concerning non-payment. He can also choose to take an aggressive approach to credit limits, which might be the best solution in very stable markets (Fitzgerald 2002, p. 129). However, it is necessary to exhibit a basic consistency because too much change will lead to misunderstandings by the sales personnel (Dennis 2000, p. 325).

Data is interpreted using absolute figures and ratios. The ratios enable the analyst to reduce the information (mainly of accounts) to a marketable size. Both the ratios and absolute figures provide an indication of the performance of a business (Irwin 1991, p.33). Even though it would be easier if a single measure could be used to describe the creditworthiness of a company, multiple ratios must be compared and linked with other data and ratios to obtain an accurate assessment of the company. This use of multiple ratios will provide an understanding that the evaluation reflects a good qualitative assessment of the health of a firm (Irwin 1991, p. 34). It was mentioned previously that a corporate's success in working capital management can be assessed by considering a number of factors. Similarly, a company's creditworthiness too can be assessed by a few factors. In fact, there are four types of ratios that the product seller considers when giving credit: the liquidity, the equity, the efficiency and the profitability of a firm (Subramanyam 2010, p. 526ff).

2.2.8.2. Evaluation of liquidity

"Liquidity risk refers to the availability of company resources to meet short-term cash requirements" (Subramanyam 2010, p.526). The importance of liquidity is best understood by considering the repercussions that stem from a company's inability to meet its short-term obligations. "The lack of liquidity prevents a company from taking advantage of favorable discounts or profitable opportunities" (Subramanyam 2010, p. 528). In addition, extreme liquidity problems can force a sale of assets, reduce prices or, in its more severe form, lead to insolvency or bankruptcy (Subramanyam 2010, p.528).

The liquidity of a company is shown in the balance sheet. A net working capital ratio of one or higher is interpreted as a good liquidity position (Subramanyam 2010, p. 531 and Keown 2007, p. 1059). However, a very good liquidity position requires the display of a positive development of this ratio over time, and this development should be comparable to that of benchmark companies. The cash-to-sales ratio provides more concrete information on the liquidity of a company. Obligors prefer to know that the debtor has sufficient cash to pay all of its bills, and this ratio indicates whether or not the sum of bills is smaller than the relevant sales (Higgins 2007, p. 43). Companies require a modest amount of cash to facilitate supply chain transactions, and they sometimes need substantially larger amounts to compensate balances for bank loans and productive investments.

2.2.8.3. Evaluation of long-term financing/equity relationships

Long-term financing/equity-relationships are focused on bankruptcy risk. Bankruptcy is considered if the net worth of a company becomes negative, i.e., if a business closes tomorrow, it would not be possible to satisfy all of the company's debts. The equity of a company must therefore be used wisely. The substantial investment is retained and strengthened by the profits of the company. The substance of the company must be sufficiently high that the debtor is convinced that the company can deal with all of its individual risks.

Equity is important. "Equity refers to the capital risk of a company. The characteristics of equity capital include its uncertain or unspecified return and the lack of any repayment pattern" (Subramanyam 2010, p. 548). Unlike short-term and long-term debt, capital must not be repaid. In contrast, debt must be paid back in full (Fraser, L. & Ormiston 2010, p. 206). A highly debt-leveraged company "enables" both managerial success (income) and failure (loss). For creditors, an increased equity capital is preferred because it confers protection against losses that can occur during difficult situations. A lower equity increases the credit risk for the debtor.

The typical equity ratios of global production companies are 30 % or higher (Subramanyam 2010, p. 549 and Keown 2007, p. 114). The individual %ages of equity depend on various factors. Damodaran describes three alternatives for how firms should choose their financing (Damodaran 2006, p. 326). The first depends on the growth lifecycle of the firm because high-growth firms steadily use increased equity. The second is the structure of other firms in the company's sector, and the third is the preference of the firm (and its bankers) for certain types of financing. It is also important for the lending bank to know whether the company belongs to a sector that ensures constant growth or whether there is a need to make other products to decrease the exposure of the company to one-way market risk.

A ratio that combines a company's long-term financing and equity with its need to be successful in the market is the financial leverage index, which measures the return on equity in relation to the adjusted return on assets. The adjusted return on assets, which is a denominator of the financial leverage index ratio, is calculated as the net earnings plus the interest expense (1 - tax rate) in relation to the total assets (Fraser and Ormiston 2010, p. 206). Furthermore, the asset turnover is worth analyzing. Although some newcomers believe that more assets indicate better liquidity, the reality is the opposite. As Higgins writes in his book, *Analysis for Financial Management*, "unless a company is about to go out of business, its value is in the income stream it generates and its assets are simply a necessary means to this end" (Higgins 2007, p. 40). For 27 countries in Europe, the average return on assets (after interest) in 2010 was 0.23% (ECB).

2.2.8.4. Evaluation of efficiency and profitability

An efficiency ratio evaluates the management. However, because this assessment includes the evaluation of soft factors, it is very difficult to translate the results into a mathematical form such that all analysts would obtain the same result. Fraser and Ormiston use some annual report data as efficiency indicators (Fraser & Ormiston 2010, p. 205). These include the rapidity of the turnover process for

receivables, the inventories, and the trade payables, which are discussed in the sections on working capital management and the evaluation of liquidity. These researchers also believe that efficiency can be evaluated through the ratio of fixed assets to turnover of the total assets. This ratio should improve if an expansion is successful (Fraser & Ormiston, 2010, p. 205).

When analyzing profitability, it is necessary to distinguish between earnings and variable costs and between earnings and fixed costs. In certain situations, companies accept sales on the basis of variable costs. Credit costs are variable costs because a stoppage of sales will quickly reduce the open receivables to zero. Therefore, an analyst has to consider the gross margin (total costs) as well as the margin on variable costs. In addition, companies with a high proportion of fixed costs are more vulnerable to a decline in sales than are other firms, because these "fixed costs" companies cannot reduce their fixed costs when sales fall (Higgins 2007, p. 39).

The profitability of the company also has to be considered in the analysis. Is it sufficient and allowable to self-finance by strengthening its own funds and liquidity? From a risk management point of view, the profit in relation to the asset must be higher than the riskless bank loan, i.e., because bank loans typically have an interest rate of 5 %, the profit margin for a company should be approximately 10 % (Keown 2007, p. 115f). This difference arises because the investor has the risk of obtaining less profit, which can occur due to various reasons, and of losing his total investment through bankruptcy. Consequently, the funding and liquidity must be sustainable and may be affected by increasing business costs, especially wages and salaries, rising costs, and scarcity of raw materials and/or a drop in sales prices. These problems can occur often and the company must be in a position to change and adapt regularly. Furthermore, the development of earning power will determine the extent to which self-financing is possible. The reinvested amount supports both liquidity and equity. Any self-financing that has taken place can be observed in the balance sheet. There is another ratio that is used for assessing companies that are listed on a stock exchange. This ratio is not calculated by using the book value, but its market price (Higgins 2007, p. 49), i.e.,

the profit in relation to the market value of the equity, or the number of shares multiplied by the price per share. The market value of the total of the shares thus indicates to the credit analyst how investors perceive the future of a company.

In general, the market value ratios are superior to the book value ratios because book values are historical whereas the market values indicate the true value of the creditors' or owners' stake in the business. Market value ratios are especially helpful when assessing the financial leverage of rapidly growing, or start-up companies (Higgins 2007, p. 50). In addition, a market price ratio that is below the company's accounting worth is a warning signal.

2.2.8.5. Limitations of financial ratio analysis

Although annual report data is the most important source of data for credit analysis and the subsequent determination of a credit limit, it has the following limitations:

- It is often difficult to define the sector to which a firm belongs when the firm is engaged in multiple lines of business.

- Accounting practices differ widely among firms. For example, the LIFO/FIFO inventory validation and depreciation behaviours result in different data.

- All financial ratios are based on historical and/or sector behaviours, and different situations can thus lead to different results in the analysis of a company.

- Many firms experience seasonality in their operations (e.g., crop protection is a classical sector that experiences this behaviour). Therefore, to avoid inaccurate results, average account balances should be used in these cases (Keown 2007, p. 122).

In spite of their limitations, financial ratios are extensively used and are considered one of the most valuable tools for the assessment of the financial conditions of a company. In addition, ratio analysis is widely used by all firms, banks, investors, regulators and the public (Higgins 2007, p. 56). The solution, therefore, is not the use of fewer ratios but the definition of more comprehensive measures within their

use. If developed with care and imagination, these new ratios can provide a large amount of information on a company. However, it is difficult to combine several ratios into a single data measurement because modern firms are complex. In addition, one or even several single ratios might give the wrong perception of a business. In fact, a ratio has no single correct value for all readers. The interpretation of a value depends on the perspective of the analyst and his evaluation of many other factors. All credit analysts do not have the same understanding regarding the definition of high, low or normal values. This is the case with working capital ratios. From the perspective of a credit analyst with a short-term view, a high current ratio is positive and suggests ample liquidity and a high probability of payment. However, an owner of the company might look at the same current ratio as a negative sign that suggests that the company's assets are being deployed too conservatively (Higgins 2007, p. 56). Therefore, the business-to-business credit analyst has to understand that the management's best working capital ratio might be different than expected.

2.2.9. Final evaluation of creditworthiness

Generally, there are two methods that can be used to obtain a deeper interpretation of data: verbal-qualitative methods, such as the traditional credit report or protocol, and quantitative methods, such as scoring models (Schulte 2002, p. 59f).The verbal-qualitative method has been employed since the implementation of credit. In this assessment, the credit report is based on traditional financial statement analysis. Traditional balance sheet analysis and ratios are generally considered as absolute individual values, which are presented to facilitate prompt decisions. The balance sheet valuation history is added to the analysis of the expectations on the projected figures. Furthermore, emphasis is placed on the overall consideration of all the risk factors, which are evaluated on a case-by-case basis. The overall assessment is then summarized in a vote. The scoring, however, is more regulated. Linear discriminate models have been used in credit decisions for several years. These models attempt to discriminate among customers on the basis of several variables. The score indicates an indifferent point between success and failure relative to an objective relationship of similar customers. The score is

usually based on past financial data and is consequently biased by these procedures (Gallinger and Healey 1991, p. 364). "Usually credit scoring models classify credit customers into two classes: 'good' and 'bad'. The two types of error rates are used to assess the performance of the models. There are different evaluation methods to describe these two types of errors. The most simple and direct method is a matrix" (Liu 2002, p. 51).

The credit scoring process can be considered as a data mining framework that consists of three stages: problem definition, data analysis and model control.

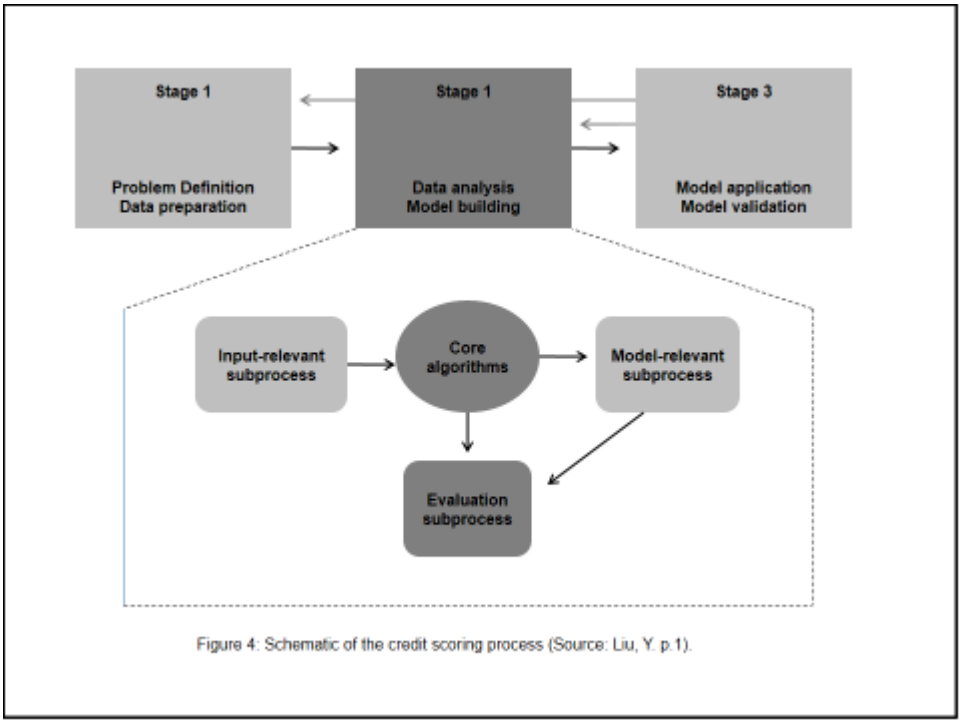


Figure 2: Schematic of the credit scoring process (Source: Liu 2002, p.1)

Scoring analysis requires sufficient relevant credit default data. However, because credit managers generally do not publish this type of data, the necessary data volume is not easily accessible. (Banks behave similarly; however, under the Basel III strictures, banks decided to build a common data pool to collect data on credit defaults (ICC 2010). Gallinger stated that "this system seems to offer the credit manager a relatively simple method for evaluating credit applicants . . . although there are a number of potential problems" (Gallinger & Healey 1991, p. 367). He

believes that analysts do not use the best ratios in their assessments of credit scoring; in fact, he postulates that analysts use some measures that have no influence whatsoever on the future success of credit customers.

The credit analyst, who has access to all the ratios, should consider the inter-relationships between individual ratios. Therefore, short-term liquidity, operating efficiency and capital structure should be considered in one ratio. This is theoretically possible because all these ratios are relevant. The DuPont system developed a formula for the calculation of an overall ratio:

Net profit margin x Total assets turnover
= Return on investment Return on investment x Financial leverage
= Return on equity

(Fraser and Ormiston 2010, p. 21)

2.3. Corporate trade finance for a firm's open receivables portfolio

Management of receivables

If a company sells goods or services, (1) either an immediate payment in cash is agreed or (2) the company gives credit to the customer and thus has to wait a set amount of time to receive the funds. Buckley refers to this credit as an investment in a customer that is linked to the sale of a product or a service (Buckley et al. 2000, p. 611).

If credit is granted by a company, a demand for its goods and services is created. If these credits are granted as loans to other companies, these are considered trade or commercial debts. Today, business-to-business credits are often used and are called consumer loans or consumer credit if these are granted to customers. The basis of receivables is that the firm sells a product and gives the payer time to pay the bill. Joy describes this as "The firm grants trade credit because it expects the investments in receivables to be profitable . . . and the motivation for investments in receivables may be oriented either toward sales expansion or sales retention" (Joy 1977, p. 457).

As mentioned previously, receivables are part of a company's current assets and appear on the credit side of the balance sheet, thus indicating the success of the company. However, each company should be aware that receivables are simply loans without interest, which can become very expensive. For example, the daily interest on a debt of euro 10 million with a 10 % interest rate amounts to approximately euro 2,800. An increase in the receivables reveals that the funds from the sale of products or services are being received later, and should thus be considered a signal to investigate the cause: Are customers not paying as agreed, paying late, or not able to pay? How many customers are critical?

Damodaran attempted to determine the best method to calculate the credit term because credit decisions have a significant influence on cash flows (Damodaran 2006, p. 399) and therefore credit terms are used to stimulate sales (Damodaran 2006, p. 408). Because the management's objective should be to maximize the long-term wealth of the shareholders, the first approach involves transferring the right proportion of receivables to the other assets.

2.3.1. Investment in receivables

The amount of investment in receivables that a company claims depends on the following factors:

- Risk attitude: an organization's approach to handle or risk.
- Level of risk: the amount of a risk or combination of risks for a corporate in conjunction with the potential probability.
- Risk evaluation: the process of evaluating different results out of the risk analysis to determine whether the risk amounts are acceptable.
- Risk appetite: the amount per type of risk and the total addition sum that an organization is willing to take.
- Risk tolerance: the firm's general willingness to take the risk (all ISO 31000).

- Credit borrowing aspects: the influence of receivables on the company's credit rating.

Traditionally, risk is a negative factor and thus something to be avoided. Webster's dictionary defines risk as an "exposure to danger or hazard" (Damodaran 2006, p. 50). Ingersoll, who analyzed financial behaviours, defined risk as a "property of the set of random outcomes that is disliked by the risk averters" (Ingersoll 1987, p. 114). However, risk becomes positive if the management considers their risk appetite, which gives the firm a clear vision of the acceptable risk tolerance levels and specific limits. Therefore, the determination of risk appetite is a healthy process because it opens communications among business units and boards of directors (KPMG 2008).

According to Paton (1922) accounting has to adapt continuously the real live conditions in order to document adequate the reality and its changes. This is still nearly hundred years later valid as well for the receivables accounting: Credit sales are now a financial service by which turnover can be increased. However, this leads to increasing receivables, which credit analysts cannot evaluate easily, as the debtor are not shown in the annual report. Thus, management policy on credit sales impacts the operational value of the firm. An increase in credit sales leads to a higher size of the inventory, and (assumingly) the cash-flow. Furthermore, the percentage between the categories of current and non-current assets will be affected. The higher current asset part might negatively impacted some financial ratios. For example, an increase in receivables due to stronger sales causes a need to increase inventory which is, in turn, related to the adequate increase in sales. In total, we can say that a change in receivables due to trade finance actions causes many effects to the categories of assets on the balance sheet.

2.3.2. Defining the corporate trade credit portfolio

The granting of credit by corporates is often a precondition for a transaction. There are several alternatives giving trade credit. The main financing alternatives are open account or secured by banks, credit insurers, or by another corporate, depending on the strategy used, the market condition and the sales volumes. For

nearly all firms, trade credit is a basic instrument to sell and run their operations. In Europe, Japan and North America, it is in many sectors since long time market condition to finance inventories and receivables heavily by asking supplier and banks for trade credit. A research for the US - Federal Reserve Board, done by Elliehausen and Wolken (1993), found that in 1987, producers' accounts payable count for 20% of all small businesses' liabilities, and 15% of all large firms' total liabilities. On the active side of the balance sheet, accounts receivable count for about 20 % of most corporate balance total active, as later shown. Therefore, trade credit is an instrument, which is used in two-ways from the firms. Particularly distributors represent the two-ways position and behave as an intermediate in the value chain, use trade credit as a product buyer, and provide it as suppliers. Thus, both corporate trade liabilities and assets trade credit inherent a substantial component for each management (Atanasova, 2007). The following section reviews the theoretical and empirical research and literature as well as the different standpoints for trade credit use.

Several studies document in their empirical work that a relationship between firm growth rates and the use of trade credit is given (Cunat, 2007; Tsuruta, 2008). Cunat found in his work that firms with increasing sales often show an increase in using of trade credit relative stronger to other sources of finance, particularly in case of liquidity shocks. A reason might be that banks wait for annual reports and therefore are not so one reacting fast on fast-growing firms' financial needs. This is confirmed by Howorth and Reber (2003), who reports about fast-growing firms and their habitual of late payment by using trade credit. From the balance sheet's ratio Tsuruta (2008) suggests that firms with a high percentage of short term assets are more likely to use trade credit than firms with high percentage of machines and buildings in their balance sheet. A basic rule for trade lending is that a corporate will grant the loan if it is expected to lead to an improvement in their overall business performance. This differs from the credit decisions undertaken by banks. Banks generally decide that granting credit is profitable if the total costs of the credit and its credit risk margin are lower than the price that the debtor has to pay for it. Trade credit is also given under the assumption that the debtor is able to pay (Brealey et al. 2009, p. 558). In addition to these financial orientated factors,

Klapper cited the main reasons for giving trade credit as: a) sale price discrimination, b) to convince a buyer of the quality of the products, c) as a tool to investigate the creditworthiness of the buyer, d) to assist the buyer in funding until it receives its revenues, and e) if bank loans are not obtained (Klapper, et al., 2010).

2.3.2.1. The use of trade finance for the discrimination of sales prices

The price discrimination theory is one reason for the use of trade credit, because trade credit offered to specific buyers is for them more important than a price reduction. This theory is empirical confirmed by Pike et al. (2005) and Ng et al. (1999). Evaluating the reasons in detail, there are two major different one for using trade credit under the aspect of a sales price differentiation (Petersen and Rajan, 1997): First, suppliers offer trade credit as a form of lower price giving for products, where a more elastic demand is market condition. Second, suppliers support their long-term customers to avoid bank debt. This is in normal times for the buyer often expensive, but it helps strongly in a firm or economical financial crisis situations. Suppliers have a strong interest that their customers stay in the market to secure future demand, as this is easier than developing new customer relations.

As defined by Vishwanath: "Credit sales could be a potential marketing tool. If other things remain constant, credit terms could be used to differentiate from competitors or match the industry norm". In addition, Vishwanath explained that selling on credit usually induces further buying and should thus be performed, as long as the "benefits of granting credit exceed the costs" (Vishwanath 2000, p. 323). Klapper writes that, in practice, the customer with the best credit rating often obtains the longest credit terms. This is understandable from the perspective of the supplier, because the best-rated customer has the lowest credit risk. Furthermore, these customers will accept average payment terms only if the price is better. A longer payment term is therefore a good alternative for the seller. A cash discount with earlier payment serves as an instrument for credit risk control (Watson & Head 2010, p. 87). From a financial point of view, a discount rate should not be offered to customers with top credit ratings because the discount rate is much

higher than the conventional bank loan. Thus, the sales management needs guidance from the treasury department to determine which customers should receive a discount. Klapper analyzed discounts from another viewpoint and found that the providers of discounts are big companies with an investment-grade rating, or small companies that are driven by the demands of a larger customer (Klapper 2010). It should be considered, that the interest costs for 30 to 60 days are approximately 1 % of the sales face value. The financing factor in relation to the total product price is therefore not the most critical. Other factors, such as the customer's satisfaction, the need to optimize working capital and the corporate credit standing, influence sales more than the financing does (Watson and Head 2010, p. 72). This is valid for trade receivables as well as for supplier financing.

2.3.2.2. Further use of trade finance as a tool to evaluate the creditworthiness of the buyer

Some of the literature evaluated the information advantage that is given when delivering under trade credit. Theoretical is this evaluated by Biais and Gollier (1997) and empirical studies in that field are from McMillan and Woodruff (1999) and Johnson et al. (2002). In theory, a product seller, who has no credit risk due to spot payment or securing the outstanding, does not need financial information about the customer. But this knowledge helps in all existing business relationships to evaluate the customer's reliability and buying capacity (Kallberg and Udell, 2003; Jappelli and Pagano, 2005). In a moment of crisis banks have already the necessary information to evaluate credit worthiness, but they are more concerned about credit risk and are less willing to give trade credit. Therefore suppliers need like the banks the credit relevant information regularly to decide on adequate information in a crisis situation themselves, whether to reduce trade credit, which lead to a damage of the customer relations for a long time or to give the trade credit. For the export business is a sharing of cross-country information helpful; for example, by informing private and public credit registries and voluntary exchange mechanisms to developing countries.

In the financial crisis of 2008, suppliers generally gave credit, whereas the banks and credit insurers did not (Broens 2011). Klapper explained this as a bank cannot

link the real transaction of the supplier with the financial risk given. But finally the market conditions determine for bankers and supplier the reasons for the giving of trade credit in each specific instance (VCI 2000, p. 12). In general, these reasons lead to trade credit practices that vary depending on the industry and country (Creditreform 2011).

Discounts are the predominant costs of trade credit (e.g., Petersen and Rajan 1994). Often, trade credit seems to be cheaper for the buyer than bank credit. But the supplier will include late payment and reminder costs. From that viewpoint it is a win-win-situation. In addition, suppliers have more knowledge of the strategic default risk of a product than banks, and their inputs are less liquid and thus less easily diverted than cash given by banks (Burkart and Ellingsen 2004).

In addition to the points raised by Klapper and others, Aktas cites important aspects that need to be included in the analysis of trade credit. Aktas used a holistic approach to determine the reasons for the intensive use of trade credit in non-listed US companies, and found that companies with improved credit ratings used increased trade credits. He justified this finding by discussing the increased focus that companies with strong trade finance have on the shareholder values (Aktas et al. 2010).

2.4. Working capital management

Because trade credit is part of working capital management and corporate strategy, the literature on working capital management should also be considered. The following section elaborates on working capital, after an introduction:

Adam Smith developed the concept of circulating capital, which is still relevant today. In 1871, Smith referred to differences between fixed capital and current capital in the balance sheet contents of the Society of Mines Royal (Dewing 1953, p. 685). Therefore the early development of working capital management was based mainly on accounting and unfortunately did not have any significant meaning in terms of value creation at that time (Smith 1936). However, it wasn't until 1917 that the term "working capital management" was explained in detail by

Lough, a business administration researcher, who stated: “Sufficient working capital must be provided in order to take care of the normal process of purchasing materials and supplies, turning out finished products, selling the products, and waiting for payments to be made. If the original estimates of working capital are insufficient, some emergency measures must be resorted to or the business will come to a dead stop” (Lough 1917, p. 355).

Working capital management, from 1920 to 1970, was largely determined by the development of macroeconomics, accounting, and the early development of operations research (Beranek 1988, p. 11). For example, Keynes devoted much of his work to the role of liquidity in the economy (Keynes 1936). Most of the papers published during this phase dealt with the management of isolated and individual optimization of short-term assets and liabilities (Gentry 1988, p. 43). Only in initial research was information from cash, receivables, inventory, and the management of short-term loans combined (Mayer 2007, p. 39). Since 1970, declining growth rates and competitive markets forced management to shift their enterprise strategies. Before the shift, business strategies focused primarily on increasing a company’s profitability through the growth of sales revenues. Since the 1970s, more complex business strategies such as target sales growth and a concentration on maximum returns on capital invested became important, which, in terms of short-term assets and liabilities, mainly meant increasing capital turnover.

2.4.1. Definition and scope of working capital management

The term "working capital" is used in corporate finance as a generally accepted explanation for short-term balance sheet items, which include current assets and short-term liabilities (Brealey and Myers 2000, p. 856). Firth uses working capital as a "general term" (Firth 1976, p. 1). Current assets include all the assets that are not recognized as long-term assets and are therefore expected to be changed into cash within twelve months. Major balance sheet items include inventories, trade receivables and liabilities, other receivables, pre-payments and cash (Coenenberg 2003, p.199 and Eilenberger 2003, p. 152). Their positioning in the balance sheet is determined by the cash conversion times. Analogous to the short-term investments on the asset side, companies have various short-term financing

alternatives (Ross 2005, p. 732). Unlike the fixed capital or long-term assets, working capital has a relatively rapid cash recycling rate. As part of the normal business cycle, investments in inventories and receivables are converted into cash after the sale of the manufactured products and payment of the receivables. In contrast, long-term assets require several years for the repayment of the initial investment (Meyer 2007, p. 528). Concerning the scope, working capital management is strongly relevant concerning the combination of resources and consumptions of working capital. A good management of resources and consumptions leads to a higher shareholder's wealth (Neveu 1985).

Working capital is not only a general expression for short-term operating assets and liabilities, but also utilizes liquidity ratios to evaluate the short-term financing behaviours of companies. In fact, there are different definitions for this term, depending on which short-term balance sheet items are ultimately considered (Schneider 2002, p. 540). Brigham and Gapenski define current assets and liabilities as working capital (sometimes called gross working capital) or net working capital, consisting of the current assets minus the current liabilities. They are further convinced that "approximately 60 % of a typical financial manager's time is devoted to working capital management. This is particularly true in smaller businesses, where most new jobs are created". Furthermore, they state that the task of working capital involves the basic question: "What is the appropriate amount of current assets for the firm to carry both in total and for each specific account?" (Brigham and Gapenski 2007, p. 856). In addition, Keown defines working capital or gross working capital as the total current assets and current liabilities that include the following: a) the assets including trade receivables and inventories, the bank deposits and the short-term financial investments and b) the bank overdraft and other short-term liabilities (Keown 2007, p. 106).

2.4.2. External evaluation of working capital

Financial analysts are generally concerned with gross working capital, because these individuals focus on all the trade activity that can be switched into cash (van Horne, 2008). Watson described working capital management through the association of the general aims of a company. In his book "Corporate Finance" he

wrote: “Working capital management is created by a long-term investment and financing decision of a company to raise future cash flow, which, when discounted by the appropriate cost of the capital, determines the market value of a company. However, such long-term decisions will only result in the expected benefits for the company if attention is also paid to short-term decisions regarding current assets and current liabilities” (Watson and Head 2010, p. 70).

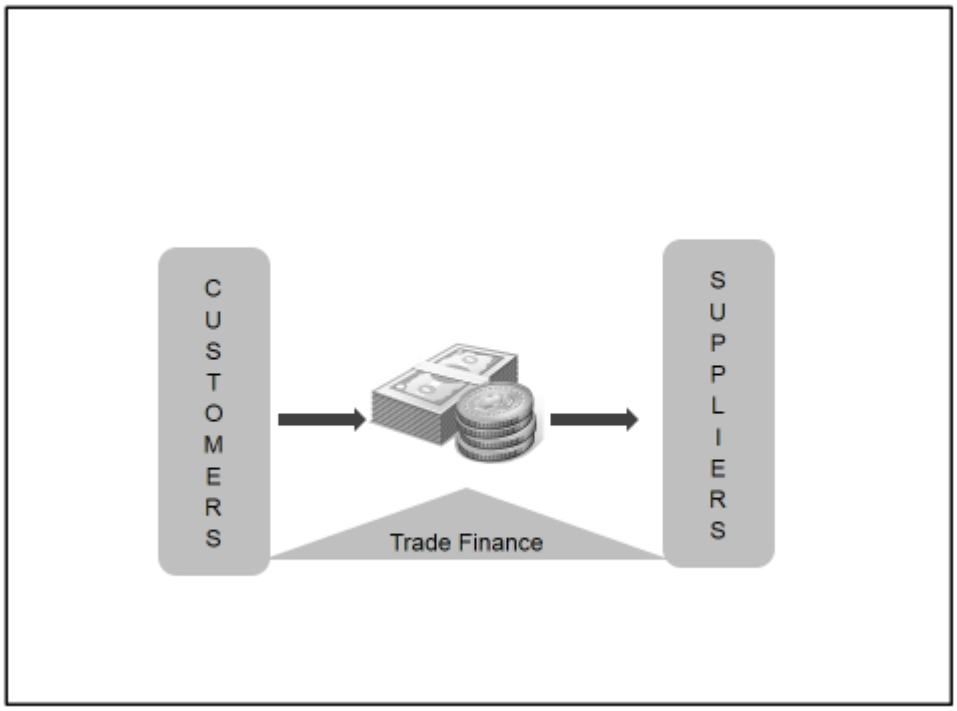


Figure 3: Schematic of working capital and trade finance
(own source)

The term management has its source in the verb “to manage”. This verb comes from the Italian word “*maneggiare*” (to handle, in particular tools), which was derived from the Latin word “*manus*” (hand). The French word “*mesnagement*” (later “*management*”) influenced the meaning of the English word “management” in the seventeenth and eighteenth centuries (Oxford English Dictionary). Today "management" is a fixed term in the English language that has also found

widespread use in other languages, but the term is so widespread that no universally accepted definition exists. In this manuscript, functional and institutional management can be distinguished from a business perspective (Steinmann et al. 1997, p. 5).

2.4.2.1. Scope of management

A functional management approach is defined by the functional organization of a company and describes the management functions that are involved in its planning, organization, management, coordination and control (Fayol 1949, p. 43ff). The approaches of this function depend on the phases of the management process and can be considered an extension of the analytic function-based approach (Terry 1977, p. 34). The functional management approach treats management as a profile function that controls the interaction of the above-mentioned management functions and the factual functions of procurement, production and sales.

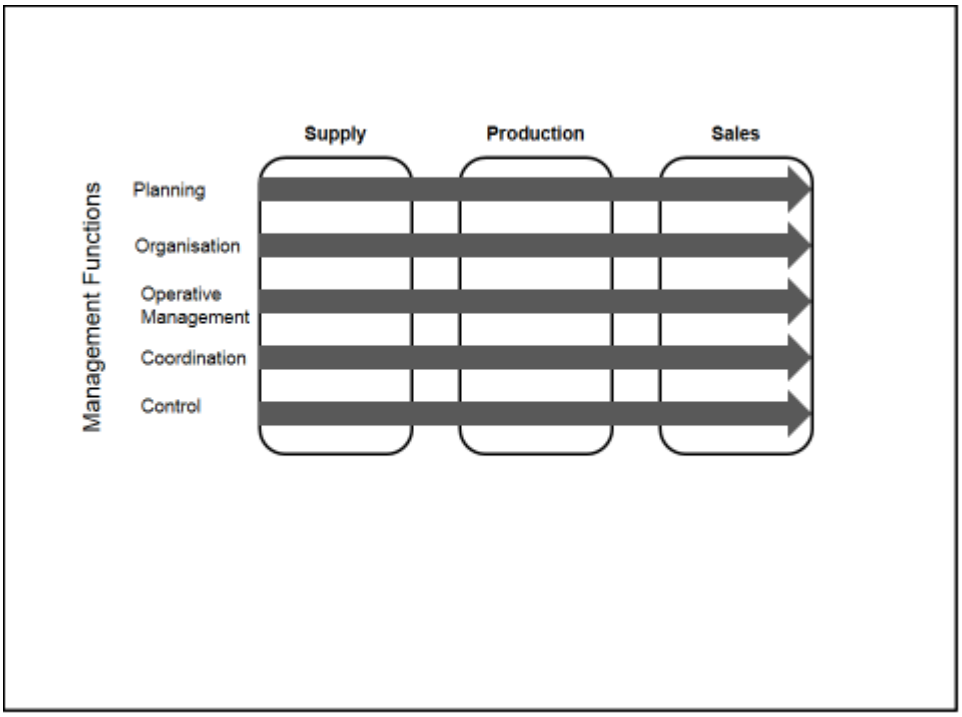


Figure 4: Schematic of factual functions**.** The five management functions are involved throughout the factual supply, production and sales functions of a company (source: Fayol 1949)

The institutional approach evaluates the people (groups) that perform the management tasks; it describes their activities and roles. The scientific research mentioned in this manuscript is focused on the actions of management. Mintzberg concluded that managers fill a series of ten roles: 1. the figurehead, or representative of the organization; 2. the leader; 3. the liaison officer; who associates particularly with outsiders; 4. the recipient, who receives information regarding the operation of an enterprise; 5. the disseminator, who passes information to the subordinates; 6. the spokesperson, who transmits information to those outside the organization; 7. the entrepreneur; 8. the disturbance handler; 9. the resource allocator; and 10. the negotiator, who deals with various people and groups of people (Mintzberg 1973, p. 15). Although the traditional management culture emanated from the idea that institutions should be organized like machines, companies are now understood to be complex systems. Therefore, systems theory has strongly influenced current management theory. This point of view allows an interdisciplinary research approach that fully supports the consideration of different values (Staele 1999, p. 162). In addition, the priorities of different management approaches can be considered through this holistic, abstract and integrated view (Ulrich 1994, p. 165).

According to Malik, one of the major problems of management is to master complexity, i.e., the proper handling of the variety of relationships between elements within the system, or company, and an ever-changing environment (Malik 1994 p. 18f). Contemporary management therefore has to be determined by the Ashby rule of necessary variety, in order to be able to respond to problems (Ashby 1958. p. 202f). Thus, it seems sensible to accept Malik's understanding of systematic evolution management, which deals with the design and control of entire systems or institutions (Malik 1996, p. 102). The term “management” is not committed to a specific type of organization and can relate, in terms of management science, to various recognition findings (Staele 1999, p. 162). The present study refers to the recognition finding of the market economy based on Gutenberg (Gutenberg 1972, p. 507ff). As a consequence this work is problem-oriented and uses a holistic, integrative, interdisciplinary approach.

2.4.3. Metrics of working capital management

The working capital ratio can be used to analyze the %age proportion of the short-term liabilities that are covered by the current assets. Therefore,

$$\text{Working capital ratio} = \frac{\text{current assets}}{\text{current liabilities}} * 100$$

The formula is sometimes seen as a way to measure a firm's liquidity. However, a high working capital ratio does not necessarily lead to a situation, where a company will have enough cash to pay at all times. The risk is still that the finished products cannot be sold or receivables are not paid in a timely manner, then the apparent good situation reflected by a high working capital ratio could be deceptive (Brigham and Erhard 2008, p.856). A company should, following the universal and ordinary funding rules, ensure that the working capital ratio is at least 100 per cent. If this ratio is exactly 100 per cent, the working capital is balanced, the net amount is zero and the relative figure is 1. A company should therefore aim to permanently maintain its minimum working capital ratio at approximately 100 per cent (Subramanyam 2010, p. 531). In fact, various banks require a working capital ratio of at least 200 per cent to rate a company as favorable.

Furthermore, the financing of working capital is very important. This relevant ratio, which is called net working capital, is defined as:

$$\text{Net working capital} = \frac{\text{current assets}}{\text{short term loans}} * 100$$

Net working capital shows the amount of short-term financing that is covered by the current assets. In general, liquidity presents a high risk if short-term financing is also used to finance long-term assets. The relevant metric is the calculation of the number of days that are occupied with working capital (DWC = days working capital). A typical figure is 55 days but some companies have much lower ratios. For example, Dell, Apple, Vobis (a German computer seller) and a US petroleum company have had negative DWC values for several years, which means that these

companies are paid by their customers before they have to pay their suppliers (Brigham and Erhard 2008, p.774).

2.4.3.1. The Acid test

The quick ratio, or "acid test", also attempts to measure a company's liquidity and is determined through the subtraction of the inventories from the current assets and the division of this value by the current liabilities. This quick ratio removes the inventories from the current assets because these are the least liquid of the current assets (Brigham and Gapenski 1997, p.856). The term "acid test" derives from the test that gold miners used to determine if their findings were real gold nuggets. Unlike other metals, gold does not corrode in acid; therefore, if the nugget did not dissolve when submerged in acid, it was said to have passed the "acid test". Similarly, a company can be considered to have financial integrity if its financial statements pass the figurative "acid test". Companies with a quick ratio that is much lower than the working capital ratio are highly dependent on their inventory, e.g., retail stores.

Each of the main drivers of working capital also has its own metric. The inventory conversion period, which is called "days on hand" (DOH), is calculated by dividing the inventory by the sales. The receivables collection period is the ratio of receivables at the end of the period to the sales that were made during the period. The result is called "day's sales outstanding", or DSO (Brigham and Erhard 2008, p.777). The DSO is analyzed in detail later in the manuscript. The payables deferral period is the average time from the purchasing of the material and labour (date of invoice) to the moment of payment (Camerinelli 2009, p. 15). This ratio, which is called "day's payable outstanding", or DPO, is calculated by dividing the payables by the purchases that were made in a specific period.

2.4.3.2. The cash conversion cycle and further measurements of working capital management

Gross working capital can be divided into treasury-related activities, which include bank deposits, short-term loans and cash positions, and the remaining trade receivables, liabilities and inventories, which are more operationally oriented. A benchmark of success for corporates on working capital mostly excludes the treasury-related activities because these are influenced by many non-operative decisions, e.g., cash reserves, upfront payment, and cash deposits as securities (REL 2003).

Data from accounting is the basic metric that is used to measure a company's working capital, although in the global accounting standard IAS/IFRS, working capital is not defined (Pellens et al. 2004, p. 15). The assets are classified by IAS/IFRS through their liquidation as either "non-current" or "current" assets. According to the maturity criterion, the short-term debt is disclosed separately from the long-term debt. The maturity classification is often used as a benchmark in the basic balance sheet analysis that is performed in North America under the local GAAP (Gräfer 1992, p. 19).

The metric for the total working capital period is called the cash conversion cycle. This period is the time that transpires from the purchase of the production materials until the cash inflow from the sale of the relevant end products. The optimal control of working capital in the company is therefore linked to target-oriented measures for inventories, trade receivables and trade liabilities (Watson and Head, 2010 p. 75). The analysis of the cycle can be considered a starting point for the identification of the potential optimization of the working capital. The financial aim is to optimize the firm's liquidity without having a negative impact on the production process. The common solution is based on the principle "as much as necessary, as little as possible" (Hennah 2009a).

Subramanyam considers working capital a measure of a company's liquidity position (Subramanyam, 2010. p. 529). Thus, working capital is the difference between the current assets and the short-term accounts payable. This means for the

working capital management that it must maintain a good balance between the trade activities cycle, the liquidity circulation and the profitability to finally increase the firm's value. Therefore, bringing working capital requirements and profitability not in the right relation, not defining the rules about each side, and not planning and controlling the components for both targets may lead to insolvency and bankruptcy. The past shows that a large number of business failures came from the inability of the financial management to plan and control the current assets and current liabilities of their respective firms (Gill 2008, p. 30).

2.4.4. Decisions made by working capital management

The right decisions form the basis of the best working capital management. To be effective, working capital management requires a clear specification of the objectives to be achieved (Camerinelli 2009, p. 15). In general, the aim of working capital management is to optimize the working capital within the general aims of the company, which are its profitability, an adequate long-term financing/equity ratio and liquidity (Irwin 1991, p. 34).

Profitability is the result of all the actions that are taken by a company. There are several methods that can be used to evaluate a company's profitability. These methods include net profit in relation to the equity and net profit in relation to turnover. Both these ratios do not use working capital data in their calculations. Other profitability evaluations include net profit in relation to total investment and net profit in relation to total debt. In these two cases, the net working capital has an impact on the result because it is a direct or indirect part of the denominator.

Long-term financing/equity ratio, or gearing, is important to obtain additional cash for the company. A business would become insolvent when its liabilities exceeded its assets. In other words, if an insolvent business closed tomorrow, it would not be possible to satisfy all the company's creditors (Irwin 1991, p. 34). However, the gearing criterion is not focused only on the actual status, but also on the expectations of the business. If a credit grantor is convinced that the company will earn money in the future, it will offer credit even if the company is over-indebted

for different reasons, such as unpaid receivables, extremely high inventories or excessive trade liabilities.

2.4.4.1. The relation between working capital and liquidity

Liquidity is necessary for the daily financing of a corporate. “Liquidity should be considered in the evaluation of the company context as the ability to convert assets into cash or to obtain cash to meet its short-term obligations. (Short-term is conventionally viewed as a period of up to one year, although it is identified within the normal operating cycle of a company).Lack of liquidity prevents a company from taking advantage of favorable discounts or profitable opportunities. Extreme liquidity problems reflect a company’s inability to cover its current obligations. This can lead to forced sale of investments and other assets at reduced prices and, in its most severe form, to insolvency and bankruptcy” (Subramanym 2010, p. 528). Beside the cash position, working capital is the next important parameter in the evaluation of the liquidity of a company. The measurement used in the assessment of liquidity is current assets subtracted from trade liabilities, which gives the net current assets.

Current assets are items in a company that are either temporary or are used only for short periods. Goods that are available for consumption, for sale or for other short-term use within the company include: goods purchased that are later resold; raw materials purchased and processed into different products, either through the use of machines or handcrafting; and receivables, which should be converted into liquid funds as quickly as possible, short-term securities and cash deposits.

The asset and liability structures of different industries are shown in Table 1:

Table 1: The asset and liability structures of different industries
(Source: Adopted from Fitzgerald 2002, p. 138)

	Construction	Manufacture	Wholesale	Retail
Material stock	Very high	Medium	None	None
Work in progress	Very high	Medium	None	None
Finished goods	Low	Medium	High	High
Trade debtors	Medium	High	High	None
Trade creditors	Medium	Medium	High	High

2.4.4.2. Working capital management impacts on corporate strategy, corporate values and equity

Working capital management is part of the management of a company. The focused aims of working capital management are a) avoidance of practices that can lead to the demise of a company (e.g., insolvency due to insufficient liquidity) and b) obtaining the right return on investments for the company's owner(s). The EVA (Economic Value Added) concept provides a useful way of analyzing working capital. EVA is a key measure of the value that is created in a company. It can be calculated as the difference between the company results (EBIT-Earnings before interest and taxes – plus taxes) and the capital costs on the invested capital; thus, the EVA shows the value of a company at a specific period. Grant considers the EVA as the only metric that is based on the principles of wealth maximization (Grant, 2003. p. 40). As a result, the EVA measure is positively affected by a

reduction of inventories, cash or receivables, without having a serious effect on the operating income, which in turn results in a reduction of the company's capital requirements and financing costs. Return on Equity (RoE), an overall aim of the company and for equity investors as well, is also influenced by the working capital. The RoE can be improved by reducing that part of the working capital that does not have an effect on the sales profit margin; by using cash to reduce equity, and; by reducing financing costs (Bodie et al., 2009, p. 460).

A firm's significant capital amount is tied to its current assets, which are mainly accounts receivable and inventories. In spite of this, companies in the past did not consistently control and optimize receivables, inventories (stocks) and trade payables. However, if a systematic and active working capital management is operated, the working capital can be permanently reduced by double digits in a short time. The released liquidity can then be used for other purposes, such as necessary investments, repayment of debts and adding to the liquidity reserve. In addition, a reduced working capital increases the value of a company, which is particularly important for listed companies. Furthermore, improvement in working capital strengthens the negotiating position of a company with regard to potential investors (Keown 2006, p. 469f). On the other hand, the efficient management of working capital creates financial reserves, which can be used to pay off loans or finance additional growth of a given equity. Stronger working capital also results in a decrease in the company's borrowing costs and the inherent improved liquidity situation reduces the vulnerability of a company to financial and other risks.

2.4.4.3. Working capital and further relations

The management of inventories, assets and liabilities is therefore an important indicator of a company's ability, even in financially critical situations, to meet its financial obligations. This was confirmed in the internal assessment of banks when the credit risk of a company that applies for a loan is analyzed.

Effective working capital management is strongly necessary for all firms due to the link on performance and liquidity of the firm (Taleb et al. 2010). The main objective of working capital management is to establish best practice in all working capital management components (Gill 2011). The efficient management of working capital must be a sub target of the overall corporate strategy and must aim to create value for shareholders (Nazir and Afza 2008). A negative, or very low positive working capital is regarded as critical because it shows a potential risk of a low liquidity and indicates that the operation has structural difficulties. The most popular measurement of working capital management is the cash conversion cycle (CCC), which is the time lag between the purchase of raw materials or the rendering of services, and the collection of cash from the sale of goods or services rendered. If the time lag is long, it means a greater investment to working capital components must be made, causing greater financing needs. Thus interest expenses will be higher, which leads to a higher default risk and lower profitability. Use of profitability as an indicator of a firm's performance can be misleading, as there can be a reverse relationship between the CCC and the firm's performance.

For the most part, the goal of improving working capital is the release of capital. However, it is not always necessary to reduce the absolute working capital; for example, a better turnover usually leads to an increase in receivables and the payment of these increased receivables is initially an influx of cash, which does not change the volume of the current assets and is an improvement from the viewpoint of credit. The management always has to optimize working capital without losing potential for sales. In general, improvement in working capital is only possible when the business partner receives, for example, a less favorable price (Joy 1977, p. 410). In a good market situation the "price" for better working capital is low, but in a downturn, generating cash is important for all firms, and consequently the "price" is more expensive. The financial crisis of 2008 showed how important (and expensive) this optimization was because the banks, as the lenders of cash, had their own problems and were often unwilling to take a credit risk.

2.4.4.4. Best practice in working capital management

Some corporates use working capital to speed up efficiency; this method is called zero working capital (Brigham and Erhard 1997, p. 860). Although it is nearly impossible to reach zero working capital, this measurement symbolizes that inventories are reduced as much as possible through "just in time" production and product demand, which enables the produced goods to be sold at once. Experience shows that all elements of production operate quickly and efficiently through data links between buyers and suppliers. Therefore, a much reduced working capital can be obtained through good planning (Vormbaum 1995, p. 147).

Generally, working capital is vital to any business because it is the source of the corporate's liquidity (Camerinelli 2009, p. 38), which represents its cash flow (Witeley 2003, p. 68). The volume of a company's working capital depends on its type of business. The two extremes are the distributors who have very high stocks, and the consulting companies, that have no need at all for stocks. Retailers have the lowest receivables outstanding, because private consumers do not receive any payment terms. The improvement of working capital management includes the following best practices that drive continuous improvement in working capital management and generate high-quality cash flow intelligence (APQC 2012):

- Strategic intention should determine all operational processes;
- A prerequisite is that executive-level support leads officially the working capital initiatives like the reduction of the amount of cash that is invested in;
- To reach the maximum efficiency processing in financial transactions should be centralized and standardized. This draw meaningful insights from the underlying data;
- A cross-functional approach is necessary to avoid silo thinking in working capital accountability;
- Using the enterprise resource planning (ERP) system with the stored data helps in reporting the daily credit and collections activities;

- Conduct real-time detailed analysis of the cash flow;
- The operating units should be informed on basis on the steps analyze, measure and advise how to improve working capital and how to increase the return on the invested amount in operations;
- Working capital management has to consider the models relevant to the company's business and design with this focus measures;
- Quality and productivity tools improve processes and enables efforts in finance;
- Discrepancies must be corrected at the front end of the process;
- The working capital risk in its various ways has to be actively managed;
- Self-service tools support efficiency; and
- Electronically transactions should be made whenever possible not only with vendors but with all partners, so that they can do the same.

The effective handling of working capital leads not only to improved liquidity, but also to a strong discipline in working capital management that is reflected in a strong sense of discipline in operations. The total results are strong gains as well in productivity as in, by extension, economic profit growth (Driscoll 2011).

2.5. Corporate trade finance on the macro level

Trade credit (i.e. accounts payable for the buyer and accounts receivable for the supplier) comprises short-term loans extended by suppliers to customers purchasing their products. The loan is automatically extended when the debtor pays late to the suppliers. Trade credit is part of the traditional credit channels, and can substitute bank loans. This was first suggested by Meltzer (1960). Jaffee and Russell (1976) found that in situations of high interest costs or limited access firms were credit-constrained and made greater use of trade credit. Nilsen (2002) looked at a longer period and calculated in his research that the use of trade credit was strongly used in the US by both small and large corporates with no access to open

market credit (like stock exchange). For firms not listed trade credit has an important role as a substitute for bank credit.

De Blasio (2003), using Italian data, confirms that firms uses corporate trade finance instead of bank credit during periods of monetary tightening; but the results were weak signals. Guariglia and Mateut (2006) started from the investment in inventories, where they used error-corrected data, and tested different trade credit alternatives to evaluate the transmission of monetary policy on trade finance. The result was that both, bank and corporate trade channels exist in the UK Mateut believes that the corporate trade finance offers tends to weaken the bank products. Love et al. (2007) made their research on data just before the global crisis. Their findings was that immediately after a financial shock in a country, region or globally, there is an increased supply of corporate trade credit. This exactly happened then in the following years.

Documenting very early in the manuscript the very high volume in international trade in consequently the importance finance the transactions, a remaining question in the literature has been, whether there are in certain crisis situation specific trade finance instruments that are best to overcome financial constraints. Letters of credit, open account supplier credit, and cash-in-advance are the most use product in international trade finance. Using unique survey data from corporates, Eck et al. (2012) evaluated that about 96% of all exporters use open account supplier credit. Furthermore, in cross-border trades is the use of open account supplier credit and advance payments in percentage higher than in domestic trades.

2.5.1. Corporate trade finance and national trade

Even in domestic trades corporate trade finance us huge according to a Federal Reserve Board Study by Elliehausen and Wolken (1993). They calculated that 15.78% of total assets of small US businesses were financed by trade credit. For the same years Rajan and Zingales (1995) found that in 1991 trade credit to customers counted 17.8% of total assets for US firms and 22% for UK firms. The percentage was more than 25% for countries like Italy, France, and Germany. Finally, Kohler, Britton, and Yates (2000) analyzed the split between bank loans

and corporates suppliers finance for the years 1983 to 1995. Here 55% of the total trade credit received by UK firms was given by other firms. They had the viewpoint that when higher interest rates occur, bank lending declines and firms increase their use of supplier trade credit to have sufficient financial resources. Although significant differences exist in the type and products and the method of using corporate trade finance for the firms around the world, financing of corporate trade is one of the most important sources of short-term finance. It is probably the most important one in a crisis situation due to the strong relation between producer and product buyer. According to later shown own evaluations for German publicly traded companies, accounts payable or accounts receivable can reach 25% of a firm's total assets. In general, theories that explain trade credit argument with commercial reasons, total transaction-profit, and financial as well as liquidity advantages (e.g., Bastos and Pindado 2007; Deloof and Jegers 1999; Deloof and Overfelt 2010; Marotta 2005; Petersen and Rajan 1997).

2.5.2. Corporate trade finance and international trade

Without corporate trade finance firms could not finance their business, especially when banks have their own problems like in the global crisis 2008. Corporate trade finance is based on the fact that the buyer helps the producer to receive cash and therefore needs the delay between the delivery of goods and services and the payment for them. On the other hand, firms are mostly supplier as well as buyer. It is often a fact that firms that receive credit from their own suppliers are more likely to extend trade credit to their customers. This inter-firm trade finance is one of the most important sources of short-term financing for firms around the world (Petersen and Rajan, 1997). To avoid a bank loans, the credit terms for receivables and liabilities must match the maturities.

A further basic point for the macro evaluation of corporate trade finance is that suppliers to financially weak firms may in a financial crisis get fast their own financing problems. This is confirmed by existing theoretical models (e.g. Cunat 2007; Wilner 2000 and Raddatz 2010. This would also be in line with Boissay and Gropp (2007) who found that the missing liquidity for the supplier is critical for

small and medium size firms or corporates with a low creditworthiness, while big firms with better credit rating have access to outside liquidity and can therefore absorb such shocks with their "deep pockets". Evidence from the 1997 financial crisis on six emerging economies (Love et al. (2007) showed that firms with low credit rating have stronger to reduce the sales supporting financing of trade. A comparison work is done by Klapper & Randall (2010).

Furthermore, trade credit is predominantly based on long-term relationships. This point from the micro view has to be considered as well on the macro-side, because trade creditors that are more dependent on their customer's business grant more credit to financially distressed customers than banks would in a financial crisis (Wilner 2000 and Cunat 2007). Nilsen (2002) showed that during monetary caused high interest rates, small firms depend strongly on supplier credit. Petersen and Rajan (1997) found that the firms that are due to an external crisis in a financial weak position try to get their financing from the supplier more than from banks and get their liquidity from short credit terms with their customers. Fisman and Love (2003) analysed different sectors in combination with different countries. They found that when firms deliver in countries with high interest rates, corporate trade finance is used stronger than when the rates are low. Furthermore some sectors have general problems to get bank financing. Thus, the theory and empirical results suggest that suppliers are absolutely necessary for the existing of financially constrained firms. This has to be considered by the regulators especially when evaluating or controlling a financial crises.

2.5.3. Corporate trade finance since the global financial crisis

The recent global financial crisis brought back for the financial world the interest from topics like derivatives and mergers and acquisition back to the fundamentals of finance like transaction banking and trade finance (Korinek et al., 2009; Freund, 2009; Evennett, 2009; Kee et al., 2010; Eaton et al., 2010; Levchenko et al., 2010; Chor & Manova, 2012). The named studies focus however more on the volume of trade finance and on how trade finance can in future avoid the negative development on trade demand during the crisis. Korinek et al. (2009) are

evaluating as well not more trade finance itself. They examined the effects of the availability and costs of bank financed trade finance on imports for 43 different countries during the crisis. Their findings is that a low offer and high costs lead to decreasing in trade. Imports and exports to the US during the recession 2008 was the topic of Levchenko et al. (2010). They evaluated disaggregated quarterly and monthly data, and found that trade credit was no the main driver for the import reduction. Chor and Manova (2012) used monthly public US import data to evaluated international trade flows since 2007. Like Levchenko et al. (2010), Chor and Manova found that credit pricing does not strongly influence import volumes during a recession.

2.5.3.1. Latest developments in corporate trade finance

In the 1990s, as part of the introduction of newer software tools, the fax advice for payments was omitted. Electronic advices for payments are sent. In 2009, a technically similar initiative was implemented by the Brazilian Government for all business-related sales; this initiative required the storing of a copy of all business-to-business receivables and payables for tax reasons. Auditors worldwide increasingly demand that reported receivables are confirmed not only randomly but in their entirety by the debtor. In addition, banks require this information in the context of a credit check. These requirements should drive an increase in the use of electronic data exchanges for all business activities. A recently developed method to improve the earnings of portfolio credit management involves ABS (asset-backed securities) programs. "The distinctive feature of asset-backed security is that the return on the securities is derived from the performance of the specific assets" (Rivett 1991, p. 159ff). In the case of credit-backed securities, investors have the same rights to the receivables in the event of a default by the company. In contrast, a corporate bond will be "secured" by the assets and the cash flow of the company.

The characteristics of ABS securities are the following:

- The final lender of the assets that back the securities will typically be in the form of a trust or another special vehicle (the intermediary or the 'SPV');

- The intermediary is typically a bank; and
- The final investors will receive income and the return of capital from the assets throughout the life of the security.

Typically, the corporate that sells its receivables is responsible for the first part of the default risk. Because this amount is much higher than the historic and expected default volume, the buyer of the receivables does not expect any credit risk. A proportion of the discount rate is a service fee for the arrangement, and a guarantee that the program will run for the total of the proposed period.

2.5.3.2. Banks development for trade finance

The management of trade receivables and liabilities by an enterprise considers the following processes: delay of payment; the financing; credit management of receivables; operational collections and management accounting costs; and optimization of the stocks. A new bank development enables corporates to make significant improvements to these processes. The new product, Trade Service Utility (TSU), was conceived by several global banks and their cooperative, SWIFT, which enables internal communication between banks. (The introduction of TSU coincided with a speech by the German Federal Chancellor, Angela Merkel at the computer fair Cebit, in Hanover in 2010, titled *Connecting the world* (Broens 2009).

Banks are major supplier of payment transaction services as well as of risk and liquidity management. However, the internet has changed the requirement of commercial and end-user customers. Furthermore, banks increasingly consider themselves as service providers Therefore the focus of the bank institutes is more, to bring added-value in financial operation management to compete in the new market environment. The financing of transactions becomes increasingly more important; in these cases, traditional products (e.g., factoring) are offered at the same extent as innovative forms of financing (e.g., supply chain finance). Furthermore, banks help their customers in their payment collection and data analysis. International cash management, e-invoicing and the creation and matching of commercial documents are further services that are offered by banks.

The aim is to get more detail knowledge about the financial side of firms as this will of central importance because it forms the basis of a successful customer relationship and financial profile analysis.

In international business, data collection and the continuous monitoring of transactions is even more of interest for banks as this business enables the banks a lot of transaction and risk related business. On the other side this business is particularly challenging and only the big bank institute can handle it. The banking technique does not offer standardized electronic invoicing formats or other ruled commercial documents. Therefore, SWIFT introduced TSU in 2007, which is a communication-based bank-to-bank application through which data exchange and purchase orders, invoices, transport documents and certification data can be automatically matched. The application, however, requires that companies make this data available.

2.5.3.3. The advantage of the banks' TSU

TSU makes it possible to promptly recognize any differences between the documents without the need to perform any individual checking. Thus, payment losses are avoided and/or the turn-around times between delivery and payment are shortened. In addition to the time advantage, the expensive creation of documents and their checking is also improved through this application. Thus, banks once again have become the suppliers of trade finance. Banks have also introduced an electronic standardized irrevocable payment obligation (bank payment obligation, BPO). This is first performed by the bank of the buyer. However, it can also be performed by another bank or, in the case of an inherent country risk, by two banks. This BPO is similar to the confirmation that is given by banks to LCs. The International Chamber of Commerce in Paris has already confirmed this product; therefore, the TSU now receives worldwide status and rights that are comparable to those of LCs.

TSU exhibits a number of other good functions. Supply chain financing (SCF) is based on a strong concept; however, this product will achieve a real break-through

if a matching standard is developed. Therefore, the target is integration of the workflow between the production and the financial data, in order to receive an on-line total status. Another advantage of TSU is in currency management: companies have a more exact knowledge of their exposure and banks can thus offer better handling recommendations, or even an active management that channels all its trade flows through TSU. TSU has a stronger impact for the B2B trade outside of the banking products, as follows: Working capital improvement. By the matching of trade receivables and liabilities, mismatches can be made available to all parties before maturity. Delay of payment can then be authorized in exceptional cases only. The matching thus increases the substantial interest and liquidity advantages. Suppliers are also able to avoid direct debits and check payments, which have some legal and financial risk. The majority of the actual collections work decreases because the information of a planned payment is available before maturity. Furthermore, a majority of the manual accounting work becomes void because debtors and creditors have a stronger interest under the electronic data exchange to harmonize the data records, such that both sides have to do the least amount of manual work. End-of-year procedure work: Confirmations with debtors over the existence of the receivables are void through this application, because the position is confirmed by the matching. The matching is improved because only a random sampling currently occurs. Thus, any deliberate and/or erroneous representations of data in the annual report is avoided.

Optimization of inventories: The data exchange over the TSU begins with the order placement, which makes it possible for the supplier to conduct a fast consideration of the demand in the production process. The TSU is then used to redefine the order quantities and times, and to determine what factors might have a positive effect on the prices. In addition, TSU is the enabler of an increasingly important argument that states that a smaller inventory protects the environment. TSU is now supported by nearly all major trade-related banks.

2.6. Conclusions drawn from the literature

Today, rating and scoring procedures are comparable to the systems that are used in a school exam (Keown 2007, p. 510; Brealey et al. 2009, p. 559). Business-to-

business scoring procedures, which have proven failure rates, can be determined using data from financial statements. Some essential questions that should be answered during the credit assessment are the following: Does the firm receive sufficient profit from its operations? Are the total assets adequate? Does the turnover of the firm compare well with the credit limit? Can the company pay its total liabilities, even at unfavorable interest rates? Does the company have sufficient equity to realize the business developments that it has planned? Does the firm have a positive net current asset? In some of the literature, the scoring judgment is based on the so-called "five Cs of credit": The customer's character, customer's capacity to pay, customer's capital, the volume of collateral provided by customer, and the condition of the customer's business (Brealey, A. 2009 p. 559; Gallinger & Healey 1991, p. 358).

Analytic procedures that utilize other data include an assessment of the payment performance of the buyer. In 2008, a creditor in Germany would have had to accept a time period of approximately two weeks on overdue payments. Insolvent companies, however, exhibit different values: three financial quarters before the application for insolvency is made, the company has overdue payments of four weeks on average. During the last quarter before insolvency, these delays are approximately 43 days on average and one-eighth of the receivables were overdue for more than three months (Creditreform 2011 p. 21). Other sources name 30 days past due date as a criterion of insolvency (Neumayer 2007, p. 145 and Thiel 1997, p. 99). Further criteria include a company's repeated failure to comply with its payment plans, the age of a company, and the length of the buyer/seller relationship (Dennis 2000 p. 328).

A scoring procedure that does not use any balance sheet data but utilizes only customer relationship data has also been developed. Surveys indicate that the weighting of the factors is quite different in this assessment. Further evidence of insolvency risk is provided by the customer's industry type. The insolvency risk increases during lower industry demand, but also during strong industry growth (Deutsche Bundesbank 2007, p. 27). The country in which the customer is located is also critical, particularly when there are difficult market conditions, governmental intervention and high inflation. Furthermore, the owners of a

company become meaningful should the company's exposure be higher than the creditworthiness of its subsidiaries. Individual criteria are first systematically assessed in relation to the importance of a default. The results are then ordered and presented to obtain an overall statement. During this evaluation, because not all criteria are equally important in the assessment of bankruptcy, the rated aspects are combined with the respective factor levels to obtain the total score. Correlation of the factors should also be considered. The data used for the standard process should be reviewed regularly to ascertain the continued validity of the specified failure criteria. Similarly, the economic assumptions that are used, such as inflation and general demand, must be continuously adapted. This evaluation has to be performed by a fundamental analysis, and by the back-testing of the company's historical data.

In the following section researcher had developed theoretical development for the study based on the above literature review.

2.7. Theoretical development of the planned research

The study objective is to find out the impact of the financial imbroglio on corporate trade credit. Therefore, the study takes the literature assessment route on the financial hypothesis for corporate trade credit. This study is a piece of mounting literature on the characteristics of the 2008 – 09 worldwide financial disaster in general and the collapse of global trade in particular. The monetary hypothesis of trade credit (Emery, 1984, Meltzer, 1960; Schwartz, 1974) speculates that companies that had ample and easy access to credit facilities had limited access to trade credit. This study also includes tax row (Brick & Fung, 1984), suggesting various tax brackets for buyers and sellers allowing them with a variety of borrowing costs since interest is tax deductible. This also allows suppliers, who are in the higher tax rate brackets, to offer credit to buyers of lower tax rate brackets. Several researches track Meltzer's (1960) and Schwartz's (1974) financial clarification for trade credit. This is evident from Petersen and Rajan (1997) findings indicating more number of firms' preferring trade credit in the absence of bank credit. Additionally, the focus of Nilsen (2002) and Baum,

Caglayan, and Ozkan (2003) lay importance of financial tightening measures besides macroeconomic ambiguity in the trade credit provided by companies. Further, Nilsen came across practical confirmation that smaller companies have limited access to loans from banks during monetary tightening periods forcing them to opt for more trade credit. Interestingly, Baum et al. gets support that companies' turn towards their supplier for financing as a source during ambiguous macroeconomic conditions, especially from non-durable goods maker, who are also big, and, high-growth deliverers. Other works also point to a similar literature offering practical confirmation that links demand for trade credit and credit rationing; for example, Danielson and Scott (2004). These authors see more demand for trade credit from opaque firms during credit rationing. Wilner (2000) sees that a dependent creditor offers more sops to a customer during the financial distress in a long-term association. Delannay and Weill (2004) confirmed that trade credit provides an alternative route to bank credit in credit starved companies like transition economies. Uesugi and Yamashiro (2008), in their recent study, examined the opposite side of influence as to the extent of how decreasing trade credit impacts the credit availability from financial establishments. Significantly, they term that bank credit and trade credit are complementary or corresponding one.

2.7.1. Corporate credit and the financial crisis

During the crisis, production companies suffer as the credit availability gets reduced in trade finance instruments provided by credit insurer and banks (Iacovone &Zavacka, 2009). There is also an investigation conducted by Bastos and Pindado (2013) in emerging markets on the usage of trade credit during the period of financial distress. According to the authors' calculation, a higher level of ratio on days-sales-outstanding and increased possibility of insolvency is the strong reasons for using trade credit in the financial disaster. Significantly, Chor and Manova (2012) confirmed international trade during the period of financial turmoil. The result was not a favourable one for companies especially in countries where the interest management are strict. This is quite evident from an academic legalization of lower interest rate regime in many central banks policies during the financial crisis and is practised even today. In Asia, Love and Zaida (2010)

examined the trade activities of small and med-sized companies following the 1998 crisis. They found that companies, which faced constraints in bank finance, could get only reduced trade credit. This has forced such firms to cut down their trade credit limits to their customers. According to Eck, Engemann and Schnitzer (2012), trade credits did have a favourable impact on companies importing and exporting activities. Moreover, trade credit is being offered by the product producer to its distributors to help finance distributors' inventory till the goods are sold and money is paid (Klapper et al. 2010).

It is a standard and a significant economic basic rule that the financially strong companies enjoy commercial loan facilities so as to help their financially weak partners in bringing down borrowing expenses. The financially stronger companies can be either buyer or seller (Giannetti et al. 2011). Secondly, corporate can take a call whether providing trade credit could potentially drive an enhancement of their business performance by and large, which the banks will shy away from it (Buckley et al. 2001). Financial institutions only offer credit facilities and have no goods to sell. Therefore, their objective is to earn profit from the credit lent including the risks associated with it and any default (Brealey et al. 2009). Our approach is purposely pessimistic, testing practically a broad range of studies planned in the literature. Hence, our results add to quantitative modelling efforts thus highlighting the more practical mechanisms to adopt.

2.7.2. Hypotheses Development

In this section, the study explains the financial crisis impact on trade credit, and the associated research. This research was devised based on practical studies. Earlier research referred to trade credit as an alternative to bank credit for those firms without credit facilities (Nilsen 2002; Marotta 1997, Delannay and Weill 2004). However, a panicked supplier could reduce investment in his customers by retracting his trade credit and tightening his terms. With these factors in mind, the following hypotheses were developed.

Corporate trade finance on a micro level:

H1: Corporate trade credit limits have a specific relationship to financial data and ratios.

H2: During a financial crisis, companies focus more strongly on a reduced working capital in order to improve liquidity.

H3: The portfolio approach enables corporates to receive better results in trade credit management that are comparable to individual credit decisions.

H4: The new banking regulations, Basel III, might strengthen shadow banking for corporate trade finance.

3. RESEARCH METHODOLOGY

This chapter discusses the methodology utilized for the research. As far as can be ascertained, this is the first research that analyzes corporate trade credit limits (HR1), and the impact of Basel III on trade finance providers (HR4). Some previous studies were similar to H2: financial crises and working capital; and to H3: the portfolio approach in corporate trade finance, which includes a triangulation research method on the topic. Effectively it is all four studies put together that seemed capable of providing a fair evaluation of each piece of research, and the impact of the financial crisis on corporate trade finance, as there are many links between the smallest micro viewpoint (in HR 1) to the highest macro evaluation (in HR4). In other words, the correct perspective was to analyze the issues from a holistic angle: from deciding on a corporate credit analyst and treasurer for a corporate, to highlighting the risks involved in corporate trade credit under economic ambiguity. The following questions were asked:

RQ1 (Corporate trade finance on the micro level): What are the criteria for deciding on corporate trade credit, its evaluation and limits?

RQ2 (Corporate trade finance for a firm's trade portfolio): How do companies manage their trade-related receivables and liabilities portfolios?

RQ3 (Corporate trade finance for a firm's trade portfolio): How was the working capital and liquidity of globally active German corporates developed?

RQ4 (Corporate trade finance and its economic validation): What was the impact of the financial crisis and the resultant changes in corporate trade finance, especially from a corporate treasurer's perspective?

3.1. Research analysis and organization

According to Buchanan (1992), qualitative research is a multi-faceted method of inquiry including facts and interpretive methods to find conclusions from the

evaluation. This transforms into single steps means that qualitative researchers analyze things in their natural condition and try to determine sense of relation, consequences etc.. Usually, qualitative research takes place in naturally existing situations, while in quantitative research settings and behaviours are evaluated and controlled. Qualitative research has its origins in descriptive analysis and is necessarily an inductive process involving reasoning from the particular situation to a general conclusion. According to (Maxcy 2003), qualitative research is a process of inquiry that implements human or social issues. The researcher develops a holistic and critical picture of an informant's views, analyzes words, and conducts the study in a natural setting. On the other hand, Wholey, Hatry and Newcomer (2010) have described that studies using mathematical analyses that reveal statistically significant differences is called quantitative research. Quantitative research focuses on the considerations that underlie the positivist traditions within which financial research was originally located, and in terms of applied deductive logic, being hypothesis driven, achieves objectivity and causal relationships. Quantitative research characterizes phenomena numerically to respond to particular hypotheses or questions. Quantitative researchers often use what might be considered a narrow angle lens, because the focus is on only one or a few causal factors at once. Quantitative researchers often attempt to hold some factors constant. Quantitative research is used to describe phenomena numerically, in order to answer specific questions or hypotheses. Quantitative research is a scientific work including experiments and other systematic approaches that emphasize quantified measures and results of performance. In order to answer the research question, the study used not only triangulation, but also adopted quantitative data from different sets of questionnaires from different target populations.

3.1.1. Research instruments

For the quantitative study RQ1 (credit limit), the sample size was 90 companies.
For the quantitative study RQ2 (corporate trade portfolio), the sample size was 200 firms.
For the quantitative study RQ3 (working capital and liquidity), the sample size was 72 companies. For the quantitative study RQ4 (financial crises and economic

validation), the sample size was 200 firms. For RQ1 and RQ3 the sample volumes were critically small for a mathematical evaluation. This affected RQ1, due to difficulties in getting real data from firms, as they considered customer data to be a major part of their business success and declined to support this research. Others did not have the requested data or did not have the time to extract it from their customer relations software. In RQ3, there were not many comparable firms. However, despite this, other research was successful, even with lower sample volumes; i.e. the Altman credit default prediction (1968), dealt with less than 40 firms.

The research instrument adopted in RQ1 in step one, was open-ended questions. In step 2 it was data collection of existing samples and close-ended questions. In RQ2 and RQ4 the questionnaire had mainly close-ended questions, added to by a few open-ended ones. These assisted in the gathering of the needed information for the study.

For RQ1, the research aim was to determine how the credit experts of corporates currently lend money to their trading partners. This analysis included an evaluation of creditworthiness and credit limits. In the first step, group interviews and discussions with approximately 50 credit analysts were performed during 2010. All interviewees belonged to different global production firms. In this step, data that was obtained was used to determine the criteria for the credit evaluation. In the second step, the participants (100) were either directly contacted or were asked by global credit manager FCIB, located in the US and the UK, and credit analysts anonymously provided data for the criteria that were selected in step 1. The relevant annual report year was 2009 in all cases. Data was obtained from 15 participating firms. Each participant could input the relevant data for ten firms. A total of 90 datasets were measured and evaluated to determine how corporate credit management handles trade-related credit risk in different situations and how it determines the credit limits.

For RQ2 and 4, the author developed the 2011 questionnaire. In February 2012, several thousand company treasurers were asked for their feedback. For the

contact-gathering, the author received the support of a global electronic financial newspaper (gtnews). Approximately 150 responses were received. In addition, a similar questionnaire was used to interrogate credit analysts, with the help of the FCIB in the UK. This questionnaire was submitted in November 2011 to approximately 500 corporate credit managers, most of whom worked for globally active companies. Approximately 50 responses were received. Compared to the initial research, the responses to the questionnaire were focused more in the receivables-oriented trade finance field than previously. The evaluation targets that were the focus of this study were a) determination of whether common developments occur, and b) identifying the changes that might occur due to the financial crisis.

For RQ3, 432 (6 years multiplied by 72) annual reports of public listed German firms were evaluated. This analysis was an evaluation of the finance strategy of international corporates. Therefore, the annual reports of 72 companies belonging to the German Dax or the Mdax, and thus being part of the real economy, were analyzed. Banks, insurers and other financial firms were excluded from the analysis as they do not have product deliveries and (real) trade receivables/ liabilities. Approximately 30 German listed companies belong to the Dax and exhibit the biggest market capitalization. Mdax represents a second group of listed corporates that have a smaller market capitalization. The annual reports from the years 2006 to 2011 of the selected companies were analyzed. The measurements that were made included a) the operative and treasury fields, in which finance strategies are given; b) the changes that were made to the finance strategies of these companies due to the financial crisis; and c) a calculation of the non-payment costs in corporate trade finance. The analysis of the comparable rates for credit insurers provided further insights into the non-payment costs for corporates in trade finance, and a central point from which to evaluate the Basel III regulations from the perspective of corporate trade finance.

3.2. Micro view: Corporate trade finance on a micro level. Research 1: Analysis of the decision-making methods used in corporate trade credit for the evaluation of credit and credit limits

In order to understand in-house corporate trade finance management, the aims of Research 1 were the following: a) to determine the most common criteria that are actually used in the evaluation of credit risk; and b) to identify the trigger points for each of the criteria that are used in the determination of credit limits.

Two basic approaches are generally used in the modelling of credit limits:
I. The limit request from the sales department determines the maximum credit limit. In this context, three specific methods can be used: (i) the limit is determined by the limit of the previous year and the failure score. This method is based on the assumption that those customers who were able to avoid bankruptcy in the previous year would also be able to avoid it in the current year. (ii) The limit is determined by a set of fixed criteria and the credit score. The fixed criteria include the equity, because the owner has the greatest knowledge of the company's wealth and is willing to disclose the equity amount. Other criteria include total value of the assets. (iii) The limit is based on the expected gain from the sale of goods over a defined period, and the insolvency risk. The relevant "recovery period" can vary but is often one year. Until then, the sum of the sales profits has to be at least as high as the credit limit. For example, if the profit margin is 20%, the sales are a consistent euro 1,000 each month, and the maximum DSO is 52 days, the annual profit is euro 2,400 and the credit limit should be between euro 2,000 (two months outstanding) and euro 2,400 (the profit for a year). This method exhibits a high probability of default and should be based on a portfolio management system. This is explained later in the manuscript.

3.2.1 Finding the right criteria

II. The maximum limit is independent of the contracted limit application. In this context, the credit analyst sets the maximum acceptable limit regardless of the current credit requirements. The advantage is that the sales unit can respond

immediately to the new credit demand. However, this approach does not involve any later credit evaluation, even in cases where the client makes sudden, significantly expensive purchases. Method B is used to support sales and/or to reduce the manual work and costs in credit analysis. A general constraint for the individual loan limit is the consideration of risk concentrations (Bonti et al. 2006, p.115ff). It is important to avoid the situation in which a single change in market conditions leads to a lack of payment, which generally endangers the credit risk of the supplier (Thomson Financials). This phenomenon relates to individual large exposure as well as to a sector or a country.

In both cases, corporate trade finance requires the use of a large amount of information that is not available at the time, and thus significant time pressure is experienced because the product must be sent out. These factors differ from those experienced by banks' credit management. To date, the literature has not proposed a systematic method to determine credit limits. Many B2B credit analysts even believe that the determination of credit is an art. Despite this, it is of interest to determine if there is a commonly used method by which B2B credit managers set a credit limit. Therefore, an empirical study, which was split into two parts, was carried out. The first phase involved the identification of the criteria that are commonly considered important in the determination of a credit limit. This information was collected from approximately 25 experienced credit analysts after the financial crisis had taken place. They named a total (gross) of 30 different criteria. Many of the analysts considered not only the annual report, but also payment behaviour, a number of soft factors, and further information about the company. None of the credit analysts who participated in this study utilized all 30 criteria. Therefore, these criteria were filtered by the research participants to determine which were the most used. The following are nine of the most widely used criteria for the evaluation of a credit limit:

- Average number of days that the customer was delinquent in the past 12 months
- Number of years that the buyer had been active in business
- Number of years that the buyer had been a customer
- Buyer's equity ratio

- Buyer's current ratio
- Buyer's return on sales in the financial year before the invoice date
- Buyer's total sales for the financial year before the invoice date
- Number of disputes concerning invoices in the past 12 months prior to the invoice date
- Profit margin of the relevant sales

3.2.2. Using the selected criteria

The second part of the research aimed to determine how selected criteria were used in the evaluation of a credit limit. All the possible responses were structured specifically for analysis, as this enabled some groups to participate and avoid compliance aspects (Silvermann 2008, p. 215). The participants in this study discussed and proposed the following trigger points for each criterion: *the weighted rolling average of the average days delinquent (ADD) over the past 12 months* (number of days that receivables were cashed in later than the agreed due date); if all payments were made before the due date, the score would be 1; if payment was made 0 to 2 days late, the score would be 2; if payment was made 3 to 19 days late, the score would be 3.; if payment was made 20 to 31 days late, the score would be 4; if payment was made 32 to 61 days late, the score would be 5; if payment was made 62 to 75 days late, the score would be 6; if payment was made 76 to 360 days late, the score would be 7; if this information was missing, the score would be 0. *The number of years that the buyer had been active in business*: less than 1 year, score = 1. 1 to 3 years, score = 2. 4 to 6 years, score = 3. 6 to 20 years, score = 4; over 20 years, score = 5; missing information, score = 0. *The number of years that the buyer had been a customer:* less than 1 year, score = 1. 1 to 3 years, score = 2. 4 to 6 years, score = 3. 6 to 20 years, score = 4; over 20 years, score = 5; missing information, score = 0. *The buyers' equity ratio,* which is calculated by net worth (after long-term assets adjustments)/total assets: negative result score = 1, 0% to 10% score = 2, 11% to 20%, score = 3, over 30% score = 4, missing information, score = 0. *The buyer's current ratio (current assets/current liabilities):* less than 0.5, score = 1; 0.5 to 1, score = 2; 1 to 2 score = 3, over 2

score = 4, missing information, score = 0. *The buyers' return on sales in the financial year prior to the invoice date* (ratio of income to sales): negative, score = 1; 0% to 1% score = 2, 1% to 3% score = 3, over 3% score = 4, missing information, score = 0. *The buyers' total sales for the financial year prior to the invoice date:* euro 0 to euro 10 million score = 0; euro 10 million to euro 250 million score = 1; euro 250 million to euro 10 billion score = 2; over euro 10 billion score = 3; missing information score = 0. *The number of disputes concerning invoices in the past 12 months prior to the invoice date:* less than 3 score = 1; 3 or more score = 0; missing information score = 0. *The profit margin of the relevant sales:* negative, score = 0; 0 to 1% score = 2; 1 to 5% score = 3; 5 to 10% score = 4; over 10% score = 5; missing information, score = 0.

Secondly, calculated data was analyzed through SPSS analysis software. Descriptive analysis was used to report mean and standard deviations while categorical variables were analyzed using chi-square and continuous data using regression analysis. $P < 0.05$ was considered significant.

3.2.3. Data Calculation and Statistical Analysis

Table 2: Frequency of demographic variables

Demographic Variable	**Frequency**	**Percent**
Disputes concerning invoices		
No	89	97.8
Yes	2	2.2
Total	91	100.0

Customers' Home Country		
Africa	1	1.1
Asia	22	24.2
EE	21	23.1
EU	35	38.5
America	11	12.1
Near East	1	1.1
Total	91	100.0
Credit Limit in EUR		
< 500.000	38	41.8
> 10m	9	9.9
1000000	1	1.1
1m-10m	29	31.9
500-1m	14	15.4
Total	91	100.0
Average Days Delinquent		
0	3	3.3
Before Due	20	22.0
0-2 Days	17	18.7
3-19 Days	22	24.2
20-31 Days	3	3.3
32-61 Days	13	14.3
62-75 Days	5	5.5
76-360 Days	8	8.8
Total	91	100.0
Return on Sales	Frequency	Percent
Negative	7	7.7
0-1%	43	47.3
1-3%	24	26.4
Over 3%	17	17
Total	91	100.0

Profit margin of relevant sales	Frequency	% (percent)
0-2	72	79.1
Negative	1	1.1
3-4	1	1.1
5-10	3	3.3
Over 10	14	15.4
Total	91	100.0

Table 2 portrays the demographic features of the participants who took part in this research. The research reveals a high percentage (97.8%) associated with "no disputes" pertaining to invoices. Additionally, it was noted that 38.5% of consumers were from the European Union, 24.2% were from Asia, 23.1% from the EE, 12.1 % from America and 1.1% from Africa and the Middle East nations. The highest percentage of credit limit in EUR was 41.8% of <500 and subsequently 31.9% of 1m to 10m; 15.4% of five hundred thousand to 1m; 9.9% of >10m; and 1.1% of 1 000 000. "Average days delinquent" was 24.2% out of 3 to 19 days; 22% of "Before due", 18.7% of 0 to 2 days; 14.3% of 32 to 61 days; 8.8% of 76 to 360 days; 5.5% of 62 to 75 days; and 3.3% was similar to 20 to 31 and 0 days. Most "return rate on sales" were 47.3% of 0 to1%; 26.4% of 1 to 3%; 17% of over 3%; and 7.7% was negative. Most of the profit margins of significant trade were 79.1% of 0 to 2; 15.4% of over 10; 3.3% of 5 to 10; and 1.1% was similar to that of negative and 3 to 4. Likewise, most of the present ratio was 39.6% of 1 to 2, 25.3% of (less than 0.5), 18.7% of (0 and 5 to 1), and 16.5% of over 2.

The maximum consumers were 53.8% of 4 years, 16.5% of 3 years, followed by 14.3% for both 3 and 5 years, 14.3 % of 2 years and finally just 1.1 % of 7 years. The maximum turnover in EUR in the year 2009 was 56% on 10m to 250m, followed by 26.4% on 251m to 10 billion, 14.3% on 0 to 10m and finally, 3.3% on over 10 billion. Additionally, the maximum number of years in business was 47.3% for over 20 years, 41.8% for 6 to 20 years, followed by 6.6% for 4 to 6 years and finally, 4.4% of 1 to 3 years. Ultimately, the maximum equity ratio was 40.7% for 0 to 10%; 30.8% for over 30%, followed by 25.3% for 11 to 20% and finally 3.3% for negative.

3.2.4. Descriptive statistics

EDA (Exploratory Data Analysis) for all the groups was carried out individually. EDAs were made of the following: “Average days delinquent”, “Years as customer”, “Current ratio”, “Return on sales”, and “Turnover in EUR”, all for the year 2009, taking into consideration that 91 case samples were carried out to establish whether or not the readings pertained to the assumption of standards. The assessment for “Average days delinquent” in 2009 pointed to the fact that the measurement was generally dispensed with, on average by 3.11, and with a measurement divergence similar to 1.975. The scrutiny for “Years as customer” pointed out that the measurement digressed considerably from the routine and was appreciably and unconstructively distorted, with an average of 3.725, and a standard digression equivalent to 0.955. Likewise, the “Current ratio”, “Return on sales” and “Turnover in EUR”, for the year 2009, further revealed an average of 2.472, 1.186 and 2.560. Additionally, standard digressions were 1.047, 0.886, 0.713 and 0.884.

Table 3: Descriptive statistics

Variables	**Minimum**	**Maximum**	**Mean**	**SD**
Average days delinquent	0	7	3.11	1.97
Years as customer	2.00	7.00	3.72	0.95
Current ratio	1.00	4.00	2.47	1.04
Return on sales	1.00	4.00	2.47	0.88
Turnover in EUR	0.00	3.00	1.18	0.71
Return on sales	1.00	4.00	2.56	0.88

3.2.4.1 Customers' home country and average days deliquent

Table 4: Relationship between Customers' home country and average days delinquent

Home country of the custo-mer	**Average days delinquent**								
	0	Before Due	0-2 Days	3-19 Days	20-31 Days	32-61 Days	62-75 Days	76-360 Days	Total
Africa	0	1	0	0	0	0	0	0	1
	0.0%	5.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%
Asia	0	1	0	2	0	8	5	6	22
	0.0%	5.0%	0.0%	9.1%	0.0%	61.5%	100.0%	75.0%	24.2%
EE	0	8	6	3	0	3	0	1	21
	0.0%	40.0%	35.3%	13.6%	0.0%	23.1%	0.0%	12.5%	23.1%
EU	3	4	8	16	2	1	0	1	35
	100.0%	20.0%	47.1%	72.7%	66.7%	7.7%	0.0%	12.5%	38.5%
America	0	5	3	1	1	1	0	0	11
	0.0%	25.0%	17.6%	4.5%	33.3%	7.7%	0.0%	0.0%	12.1%
Near East	0	1	0	0	0	0	0	0	1
	0.0%	5.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%
Total	3	20	17	22	3	13	5	8	91
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Phi-value: 0.935, P-value: 0.000<0.05.

Table 4 shows a comparison between "Customers' home country" and "ADD" (Average days delinquent) for the year 2009. It was noted that 38.5% of the respondents were citizens of the European Union. Additionally, most of the ADD participants were from 76 to 360 days delinquent, i.e. about 75%, and were from Asia. Most of the ADD participants for the year 2009 that were 62 to 75 days delinquent, i.e. almost 100%, were also from Asia, and most of the ADD participants that were from 32 to 61 days delinquent, i.e. about 61.5%, were also from Asia. However, most of the ADD participants that were from 20 to 31 days delinquent, equal 66 %, were from the EU, and most of those that were 3 to 19 days delinquent, or about 72.7%, were from the EU. Furthermore, about 47.1% of

the ADD participants were 0 to 2 days delinquent, and were also from the EU. Additionally, most of the ADD participants that were in the "Before due" category, about 40%, were from the EE, and most of the ADD participants that were of 0-days, about 100%, were from the EE. Taking into consideration the Phi-value of 0.935 and the P-value of 0.000, i.e. lower than 0.05, it can be deduced that there is a correlation between ADD and the customers' home country.

3.2.4.2. Customers' home country and Disputes concerning invoices

Table 5: Relationship between Customers' Home Country and Disputes concerning invoices

Customers' Home Country	**Disputes concerning invoices Yes / No**		
	No	**Yes**	**Total**
Africa	1	0	1
	1.1%	0.0%	1.1%
Asia	22	0	22
	24.7%	0.0%	24.2%
EE	21	0	21
	23.6%	0.0%	23.1%
EU	34	1	35
	38.2%	50.0%	38.5%
America	10	1	11
	11.2%	50.0%	12.1%
Near East	1	0	1
	1.1%	0.0%	1.1%
Total	89	2	91
	100.0%	100.0%	100.0%

Phi-value: 0.196, P-value: 0.621>0.05

Table 4 portrays a comparison between "Customers' home country" and "Disputes pertaining to invoices". It was noted that about 38.5% of the respondents were from the EU. Additionally, most of "Disputes pertaining to invoices" participants who replied 'yes' were 50% from the US and the EU, and most of "Disputes

pertaining to invoices" participants who replied 'no' were 38.2%, from the European Union. Taking into consideration the Phi-value of 0.196 and the p- value of 0.621, i.e. more than 0.05, it can be deduced that no correlation exists between "Customers' home country" and "Disputes pertaining to invoices".

3.2.4.3. Customers' home country and average days deliquent

Table 6: Relationship between Customers' home country and Credit limit in EUR

Customers Home-Country	**Credit limit in EUR**					
	< 500.000	**> 10m**	**1000000**	**1m-10m**	**500-1m**	**Total**
Africa	1	0	0	0	0	1
	2.6%	0.0%	0.0%	0.0%	0.0%	1.1%
Asia	15	0	0	1	6	22
	39.5%	0.0%	0.0%	3.4%	42.9%	24.2%
EE	6	0	1	10	4	21
	15.8%	0.0%	100.0%	34.5%	28.6%	23.1%
EU	16	1	0	15	3	35
	42.1%	11.1%	0.0%	51.7%	21.4%	38.5%
America	0	8	0	3	0	11
	0.0%	88.9%	0.0%	10.3%	0.0%	12.1%
Near East	0	0	0	0	1	1
	0.0%	0.0%	0.0%	0.0%	7.1%	1.1%
Total	38	9	1	29	14	91
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Phi-value: 0.952, P-value: 0.000<0.05.

Table 6 reveals a comparison between "Customers' home country" and "Credit limit in EUR". It was monitored that 38.5% of respondents were from the European Union. Additionally, most of the 42.9% "Credit limit in EUR" participants of five hundred thousand to 1m were from Asia; most of the "Credit limit in EUR" participants of 1m to 10m, or about 51.7%, were from the European Union, and most of the "Credit limit in EUR" participants of 1 000 000, or almost

100%, were from the EE. Most of "Credit limit in EUR" participants of more than 10m, or about 88.9%, were from US and most of those participants of less than five hundred thousand were about 42.1%, and from the European Union. As noted from the Phi-value of 0.952 and the p-value of 0.000, i.e. lower than 0.05, it can be deduced that a correlation was present between "Credit limit in EUR" and "Customer's home country".

3.2.4.4. Customers' home country and years in business

Table 7: Relationship between Customers' home country and Years in business

Customers' Home-Country	**Years in business**				
	1-3 Years	**4-6 Years**	**6-20 Years**	**Over 20 Years**	**Total**
Africa	0	0	1	0	1
	0.0%	0.0%	2.6%	0.0%	1.1%
Asia	2	3	8	9	22
	50.0%	50.0%	21.1%	20.9%	24.2%
EE	2	2	16	1	21
	50.0%	33.3%	42.1%	2.3%	23.1%
EU	0	1	12	22	35
	0.0%	16.7%	31.6%	51.2%	38.5%
America	0	0	1	10	11
	0.0%	0.0%	2.6%	23.3%	12.1%
Near East	0	0	0	1	1
	0.0%	0.0%	0.0%	2.3%	1.1%
Total	4	6	38	43	91
	100.0%	100.0%	100.0%	100.0%	100.0%

Phi-value: 0.612, P-value: 0.003<0.05.

Table 7 is a comparison between "Customers' home country" and "Years in business". It is noted that about 38.5% of respondents were from the European Union. Additionally, most of the "Years in business" participants of more than 20 years constituted about 51.2 % and were from the European Union. Most of the "Years in business" participants of 6 to 20 years were about 42.1% and were

from the EE, and most of the "Years in business" participants of 4 to 6 years were about 50% and from Asia, and those participants of 1 to 3 years, about 50%,were from Asia and the EE. As noted from the Phi-value of 0.612 and the p-value of 0.003, i.e. lower than 0.05, it can be deduced that a correlation exists between "Years in business" and "Customers' home country".

3.2.4.5. Customers' home country and years as customer

Table 8: Relationship between Customers' Home Country and Years as Customer

Customers Home Country	**Years as customer**					**Total**
	2.00	**3.00**	**4.00**	**5.00**	**7.00**	
Africa	0	0	1	0	0	1
	0.0%	0.0%	2.0%	0.0%	0.0%	1.1%
Asia	4	8	9	1	0	22
	30.8%	53.3%	18.4%	7.7%	0.0%	24.2%
EE	3	3	13	2	0	21
	23.1%	20.0%	26.5%	15.4%	0.0%	23.1%
EU	6	2	24	2	1	35
	46.2%	13.3%	49.0%	15.4%	100.0%	38.5%
America	0	2	2	7	0	11
	0.0%	13.3%	4.1%	53.8%	0.0%	12.1%
Near East	0	0	0	1	0	1
	0.0%	0.0%	0.0%	7.7%	0.0%	1.1%
Total	13	15	49	13	1	91
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Phi-value: 0.708, P-value: 0.001<0.05.

Table 8 portrays a comparison between "Customers' home country" and "Years as customer". It is noted that about 38.5% of respondents were from the European Union. Additionally, almost 100% of the "Years as customer" participants of more than 7 years were from the European Union; most of the "Years as customer" participants of 5 years, at 53.8%, were from the US; and most of the "Years as customer" participants of 4 years, at about 49%, were from the European Union.

Furthermore, most of the "Years as customer" participants of 3 years, at about 53.3%, were from Asia. As noted from the Phi-value of 0.708 and the p-value of 0.001 that is lower than 0.05, it can be deduced that a correlation is present between "Years as customer" and "Customers' home country".

3.2.4.6. Customers' home country and equity ratio

Table 9: Relationship between Customers' home country and the Equity ratio

Customers Home Country	**Equity Ratio**				
	Negative	**0-10%**	**11-20%**	**Over 30%**	**Total**
Africa	0	0	0	1	1
	0.0%	0.0%	0.0%	3.6%	1.1%
Asia	0	20	1	1	22
	0.0%	54.1%	4.3%	3.6%	24.2%
EE	0	4	8	9	21
	0.0%	10.8%	34.8%	32.1%	23.1%
EU	3	13	11	8	35
	100.0%	35.1%	47.8%	28.6%	38.5%
America	0	0	3	8	11
	0.0%	0.0%	13.0%	28.6%	12.1%
Near East	0	0	0	1	1
	0.0%	0.0%	0.0%	3.6%	1.1%
Total	3	37	23	28	91
	100.0%	100.0%	100.0%	100.0%	100.0%

Phi-value: 0.730, P-value: 0.000<0.05.

Table 9 illustrates a comparison between "Customers' Home Country" and the "Equity Ratio". It is noted that about 38.5% of respondents were from the European Union. Additionally, most of the "Equity Ratio" participants, at more than 30%, or about 28.6 %, were from the US and the European Union, while most of the "Equity Ratio" participants at 11% to 20%, or about 47.8%, were from the European Union. Furthermore, most of the "Equity Ratio" participants at 0 to10%, or about 54.1%, were from Asia, while most of the "Equity Ratio" participants of

negative, or almost 100%, were from the European Union. As noted from the Phi-value of 0.730 and the p- value of 0.000, i.e. lower than 0.05, it was deduced that a correlation exists between "Equity ratio" and "Customers' home country".

3.2.4.7. Customers' home country and current ratio

Table 10: Relationship between Customers' home country and the Current ratio

Customers Home Country	**Current ratio**				
	Less 0,5	**0,5-1**	**1-2**	**Over 2**	**Total**
Africa	0	0	0	1	1
	0.0%	0.0%	0.0%	6.7%	1.1%
Asia	20	1	1	0	22
	87.0%	5.9%	2.8%	0.0%	24.2%
EE	1	4	9	7	21
	4.3%	23.5%	25.0%	46.7%	23.1%
EU	2	12	16	5	35
	8.7%	70.6%	44.4%	33.3%	38.5%
America	0	0	9	2	11
	0.0%	0.0%	25.0%	13.3%	12.1%
Near East	0	0	1	0	1
	0.0%	0.0%	2.8%	0.0%	1.1%
Total	23	17	36	15	91
	100.0%	100.0%	100.0%	100.0%	100.0%

Phi-value: 0.962, P-value: 0.000<0.05.

Table 10 illustrates a comparison between "Customers' Home Country" and "Current ratio". It is noted that 38.5% of the respondents were from the European Union. Additionally, most of the "Current ratio" participants of more than 2, or about 46.7%, were from the EE; most of the "Current ratio" participants of 1 to 2, or about 44.4%, were from the European Union; and most of the "Current ratio" participants of 0.5 to1 or about 70.6%, were from European Union, while most of the "Current ratio" participants of less than 0.5 or about 87%, were from Asia. As noted from the Phi-value of 0.962 and the p-value of 0.000, i.e. less than 0.05, it

can be deduced that a correlation exists between "Current ratio" and "Customers' home country".

3.2.4.8. Customers' home country and return on sales

Table 11: Relationship between Customers' Home Country and Return on Sales

Customers Home Country	**Return on sales**				**Total**
	Negative	**0-1%**	**1-3%**	**Over 3%**	
Africa	0	0	0	1	1
	0.0%	0.0%	0.0%	5.9%	1.1%
Asia	1	21	0	0	22
	14.3%	41.2%	0.0%	0.0%	24.2%
EE	2	7	4	8	21
	28.6%	13.7%	25.0%	47.1%	23.1%
EU	4	12	12	7	35
	57.1%	23.5%	75.0%	41.2%	38.5%
America	0	11	0	0	11
	0.0%	21.6%	0.0%	0.0%	12.1%
Near East	0	0	0	1	1
	0.0%	0.0%	0.0%	5.9%	1.1%
Total	7	51	16	17	91
	100.0%	100.0%	100.0%	100.0%	100.0%

Phi-value: 0.720, P-value: 0.000<0.05.

Table 11 illustrates a comparison between "Customers' home country" and "Return on sales" for the year 2009. It is noted that 38.5% of the respondents were from the European Union. Additionally, most of the "Return on sales" participants, of more than 3%, or 47.1%, were from the EE, and most of the "Return on sales" participants of 1 to 3%, or about 75%, were from the European Union. Furthermore, most of the "Return on sales" participants of 0 to 1%, or about 41.2%, were from Asia, and most of the "Return on sales" participants of negative, or about 57.1%, were from the European Union. As noted from the Phi-value of

0.720 and the p-value of 0.000, i.e. less than 0.05, it can be deduced that a correlation exists between "Return on sales" and "Customers' home country".

3.2.4.9. Customers' home country and turnover in EUR

Table 12: Relationship between Customers' home country and Turnover in EUR

Customers Home Country	**Turnover in EUR**				
	0-10m	**10m-250m**	**251m-10 Billion**	**Over 10 Billion**	**Total**
Africa	0	0	1	0	1
	0.0%	0.0%	4.2%	0.0%	1.1%
Asia	2	18	2	0	22
	15.4%	35.3%	8.3%	0.0%	24.2%
EE	8	11	2	0	21
	61.5%	21.6%	8.3%	0.0%	23.1%
EU	3	18	12	2	35
	23.1%	35.3%	50.0%	66.7%	38.5%
America	0	3	7	1	11
	0.0%	5.9%	29.2%	33.3%	12.1%
Near East	0	1	0	0	1
	0.0%	2.0%	0.0%	0.0%	1.1%
Total	13	51	24	3	91
	100.0%	100.0%	100.0%	100.0%	100.0%

Phi-value: 0.608, P-value: 0.004<0.05.

Table 12 portrays a comparative study between "Customers' home country" and "Turnover in EUR". It was noted that 38.5% of respondents were from the European Union. Additionally, most of the "Turnover in EUR" participants of more than 10 billion, or about 66.7%, were from the European Union; most of the "Turnover in EUR" participants of 251m to10 billion, or about 50%, were from the European Union; most of the "Turnover in EUR" participants of 10m to 250m, or about 35.3%, were from the EU and Asia. While most of the "Turnover in

EUR" participants of 0 to10m, or about 61.5%, were from the EE. As noted from the Phi-value of 0.608 and the p-value of 0.004, i.e. less than 0.05, it was deduced that a correlation exists between "Turnover in EUR" and "Customers' home country".

3.2.5. Discussion of research 1 on corporate trade finance on a micro level

Although the breakdown on the regions provided a lot of information about the prevailing differences, conclusions were drawn in respect of the global view in order to avoid too much information, and as stated in the research topic:
In most cases, the profit margin of the relevant sales was unknown. Therefore, it was assumed that credit analysts took the average profit margin of a firm or unit into consideration in determining the credit limit. Furthermore, the country risk had no major impact on the credit limit. Debtors who were given credit limits of over euro 10 million were likely to pay on time. These debtors would have been active on the market for many years and typically had a long relationship with the seller. In these cases, the debtor's balance sheet showed equity of 11% or more of the total assets. The current assets were higher than the current liabilities. The buyers' turnovers were euro 250 million or higher. Consequently, the working capital management was considered successful. Buyers who were offered credit limits between euro 1 and 10 million had the following characteristics: 86% of the cases had an ADD (average days delinquent) of less than 20; the debtors had been active in business for a long time; the duration of the relationship between the customer and the buyer was over six years; 80% of the debtors had a balance sheet that showed equity of at least 11% of the total assets; 65% of the cases showed a working capital ratio of over one; the return on sales was more than 1% in over 50% of cases; and the customer's annual turnover was between euro 10 and 250 million.

The debtors who had obtained credit limits of between euro 300 000 and 1 million were not as strongly focused on punctual payments, because 50% of them were late by over 20 days. These buyers had mostly been in the market for more than six years and the contact between the obligor and the debtor had existed for at least three years. In addition, the data showed that only 45% and 42% of debtors

respectively had an acceptable equity (11% or better) and a positive working capital (better than 1). In addition, the turnover of the buyers' was typically (over 75%) less than euro 250 million, or unknown. Nearly all of the criteria used to determine the credit limits below euro 300 000 had a comparable weight to those used in the determination of limits between euro 300 000 and 1 million. Only turnovers that showed these lower limits were mostly given to smaller companies that had turnovers of below euro 250 000 (only 12% of these debtors had a turnover of over euro 250 000).

3.2.5.1. Back-testing the results of research 1 in a comparison with the literature

The research results were theoretically evaluated using creditworthiness determining factors such as liquidity, long-term financing-equity ratio, efficiency and the profitability of a firm. "Liquidity refers to the availability of company resources to meet short-term cash requirements" (Subramanyam 2010, p.526). Credit analysts consider liquidity by evaluating the working capital ratio and payment behaviour. The determination of credit limits over euro 10 million confirms this theory because these credit limits are based on the lack of payment overdues and a positive working capital ratio. The liquidity data used for determining credit limits between euro 1 and 10 million was not as good as in the previous case. In these cases, payment overdues of up to 19 days were being accepted. In addition, in a third of the cases, working capital showed that the current liability was higher than the current assets. In cases in which the limits were determined to be below euro 1 million, the liquidity figures seemed to be even less important. This finding indicated that better liquidity results could be obtained by having a higher credit limit.

The way in which the long-term financing of a company is set up is a measure of its bankruptcy risk. Although net worth was not mentioned by the expert group, many participants explained that, in addition to the data delivered, they determined credit limits through a combination of the probability of default and a percentage of the net worth. The handling of long-term financing used by the credit analysts who participated in the research was therefore unclear. A probable reason could have been that their payment terms were typically 90 days or less. Therefore, the

credit analysts were more focused on liquidity risk because it is the short-term reason for insolvency.

Efficiency checks evaluate managements. However, this evaluation includes the assessment of soft factors, which are difficult to translate into a mathematical formula. Therefore, efficiency was not included in the 30 criteria that the 50 credit analysts indicated were important in the credit decision process. The sales people in the seller's firm would typically be able to provide this information because they often knew the buyer's company quite well. However, efficiency, which is the focus of 25% of the literature, is not typically considered in the credit limit calculation. Profitability assesses the path of self-financing. From a risk management point of view, the profit in relation to the total assets must be higher than a riskless bank loan. In the first step of credit limit research, most credit analysts preferred the profit to turnover ratio to the profit to net worth relationship. Consequently, this result indicated that the profit to turnover ratio is sufficient for the evaluation of insolvency risk.

A comparison of the empirical results with the literature showed that many credit experts confirmed the observations presented in the literature, even if the literature did not propose a concrete method for the determination of credit limits. There seemed to be a common understanding that certain data led to a commonly agreed credit limit; this common understanding could be influenced by a number of other, changing factors such as country risk, high inflation, or a sector crisis. Therefore, the process should be updated regularly. As a final result of Research 1, the empirical study found that a defined data structure can be used for the evaluation and scoring of a limit. This result would reduce the amount of work and data required in future for the determination of credit limits. It would also help new credit analysts in learning how to determine credit limits, and help convince internal and external business partners that the credit limits are fair and that they conform to the market.

3.3. Corporate trade finance for a firm's trade portfolio

The current strong focus by corporate trade finance management on credit portfolios has resulted in a change from the use of many single optimizations to just one. The literature states that the return from the combined assets in a portfolio is a weighted average of the return from the individual assets (Elton et al. 2007, p.51; Bugar and Uzsoki 2012; Armitage 2005, p.41) and that the portfolio theory has the advantage that positive and negative positions result in lower risk (Elton et al. 2007, p.64). A further advantage of the portfolio view is that the inherent risk-adjusted return can help determine whether a company is extracting the highest possible return for the least possible risk. In the literature, this measure is called the risk-adjusted return on capital (RAROC), and its calculation is based on research that was performed by Markowitz. The goal of his work was the identification of a risk measure of the diversification benefits of a composite portfolio, i.e. the benefits of diversification in different markets, regions or types of investments (Herring et al. 2007, p.347). In the analysis of a given return, optimization occurs on the assets (investment) side and the investor will select single items that obtain the lowest risk (Francis et al. 2010, p.731).

The benefit of portfolio diversification is that it allows analysts to take a long-term view on the assets. However, an individual loss can be so damaging that it stops the investor from having the money to make subsequent investments; this would make the investor unable to benefit from the portfolio effect, which is available only to investors who can afford to stay in the business long enough to observe the numbers gradually trend towards the expected outcome. Some risks can be so serious that they obviously threaten the financial viability of a company. Companies that are subject to these types of risks cannot afford to take the long-term view and are thus found to be in a "financial distress" situation. The positive view of this effect is called "risk capacity", which describes the ability of a firm to cope with the risks inherent in its portfolio (Woolley 2009, p.164).

3.3.1. Corporate trade finance and the portfolio concept

Michalski used the general portfolio concept to determine the levels of accounts receivable (Michalski 2008). He started with the definition of the target for receivables: the best volume of receivables is that in which any change in the level or risk position negatively influences the outcome of the receivables. He used this information to develop a formula based on the assumption that a firm's present value is the sum of its future free cash flows discounted by the rate of capital financing costs:

$$\Delta \mathrm{Vp} = \sum_{\mathrm{t}=1}^{\mathrm{n}} \frac{\Delta \mathrm{FCFFt}}{(-1+\mathrm{k})\exp \mathrm{t}}$$

Where ΔV_p is the increase in the firm's value, $\Delta FCFF_t$ is the future free cash flow growth that occurs during period t, and k represents the discount rate. The trade credit policy decisions that change the terms of the trade credit create a new accounts receivable level. Consequently, the trade credit policy has an influence on the firm's value. The profit rate resulting from the trade credit can be obtained through the following formula:

$$R_{nAR} = \frac{\Delta CR - \Delta Costs}{\Delta Costs}$$

Where R_{nAR} indicates the profit rate that is obtained from giving trade credit to n purchasers, ΔCR is the cash from the sales growth that is generated from further sales to n customers, and Δ costs represents the increase in costs that result from offering the trade credit to n purchasers (Michalski 2008). This formula means that the netting of the results cannot be used for credit portfolios to determine the credit risk of a given amount of outstanding receivables because none of the receivables has a negative default probability. However, the portfolio of receivables can average single credit risks, which proves advantageous in the management of a combined risk position compared to the management of each single credit risk (Michalski 2008 and Niethen 2001, p.140). In addition, the manager can

mathematically optimize the cost-benefit relationship of the defaults of a receivables portfolio by adding the optimal securities, such as credit insurance and bank guarantees. When the credit capacity is reached, a bank or an insurance hedge is economically necessary.

3.3.1.1. Transactions costs and the portfolio approach in corporate trade finance

Transaction costs limit the benefits of a portfolio; these have nothing to do with cash, but are associated with sharing risk (Woolley 2009, p.166). In the past, the combination of all of a group's credit exposures into a data pool was too expensive. However, new IT hardware and software solutions have decreased the costs of each exposure and are thus strong enough to make a corporate credit management portfolio approach make sense. The portfolio theory describes the best possible way to actively build a portfolio strategy (Günther 2003, p.139). If the strategy is defined for the credit portfolio, it can be used to guide the credit exposure and limit the decision process that results from the carrying costs and opportunity costs. The carrying costs are the costs associated with the credit and the capital that are associated with the receivables; it thus includes the costs of the payments that will be received later, the losses from bad debts and the costs of loan processing (Vishwanath 2000, p.323). The opportunity costs represent the lost sales due to rejections by the credit department. The optimal credit policy depends on the characteristics of each company. For example, some companies should handle their under-utilized capacity by granting more generous credit than others (Buckley et al. 2000, p.619 and Vishwanath 2003, p.323).

The advantages of a portfolio strategy in corporate trade finance rely on its efficiency. The much improved information and communication methods, the new approaches of corporate management and the increasingly international markets have had a significant impact on the design of credit management in recent years. Furthermore, various new hedging instruments from the financial sector, such as CDS and CDOs, and the insurer, also increase the efficiency of corporate trade finance. Some of these are only effective for a portfolio of exposures. As a consequence of their portfolio views, companies have recently streamlined the organization of corporate trade finance credit management with a focus on the

group risks, and profits and costs, which means that the optimization of the loan portfolio is related to the risks that should be taken internally in the group and those that should be hedged or sold (VCI 2000, p.26). Companies have implemented these goals in many ways. This was confirmed a number of years ago through a survey of the companies in the German VCI/chemical industry, all of which followed very different paths. The implementation of the portfolio is particularly reflected in the shaping of their risk strategies and organizational structures.

3.3.2. Research 2: Impact of the financial crisis on the finance strategies of stock-listed German companies

The global financial crisis of 2008, which was mainly a crisis of the banks, had an impact on the German economy, and thus on companies listed on the stock exchange. Therefore, in 2008 and 2009, companies mainly focused on operational crisis management. This analysis portrayed how the financial management of manufacturing and trading companies had behaved after the financial crisis. Had their financial management changed since the financial crisis? Had financial managers, such as treasurers, implemented new strategies based on lessons learned from the crisis? In addition, were there other developments affecting the companies' current financial strategy?

This research was based on the public information supplied in the 2006 to 2011 annual reports of companies that were listed on the German Dax and Mdax, whereas the descriptive information (other than balance sheet and profit and loss calculations) was taken from the year 2010. The analyzed companies included the biggest German groups, such as Siemens and Volkswagen. In total, approximately 70 groups of companies were included in the analysis. All these companies had annual sales listed in the billions of euros. The analysis excluded firms that were not part of the real economy (e.g. banks) and firms that had business models with characteristics that required individual analysis (e.g. milestone payments to producers of long-term machines and the impact of these payments on the liquidity of that producer). Of the approximately 70 companies scrutinized, 14 belonged to

the chemical/pharmaceutical category, eight to the automotive sector, seven to technology, and six to the engineering/production sectors.

3.3.2.1. Trade, country, and bank credit risk

Fifty-six of the companies that were surveyed (78%) disclosed their trade credit risk. In most cases, an active receivables management and/or credit insurance was named. Twelve chemical or pharmaceutical, seven automotive, and all the technology and engineering companies addressed this issue.

Nearly all of the German Dax- and Mdax-listed groups published their defaults on trade receivables. However, some companies included amounts that were not considered commercial credit risk defaults. This occurred in cases in which the receivables were defaulted due to country risk (i.e. pharmaceutical products that were outstanding to Greece), or when the written invoices that were used were later declared invalid. Therefore, it made sense to include 49 out of the original 72 companies in this evaluation. These companies had an approximate euro 2.4 billion trade exposure as at the end of 2010 and 2011. In addition, their default ratio in 2010 was 0.19 % of the trade exposure. In 2011, the ratio improved to a rate of 0.15% of the exposure.

In 20 of the annual reports for the year 2010, the existing country risks were reported, in particular those concerning commercial transaction risks. Hedges are made with export agencies through either letters of credit or credit insurance. Four chemical/pharmaceutical companies, four automotive suppliers, two technology companies and two mechanical engineering groups reported information on country risks.

A large percentage (82%, or 59 firms) of the companies surveyed reported on their management of bank default risk. A good credit standing would usually be required, which is often documented by the requested adequate (A) rating. Twelve chemical/pharmaceutical companies and all the automotive group companies reported on this risk. Conversely, banking risk is not named in the reports of three of the companies in the mechanical engineering sector.

3.3.2.2. Working capital

Working capital was evaluated for each of the companies to analyze its development over the evaluated time period. Therefore, a comparison was carried out on three aspects of working capital:

The volume of net working capital (trade receivables, inventories, and trade payables) of 68 analyzed companies (four had special conditions) had increased by euro 35.6 billion and, when taking into consideration the sales changes, it had increased by 94%. This corresponded to a cash conversion cycle increase from 48.5 days to 53.1 days. In the chemicals/pharmaceuticals and automotive sectors, net working capital had increased by 11.3 billion, which meant that sales had adjusted by 11.8%. For the automotive manufacturers the increase was 10 billion, and sales had adjusted by 16%. The net working capital of the technology companies had increased by 6.7 billion and sales had adjusted by 11.7 %. In contrast, the mechanical engineering firms slashed their net working capital by euro 315 million, which exhibited a decrease of 6.5%.

A comparison of the same period was made for the receivables subset. Total exposure increased by almost euro 14 billion (10%), and the time of invoice to cash (DSO) had improved from 57.3 days to 55.4 days on average. The DSO of the chemicals/pharmaceuticals companies had increased by 13.4% on average, while the DSO of the companies in the automotive sector improved (reduced) by 4.2% or 1 day. The technology firms remained nearly unchanged with a 1.1% and a 1 day increase. The best development could be seen in the case of machine producers whose DSO improved by 12% and 8 days. A further assessment of the absolute advantages of working capital changes considered that most companies had long-term loans. In this context, stronger working capital and less debt would lead to a positive market price change for the company. Active control of working capital is therefore nominally higher than the change in interest costs in the profit and loss calculation.

3.3.2.2.1. Working capital in relation to other annual report data

Table 13: Relationship between Working capital and Sales growth, Tangible net worth, EBIT interest, EBITDA margin and Total assets

	Unstandardized Coefficients		**R-square**	**F-value**	**T**	**P-value**
	B	**Std. Error**				
2011						
(Constant)	6369.188	13416.869	0.999	780.706	.475	.655
Sales growth	1189.556	1483.440			.802	.459
Tangible net worth	-.998	.016			-61.370	**.000**
EBIT interest	12.609	41.499			.304	.773
EBITDA Margin	-8.514	25.243			-.337	.750
Total assets	.538	.031			17.289	**.000**
2010						
(Constant)	812.584	2062.270	0.999	1023.587	.394	.720
Sales growth	-15.622	121.391			-.129	.906
Tangible net worth	-.073	.039			-1.856	.160
EBIT interest	15.514	4.251			3.650	**.036**
EBITDA Margin	-8.237	2.714			-3.035	.056
Total assets	.202	.016			12.891	**.001**

Dependent variable: 2012, 2011- Working capital

Table 13 documents a trade credit analyze for 2010 and 2011. The influence between working capital and other variables that incorporate sales growth, tangible net worth, EBIT interest, EBITDA margins, and total assets were examined. All weakening comprised a constant; coefficients were not documented due to space constraints. Complete t-values were in digression after every coefficient. According to the results, working capital is seen to have a noteworthy correlation with sales growth, tangible net worth, and EBITDA margins.

3.3.2.3. Liquidity

The availability of sufficient liquidity at all times is an important economic target of companies (Lee & Lee 2006, p.399). Similar to bank requirements (Basel Committee, p.2.), companies should retain approximately one month's worth of cash. The ratio of liquidity to sales in 2011 was on average 46 days for the companies that were analyzed. This value was 46, 48, 34, 38, and 39 days in 2010, 2009, 2008, 2007, and 2006, respectively.

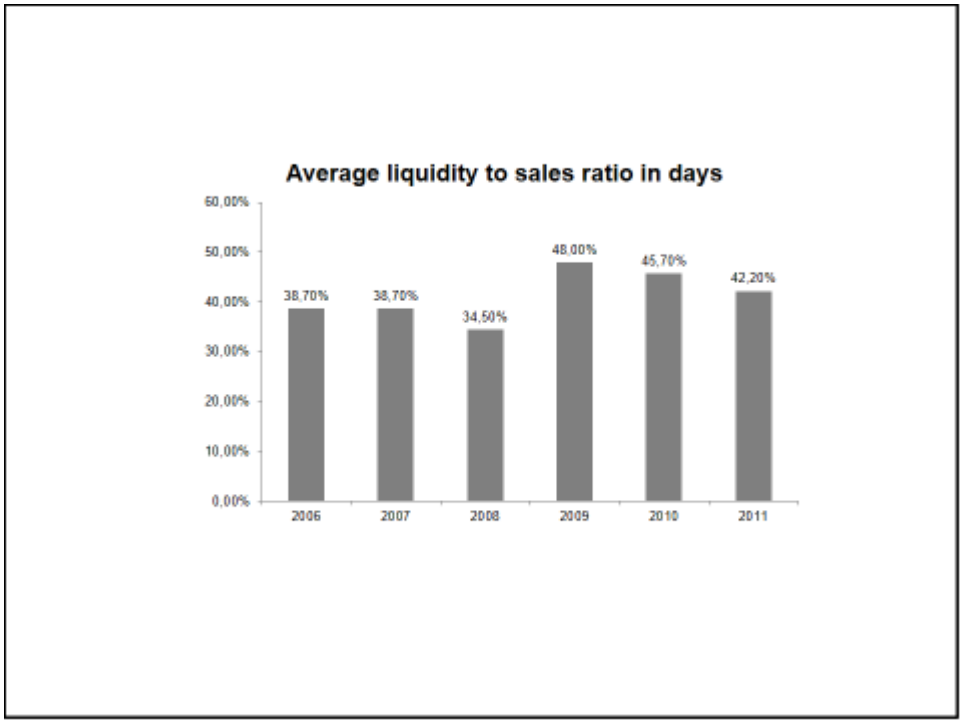


Figure 5: Average liquidity (in days) of listed German companies

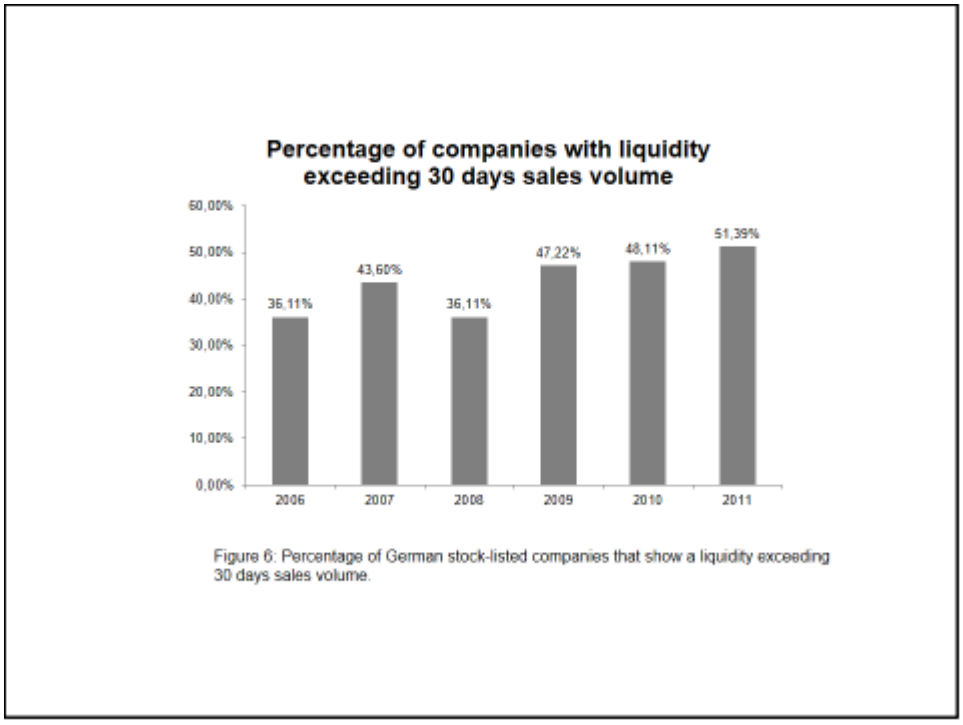


Figure 6: Percentage of German stock-listed companies that show a liquidity exceeding 30 days sales volume.

Figure 6: Percentage of German listed companies that show a liquidity exceeding 30 days of sales volume

Figure 6 shows that after the financial crisis more firms examined their liquidity situation and increased their cash position to be better prepared for bad times, particularly concerning the non-payment risk. The chemical/pharmaceutical companies had an average ratio of 33 days. The average liquidity ratio of the sector increased steadily every year. In the automotive industry, the average ratio was 31 days and the individual values ranged from 17 to 47 days. The average increased for the chemical/pharmaceutical firms until 2010, while 2011 showed a rebound. In the technology sector, the average was 58 days with a maximum of 168 days and a minimum of 8 days. This sector had already seen its peak liquidity average in 2009. The machinery firms exhibited an average of 23 days with individual results that ranged from 7 to 62 days. The average comparisons for the year showed no trends. It could be that this sector saw poor sales as a result of the financial crisis. In 2011, the 30-day cash reserve hurdle rate was managed by seven (from 14) chemical/pharmaceutical companies, four (from 8) automobile companies, four (from 6) technology groups and two (from 6) production firms.

Because the analysis included the period of the financial crisis, a view of how many companies increased their liquidity during this period was obtained. A comparison of the previously described liquidity-to-sales ratios in the years 2006-7 with the corresponding ratios in the years 2010-11 showed that 45 of the analyzed companies (65%) experienced a liquidity increase as a result of the financial crisis. In general, the liquidity ratio rose by 14% from the period of 2006-7 to the period of 2009-11, which demonstrated that the financial crisis had an influence on the financial behaviour of companies.

3.3.2.3.1. Liquidity and the financial crisis

The sector analysis showed that eleven of the fourteen chemical/pharmaceutical companies exhibited an increase in this ratio after the start of the crisis. The liquidity ratio of three automotive companies, four technology groups and four mechanical engineering companies also increased**.** This data clearly showed that companies had higher liquidity as a result of the financial crisis. As mentioned previously, the availability of sufficient liquidity is an essential goal of all companies. This target entry was listed in most of the annual reports. Some companies believed that a low net debt was more relevant than a high liquidity position. Because the bank's interest rate is lower than the hurdle profit rate for corporate assets (typically approximately 8 to 10%), the corporates had a stronger focus on efficiency.

Some groups have confirmed credit lines and believe that they do not need significant cash-liquidity (reserves). An analysis of the Eurostat data (Statistical Bureau of the European Commission) shows a slow increase in the cash that European companies have; however, the turnover increases at approximately the same rate (Eurostat data 2011). As a consequence, state-of-the-art risk management in liquidity does not just aim to increase liquidity. The financial crisis has reminded us that banks, the banking industry, and even countries can become insolvent. Therefore, the current interpretation of whether higher liquidity is necessary now differs, due to the experience of the financial crisis. Because

liquidity is invested in banks or is at least received through bank transactions, higher amounts of cash might not be the solution to a banking crisis. Higher amounts of cash are more relevant to those countries that are in turmoil. Finally, each group has different conditions and views that determine its liquidity target. Short-term liquidity also has to consider a) the volatility of daily net changes, b) the risk strategy, c) the market situation, and d) the time until a defined liquidity need can be covered by a lender (bank).

Out of the 72 companies that were evaluated, 35 reported that they undertook liquidity planning (for further information on liquidity planning, please refer to Tirole 2006, p.199). In addition, of these 35 companies, 13 indicated that their liquidity plan was prepared on a rolling basis for the following 12 months. These 35 companies included six chemical/pharmaceutical groups, seven automotive companies, three technology companies and four engineering firms.

3.3.2.3.2. Securing liquidity

There are four methods by which corporates can secure themselves against liquidity risk:

• It is beneficial to have operating accounts with multiple banks and in different regions. Therefore, it will be possible to run cash transactions at any time, even when one bank/region is not active. (This approach is common today but is not mentioned in the annual reports.)

• The second option is the right choice of bank for cash management. If the assumption is that derivatives, securities speculation and risky loans are the main risks for the insolvency of banks, at least one of the banks that is used for the management of the company's cash should not operate in any of these risky arenas.

• The third approach is to treat remittances from one bank to another as real-time transactions (ECB). This avoids the risk that cash is not forwarded due to a bank or state bankruptcy (settlement risk; Padmalatha and Paul, p.222). In addition, the

bank exposures can thus be reduced and the operational handling in trade finance can be improved. (For example, reminders are avoided for trade exposure because these inform customers that invoices have not been paid, when in reality, the transaction has already been made. In addition, the suppliers can be paid at very short notice, which proves advantageous when the receipt of money is a prerequisite for the release of goods by the supplier.)

• It is possible to use corporate clearing. If there is a general finance and banking solvency crisis, companies in the real economy might not be able to receive and pay money. In such situations, bilateral or multilateral clearing between corporates is a solution. In this context, multilateral clearing means that several companies pool their receivables and liabilities (in a data pool) in the same way that a corporation internally balances its group companies. Third party clearing is not new and is commonly used by the airways companies (IATA 2012).

3.3.2.4. Further financial crisis-linked findings in annual reports

In the analysis of corporate creditworthiness, the sum of equity and long-term liabilities should be higher than the long-term assets. This rule is "the golden rule of financing". The reason for the evaluation in this research is that a short-term loan can expire before the cash-flow of long-term assets is received, and is therefore risky for the firm. (Wöhe1989, p.264). On average, the "golden rule of financing" is a given in the stock exchange-listed companies that were investigated in this study. The best and worst years show an average ratio of 82% and 87% (82% of the credit analysis is a better value). The highest ratio was recorded in 2011, despite the financial crisis. But the ratio was still within the framework of the "golden rule of financing" and was therefore, from a credit standpoint, acceptable. Not all single companies constantly followed this rule. The highest ratio for a company was 269% in one year, while a very efficiently-run firm showed a low 23% ratio in one year. This ratio fluctuated in one company from 8% to 177% over a six year period. The average change for the firms over that time was 23.5%.

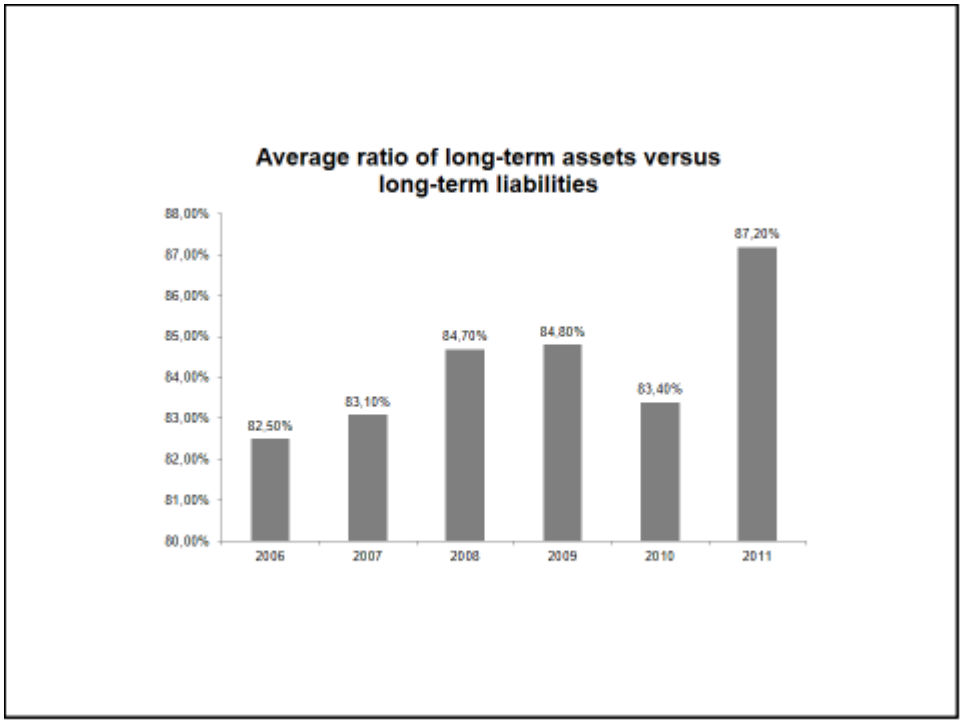


Figure 7: Average ratio of long-term assets to long-term liabilities of German listed companies

The average deviation margins for each sector were the following: chemicals/pharmaceuticals from 81% to 86% (2011: 82%); automotive manufacturers and suppliers from 83% to 90% (2011: 82%); technology companies from 82% to 89% (2011: 85%); and machinery companies from 63% to 70% (2011: 70%). An analysis of each year showed that the first worst peak was recorded during 2008, which was the year of the financial crisis. This result showed that the control of the equity and financial debt could not respond quickly enough to the economic developments. In 2011, the companies seemed to return to a less cautious consideration of the "golden rule of financing", which might be interpreted to mean that the financial crises had less of an impact on companies. As in 2010, all groups reacted to the financial crisis. The 2010 annual reports were evaluated and the corresponding conclusions are described in the following sections.

3.3.2.4.1. Value management and the financial crisis

The 2010 annual reports of the companies that were analyzed show how they managed their target profitability. The return on capital employed (ROCE) and the economic value added/cash value added (EVA/CVA) methods were mostly used. ROCE is defined as the net operating profit before or after taxes divided by the sum of the total assets that bear the debt, which is deducted from the available cash and cash equivalents. The EVA/CVA calculation is similar and results in an "excess return" that is based on the capital employed and a (free) rate, which is defined as a hurdle rate (McLaney and Atrill 2007, p.209). In enterprise planning, the hurdle rate is calculated as the weighted average cost of capital (WACC) (Brigham and Erhard 2008, p.361). The methodologies used in the analysis of the German firms were the following: ROCE was used by 32% of the companies; 17% of the companies utilized other economic calculations, 15% of the companies used EVA or CVA, 3% of the companies did not divulge their methods, 3% of the companies displayed non-economic financial aims, and 2% reported the creation of added value.

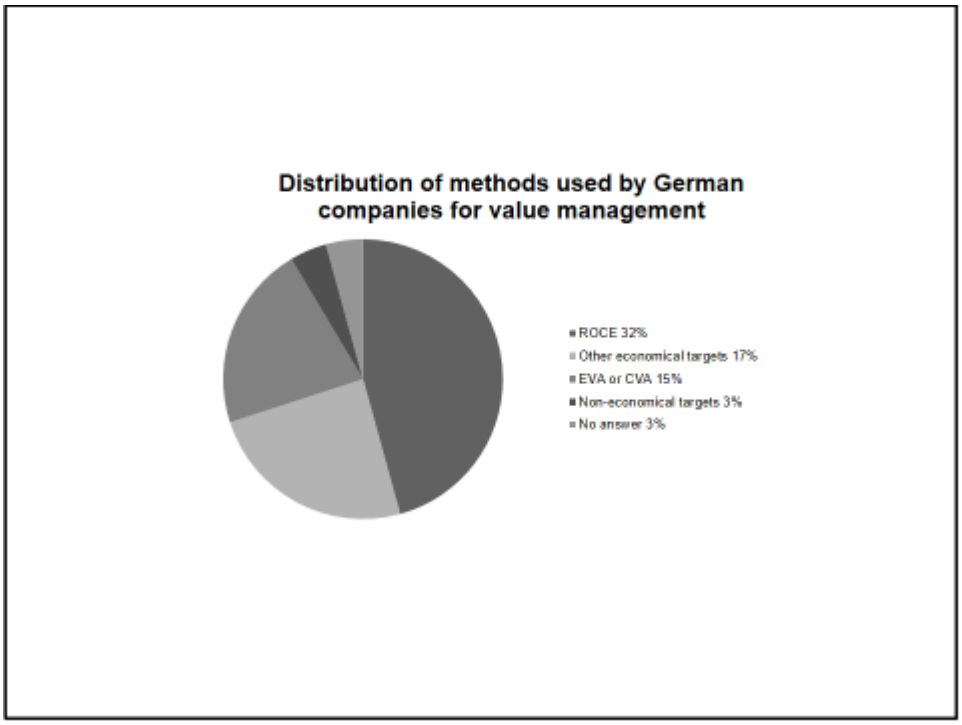


Figure 8: Distribution of methods used by German companies for value management

Of the 14 chemical/pharmaceutical companies, seven utilized ROCE, three used EVA/CVA and four utilized other economic indicators. Out of the eight automotive manufacturers/suppliers, six used ROCE. In addition, six of the seven technology firms used ROCE. Nearly the same percentage was found in the machinery production sector: ROCE was used by four of the six companies.

The value management analysis of the reports led to additional conclusions:

a) The companies often used calculations based on values that differed from the reported figures in the balance sheet. This was done to exclude factors that were specific to a certain year. Because the items were not explained in detail, it might have been better to use the balance sheet figures as a basis for the calculation, and to have explained exempted items verbally. This would have enabled the receiver of the information to interpret the results accordingly and correct them if s/he was convinced of the need.

b) The WACC measure makes an assumption of the base interest rate and the debt portion to represent long-term continuity, e.g. the interest rate is often determined by a 10-year bond loan. As is shown later, this was not an effective fixed interest rate for long-term loans in recent years. In addition, the underlying debt proportion in the WACC does not match reality.

c) The stability of future yields is generally discussed in the Risks and Opportunities section of an annual report. The implementation of modern approaches in business administration, such as the “best/worst case scenario” analysis (Dewar 2002, p.27) and real options models (Shim et al. 2012, p.351), were reported by only a few companies.

3.3.2.4.2. Financial risks of corporates and the financial crisis

Sixty percent of the companies addressed the management of foreign currency risk in their annual reports. Of these, 22 companies report that they fully hedged the net transactional currency risks. Fourteen mentioned that they were not affected by currency risk. Nearly all the companies pointed out that entering into speculative currency risk was prohibited. The remaining companies did not report a speculative hedging position. Eleven chemical/pharmaceutical, six automotive, six technology, and three mechanical engineering companies reported on their currency risk and hedging strategies. The information on foreign exchange derivatives was highly relative to the information on other risks that are undertaken by the firms. In the credit analysis, information on the company's total risk from the affected currency fluctuations was more important. However, this information was considered as internal knowledge. In addition, this information was not trivial, and perhaps it was not feasible to obtain, because the transactional risk in foreign currency is only a portion of the total economic currency risk. (Watson & Head 2010, p.386.)

Special attention was paid to long-term loans (Shim et al. 2012, p.131.) The 14 companies that did not exhibit any long-term debt financing in their balance sheets were excluded from the analysis. The remaining 58 firms had loans with an average four-year residual maturity. Although there were individual companies, such as those in the property sector, with a longer residual maturity, the maturity of the loans was generally less than the remaining use-time of the average assets. This finding suggested that the implementation of the golden rule in the asset-liability control was at least partially abandoned in operative finance in favour of the speculative "riding of the yield curve". This result was found in all the sectors: the average credit periods were 4.2, 4, 4.1 and 3.6 years in the chemical/pharmaceutical, automotive, technology and mechanical engineering companies, respectively.

3.3.2.4.3. Covenants, commodity risk and the financial crisis

Concerning covenants (Eckbo 2008, p.68), the 14 companies with no long-term loans were not affected. The 18 affected companies stated in their annual reports that they had no covenants. Twenty-eight companies (39%) reported the presence of covenants (this is particularly true of companies listed on the Mdax). Twelve companies out of these 28 did not provide detailed information on any covenants and/or their conditions. The remaining ten firms reported different details.

Twenty-five companies reported the existence of commodity risks that were the result of commodity purchases or sales. Unless the volume is low, commodities risk is generally hedged by derivatives or future contracts. In the chemical/ pharmaceutical sector, five companies reported their commodities. All except one of the companies in the automotive sector mentioned commodities, whereas only the Siemens group in the technology sector was affected by this risk. This topic was not reported on by any of the mechanical engineering firms. (Smithson 1998, p.174.)

Although interest rate management in often discussed in the financial press, there was no evidence of interest rate management goals in the annual reports that were studied. The interest rate management method advocated in the literature, which includes the use of variable interest rates for current assets, and fixed interest rates for the debt financing of fixed assets, was not detailed in any of the annual reports. (Brigham and Gapenski 2007, p.518.)

3.3.2.4.4. Equity, other financial topics and the financial crisis

The development of equity ratios is economically related to the corporate aim for financial security. Therefore, two equity developments were analyzed:

a) The relationship between equity and total assets. The average ratio remained stable over the 6 evaluated years. It started in 2006, therefore before the crisis, at 36.90 % and went down during the financial crisis in 2008 to 35.08%. In 2011 it rose back up to 36.95%. This development could be interpreted to mean that after

the start of the financial crisis, firms wanted more equity, as the credit spread for bonds increased strongly and debt financing was more expensive and risk inherent. The chemical and pharmaceutical companies had, over the six years, an average equity ratio that ranged from 33.67% to 37.57%. The year 2010 showed the highest ratio for equity in relation to total assets, and 2011 the lowest. Therefore, for this sector the financial crisis in 2011 was not as relevant in terms of the equity position. The financial crisis did not lead the automotive firms to a more judicious equity ratio. Their highest equity ratio was in 2006 and the lowest in 2009. But the balance sheets of the automotive producers had big leasing positions. Therefore, it may be said that the low equity ratio was influenced by the higher leasing demand during the financial crisis. The technology sector showed a development similar to the chemical/pharmaceutical sector, with an equity ratio peak in 2010 of 24.14%, and in 2011, on average, 22.87%. In comparison the machinery firms were, in 2011 still more risk-aware, as their average equity ratio increased steadily each year from 35.50% in 2006, and in 2011 was nearly 40 per cent (39.92%). The company with the most stable equity ratio over the six years was a distributor with a ratio-range of 1.2 %.

b) The relationship between equity and net financial debt. An analysis of the development of the ratio of net borrowing to equity was carried out with 49 companies, as it made no sense to include firms with nil net borrowings. Automotive firms with high leasing positions were also excluded. The average of the net borrowings-to-equity ratio of all remaining companies was 59.16%, 63.67%, 71.49%, 67.02%, 53.80% and 67.62% in the years 2006, 2007, 2008, 2009, 2010 and 2011, respectively. The first result is that the listed companies had more money from equity investors than (net) from financial lenders. Firms were therefore evaluated as well capitalized. Furthermore, the year 2008 showed the highest ratio. As the banks were unwilling to give credit in 2008, companies had to reduce their debt ratio in 2009 and again in 2010. In 2011, firms again had a significantly higher debt ratio than in an average year, which meant that the financial crisis had had no further influence on corporate debt. The minimum average equity/net borrowings ratio of the chemical/pharmaceutical companies was 6.69% below the maximal average from 2006 to 2011. The lowest debt leverage was in 2007. As this was before the financial crisis, the reason for the low

debt financing was more sector-internally driven. From the automotive sector, only three companies could be included in the evaluation. Therefore, the ratios were listed without an evaluation, as follows: 2006: 37.67%; 2007: 94%; 2008: 130.67%; 2009: 138, 67%; 2010: 79% and 2011: 56.04%. The technology sector experienced an average ratio of 56.21% with 69.25% for 2006, and 43.68% for 2011. This could have been caused by the financial crisis, due to lower down payments from the customer in the latter years. In the technology and mechanical engineering sectors, some of the companies also exhibited high down payments, which resulted in the exclusion of some companies from the analysis. The remaining three companies had a strong downward trend concerning the debt-equity ratio. From 2006 to 2011 the ratio went down from 61.67% to 28.20%, which is a reduction of over 50%.

Some of the companies reported trade guarantee lines and asset-backed security (ABS) programs. One chemical/pharmaceutical firm listed its ABS-program and another reported its factoring system. In the automotive sector, five groups reported on their ABS and factoring programs. Two technology companies mentioned high bank-guarantee lines, whereas the other technology companies and all the mechanical engineering companies did not address any of these issues.

3.3.2.5. Link concerning the discussion of Research 2

The discussion will be presented together with those of Research 3, as both evaluate the trade finance portfolio approach.

3.3.3. Research 3: Operative experts' experience of the impact of the financial crisis on corporate trade finance

Using the author's concept and questions, gtnews conducted a global survey in January 2012 and invited thousands of corporate treasury experts to participate. A total of 149 corporate treasurers responded, which illustrates the awareness and interest in this topic. The majority of the respondents were based in Western Europe, which, in combination with those from North America, constituted 75% of the respondents. Because most multinational groups are located in these two

regions, the percentage does reflect reality. The Asia-Pacific respondents comprised 11% of the total respondents, whereas the respondents from Central and Eastern Europe (CEE), Latin America and the Middle East and Africa (ME&A) were each approximately 5% of the total.

A further detailed analysis on the impact of the financial crisis in relation to the revenues of companies was also performed. The feedback reflected the typical diversification of the export industry. The respondents from companies that exhibited a turnover of below US$ 50 million constituted approximately 5% of the total. The second largest respondent group, which was composed of slightly more than a quarter (26%) of the respondents, where from corporates with an annual turnover of US$ 50 to 250 million. The corporates with turnovers of between US$ 250 million and US$ 1 billion constituted 20% of the total number of respondents. The corporates that had revenues between US$ 1 and 10 billion were most often those operating globally. Therefore, it was not surprising that this group comprised the largest proportion of respondents at 32%. The respondents from corporates with revenues of more than US$ 10 billion represented 17% of the total. A similar questionnaire was given to credit analysts, with the help of the UK branch of FCIB, which is a global association of credit managers. This questionnaire was answered by approximately 50 corporate credit managers, most of whom worked for globally active companies. This population was not broken down by region or by company size.

3.3.3.1. Trade finance guidelines

On average, approximately two-thirds of the participating corporates had stricter trade credit management guidelines as a result of the financial crisis of 2008. In fact, more than 80% of the participants based outside of Western Europe and North America reported stricter guidelines. The responses from corporates based in Latin America were similar to the global average of approximately 66%. About 60% of the experienced private companies in Western Europe/North America reported stricter guidelines due to the crisis, which was lower than the global average. This lower rate could be explained by the fact that these corporates may

have started developing stricter credit management guidelines earlier than in other regions, or that they simply did not take any action as a result of the financial crisis. It is also possible that this result reflected the different risk situations of the different regions.

Although the reason behind these different results is unknown, the rate that was found for the corporates in Latin America might provide a hint: this region was not strongly affected by the financial crisis. Its credit management frameworks had been built many years ago due to the difficult financial situation that this region experienced in the 1980s. Interestingly, the size of the company/group did not seem to have had an impact on the reassessment of credit guidelines. All the revenue categories exhibited fluctuations within 5% of the overall average, which showed that the financial crisis had had a global impact. The credit analysts' survey did not include this topic.

3.3.3.2. Creditworthiness efforts

The next question, which examined a specific behaviour in credit risk management, was the following: "Does your organization conduct a more in-depth analysis of its open trade risk than it did before the financial crisis?"

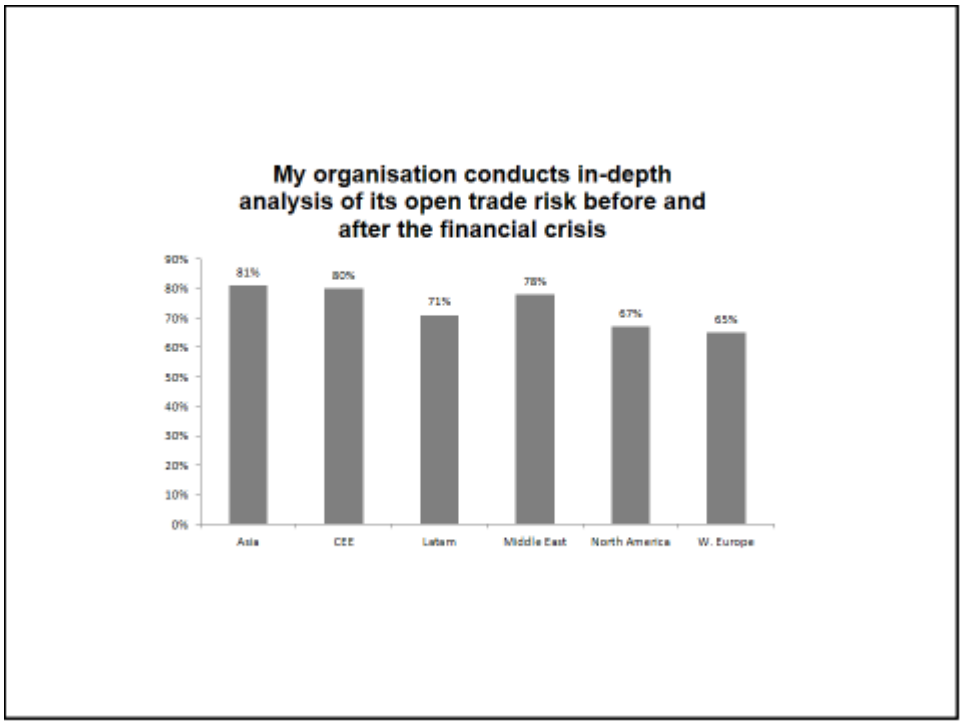


Figure 9: Percentage of companies that reported changes in their credit analysis

The changes in credit risk management in corporates in the different regions followed a similar trend as that observed in Question 1. A total of 80% of the respondents that are based in Asia-Pacific, CEE and the ME&A reported changes in their credit risk management as a result of the financial crisis. Latin American corporates exhibited an average result. In addition, approximately two-thirds of the corporates in Western Europe and North American stated that they conduct a more in-depth analysis of their open trade risk than they did before the financial crisis.

The answers to the questionnaires sent to the credit analysts were quite similar: 65% of the participating companies had a group-wide credit and collection guideline before the financial crisis and thus, a global view. However, the current responses showed that three out of four companies had stricter guidelines than before the crisis. During the financial crisis, an additional 15% of the companies implemented a group guideline, which meant that four out of five companies had a centralized group credit guideline.

In operative credit management, the larger corporates were more cautious as a result of the banking crisis than the smaller companies. Approximately 40% of the companies with revenues below US$ 250 million per annum were not influenced by the crisis, whereas approximately 70% of the larger companies said that they conducted an in-depth analysis as a result of the financial crisis. There are two theories that could explain the reason for these changes in the behaviour of corporates: smaller companies are more focused on their direct relationship with the customer and less determined by data; and smaller companies do not have in-house credit experts. In conclusion, more than two-thirds of the companies were currently performing a more in-depth analysis than they had done before the financial crisis. To optimize the results from the procedures used in credit management, three out of four credit analysts (72%) were stricter with the payment behaviour of their customers than they had been before the crisis. In addition, more than half (55%) of the surveyed credit analysts were using a scoring technique.

3.3.3.3. Credit report information

The next question that was asked was: "Compared to before the crisis in 2008, does your organization currently spend more money to receive credit report information from banks and information brokers?" Only one in four of the smallest companies had increased their spending to obtain better data for their credit decisions, while the corporates belonging to the other four revenue sizes showed an increase of approximately 40%. In addition, although the corporates based in the ME&A had increased their spending, none of the CEE corporates had changed their spending behaviour. The credit analysts of nearly all of the surveyed companies currently analyzed the latest accounts of their customers' companies, which fact was underlined by the increased volume of credit reports that were obtained. Approximately half of the companies investigated (45%) currently spent more money on credit report information from banks and information brokers than they had prior to the crisis.

3.3.3.4. Automated credit processes

Because personnel costs are always an important issue, corporates might utilize new or old technologies to improve their credit analysis and collection. This was the focus of Question 4: "Did your organization halt programs to automate its credit analysis due to the financial crisis?" Companies in the emerging markets invested more in technological support for their credit management. Because the global average implementation rate was only 16%, approximately 40% of the CEE, the ME&A and Latin America respondents continued to use automated programs. In North America and Asia-Pacific, only 10% and 13% of the respondents, respectively, continued utilizing automated programs.

This behaviour was also broken down by the different revenue categories: 26% of the companies with a turnover of between US$ 50 and 250 million continued using automated credit analysis. Because this ratio was still low, it was clear that the bulk of investment in credit management software was still to come.

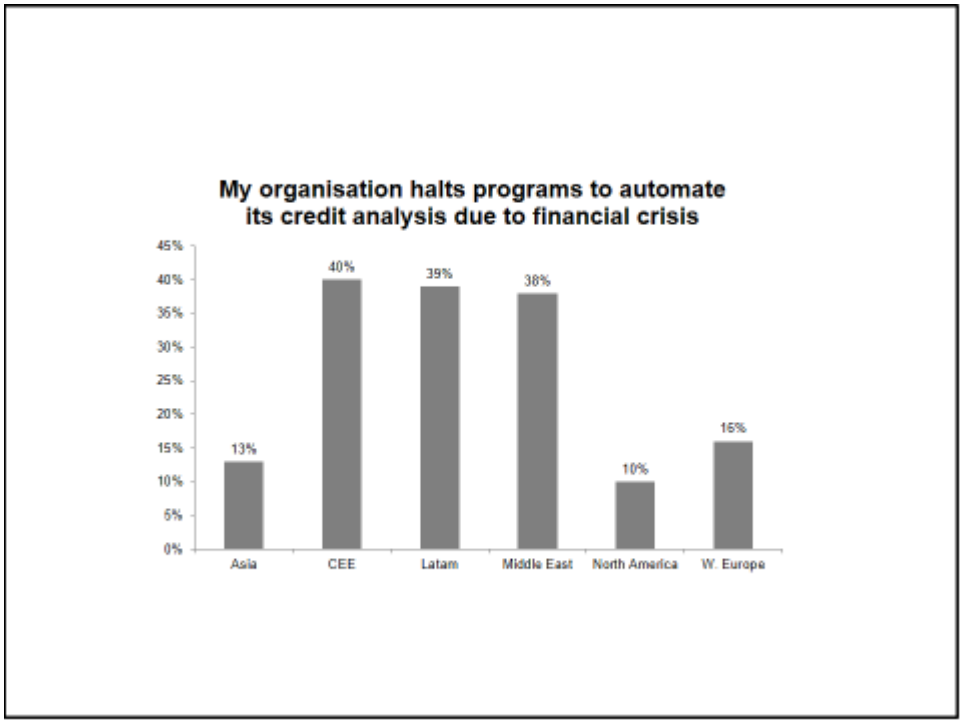


Figure 10: Percentage of organizations that utilized automated credit analysis

The responses from the credit analysts showed that firms invested in special software for their receivables management to avoid late payments, defaults and discrepancies. In fact, one in three companies had additional (accounting) software. Before the crisis, the number of companies that used additional receivables-specific software was 18%.

3.3.3.5. Exposure reporting

Management reporting is more intensive when a new risk, such as a financial crisis, appears. The information included for trade finance increased reporting on topics involving country risk, defaults, premiums (credit insurer) and handling and coverage fees (banks). On average, 58% of the corporates indicated more regular reporting of trade finance and credit management topics to top-level managers. The effect of the crisis was significant in North America and Western Europe, where approximately 50% of the companies/groups had intensified their reporting behaviour. In Asia-Pacific, 57% of the surveyed companies reported an increase in their reporting rate. In the ME&A, nearly 90% of the companies conducted deeper reports due to the financial crisis, similar to the rate in the Latin American

companies (86%). In addition, 75% of the CEE corporates reported with greater frequency. Only 25% of the companies world-wide had not changed their reporting information.

The analysis on the reporting intensity in terms of revenue size showed that the medium-sized to large companies (€ 250 million to € 1 billion turnover) were more likely to have retained their old procedures because only 41% of these corporates had improved their analysis package. Analysis of the other revenue groups (from small to very large) showed that between 56% and 75% of these companies increased their reporting.

3.3.3.6. Reports on DSO

The most widely used key performance indicator (KPI) in receivables management is days sales outstanding (DSO), which is the time it takes to receive payment, including the overdue period. The DSO time has to be financed by the seller. In addition, the DSO ratio is currently used more often as a KPI than it was prior to the crisis. Companies that were based in the ME&A had the biggest impact because nearly all the companies (89%) reported a stronger usage of the DSO ratio. The fact that this result was found for an emerging market region was unusual because the financial crisis was felt more strongly in North America and Western Europe, which were the epicentre of the sub-prime and the euro crises. However, only approximately 33% of the firms in these most-affected regions mentioned an increase in their DSO reporting.

The revenue size of a company did not have a significant impact on the timing of its DSO updates. Between 33% and 48% of the companies in each revenue-group indicated more frequent DSO reporting as a result of the crisis? The control group (the credit analysts) claimed that their DSO calculation was not performed more often than it was prior to the financial crisis, which is differed from the results obtained from the corporates. The reasons for this stable behaviour were based on the fact that the DSO was mainly controlled by the sales department and thus was seldom a treasury-based decision process (i.e. the determination of payment term and reminder strategy). In addition, since the crisis, an additional 31% of the

corporates planned their DSO; thus, a total of 80% of the firms planned their DSO. This planning was likely driven by the high importance placed on cash and financial planning.

3.3.3.7. Overdues report

The critical part of receivables management is the overdue period because this lies outside of the sales contract. The seller is at a disadvantage when the buyer extends the payment period. Fifty-nine percent of all companies surveyed attempted to avoid overdue payments through stricter collection strategies than those that had been in place before the crisis. All the ME&A-based companies supported this policy change. The other regions exhibited quite different ratios: 80%, 67%, 62%, 59% and 45% of the companies based in CEE, Latin America, Asia-Pacific, Western Europe and North America, respectively, indicated that they were stricter with collections. The breakdown by company size showed more similarity across the companies. Between 50% and 65% of the firms in each of the revenue categories had increased their collection activities since the financial crisis of 2008.

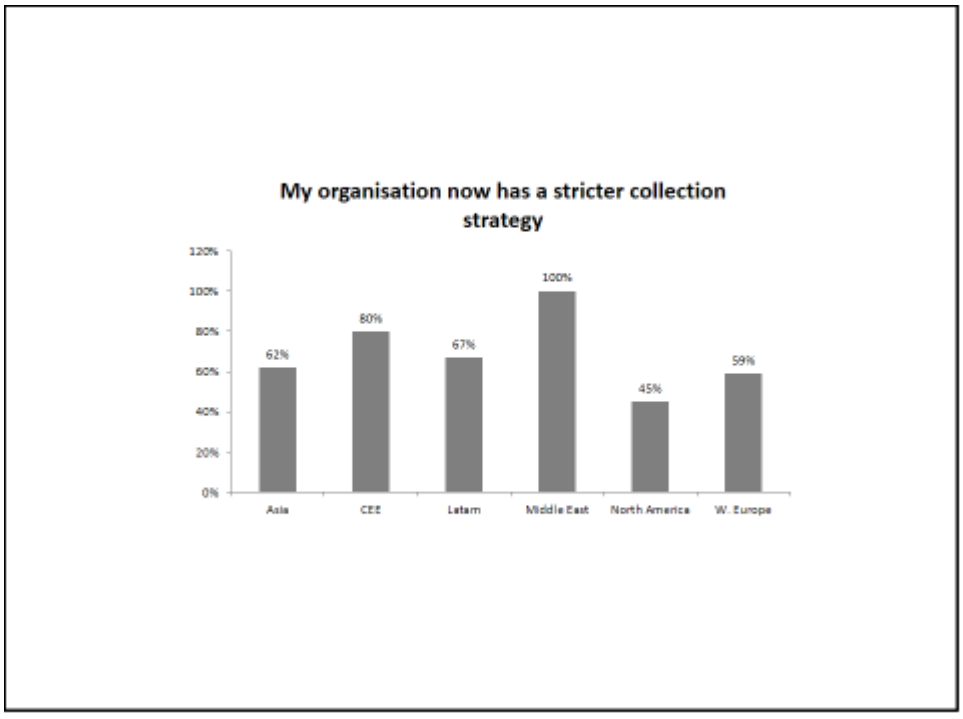


Figure 11: Percentage of companies that had a stricter collection strategy as a result of the financial crisis

Stronger collection activities were supported by new collection strategies. Almost half of the companies (49%) had created new strategies, whereas the rest of the companies had retained the old protocols. The companies in Asia-Pacific (40%) and Western Europe/Latin America (43%) had not changed their collection strategy as much as the companies in the other regions, which generally behave differently. The companies in the ME&A (89%) and CEE (100%) were strongly in favour of implementing new organizational procedures to receive payments more quickly. In addition, approximately 50% of the companies in North America had implemented new procedures.

The companies with a turnover of between US$ 50 and 250 million were most likely to change their collection strategy because 62% of these companies had developed a new strategy. In addition, 52% of the corporates with a turnover of between US$ 1 to 10 billion had also developed new strategies for the collection of payments. The companies with an annual turnover of between US$ 250 million and US$ 1 billion were less likely to change their collection strategy because 38% of the surveyed companies in this group had reported a change. (This question was not included in the questionnaire that was answered by the credit analysts.). The final two fixed questions focused on the next steps in receivables management and corporate trade finance.

3.3.3.8. Matching of receivables

The last question related to the future of financial receivables management: "In credit management and collection, is it advantageous to your organization if an open account debtor can electronically confirm the correctness of the liability before the due date?" Today, receivables invoices are unanswered by the buyer until the execution of the payment. An earlier answer would help credit management and collections and influence auditors and analysts because the risk of not knowing is an uncertainty for the seller.

In general, 71% of the surveyed corporates were interested in receiving a debtor's confirmation soon after invoicing. This confirmation should be in an electronic form such that it can be automatically matched with the open outstanding. The Asia-Pacific (81%), CEE (100%), Latin America (100%) and the ME&A (89%) companies exhibited the strongest demand for electronic confirmation. This trend might have been because these regions did not have an "old system", such as the US-lockbox or a direct debit. In North America, 63% of the surveyed companies were interested, whereas the demand in Western Europe was 66%. Interestingly, 100% of the firms with the smallest turnover (up to US$ 50 million per annum) supported the request. In all the other revenue segments, the positive answer deviated around 66%.

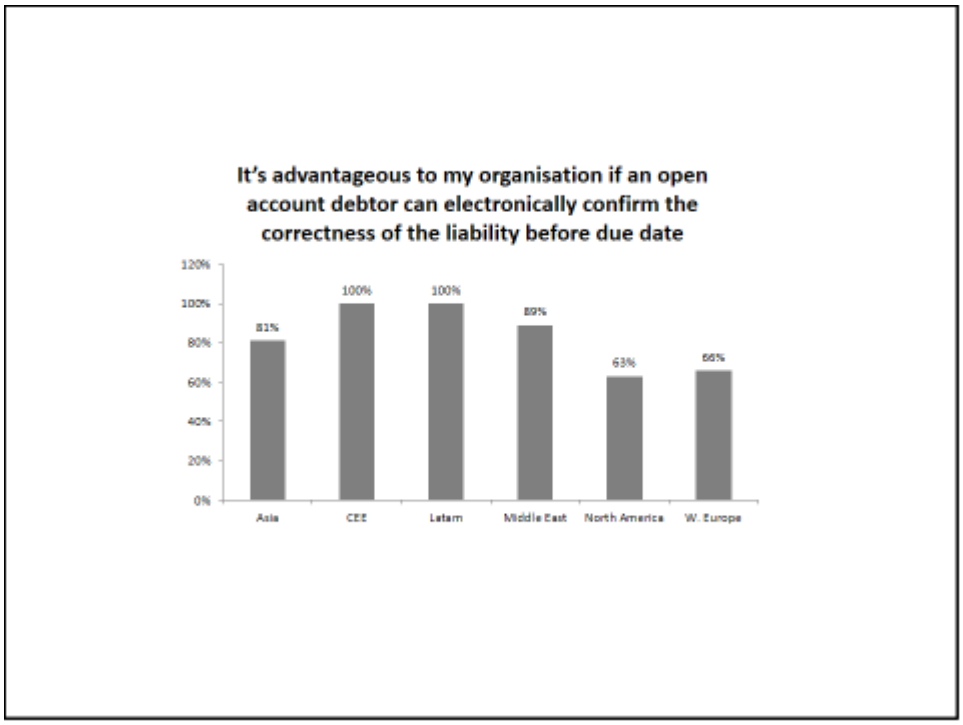


Figure 12: Percentage of organizations that believed it would be advantageous if an open account debtor could electronically confirm the correctness of their liability before the due date

The responses from the credit analysts were similar to those obtained from the corporates. Probably because the letter of credit is the last paper-based contract that is used in finance, 75% of the surveyed companies preferred an electronic

version. In addition, corporates would have liked to receive the "intent to pay" message electronically if they were the seller. If the corporates were the buyer, nearly half of the firms (41%) would send the "intent to pay" message if it could be sent electronically. Furthermore, 72% of all the corporates that were surveyed wanted the "intent to pay" message electronically transferred to their ERP and receivables management software. The "intent to pay" message would also be helpful in the reduction of the trade finance costs for banks, because the buyer's confirmation message would enable their ability to have lower credit margins.

3.3.3.9. Late payments – a big challenge

Many of the responses reflected the questions that were asked in the survey, such as changes in automated scoring, credit information, and DSO/overdue. Other participants indicated that their main challenge stemmed from bank borrowing. The most-mentioned challenge concerned the public sector companies and (late) payments. Furthermore, additional receivables-oriented challenges focused on the training of receivables experts and the achievement of the right balance between credit risk and sales. More general challenges included improved liquidity management, local currency depreciation and decreasing product demand.

The credit analysts indicated that more than 50% of the corporates considered the analysis of credit the biggest challenge facing the financial field today. In many responses, the correlation between credit analysis and sales was raised. Additional international sales and credit limits were also cited as important. Furthermore, the availability of credit information and early warning signals was raised by the credit analysts. The credit information at the beginning of the crisis was dated and thus did not reflect the impact of the crisis on customers. However, this information was used to detect other early warning signals. The most important early signal for many companies was payment behaviour.

Further individual responses concerned the collection of payments. Other questions generated concerned the possibility of longer credit terms, partially due to the new bank restrictions for customers and the banks' prior commitments.

3.3.4. Discussion of Research 2 and Research 3 concerning the corporate trade finance portfolio approach

Concerning Research 2, it should be noted that generally there were no detailed legal requirements for the information included in the annual reports, as there generally are in accounting. Despite these limitations, the data provided many clues regarding the handling. The financial crisis had led the companies to hold more liquidity, to improve their receivables management and to install many financial internal regulations. The development of the working capital showed further room for improvement.

Very important for the later macro evaluation of corporate trade finance was the very low default rates in that field. To further secure the result, two other calculations were important: this research result was firstly, much better than that reported by Boissay and Gropp (2007), who calculated a rate of 1.81%. The difference between this analysis and that performed by the German group was that they used data from several thousand French firms, most of which were small firms. Like Boissay and Gropp, the researcher assumed that small companies, especially those with liquidity needs, would default more often than large firms. The second analysis provided an indication of the actual global corporate trade default ratio. The researcher analyzed the three biggest international credit insurer groups: Atradius, Euler Hermes and Coface. Together, the three groups had a credit exposure of euro 1.432 billion in 2010, with a default to exposure ratio of 0.12%. In this context, exposure referred to limits; therefore, it was assumed that the limits used were averaged by 50%, which increased the credit default ratio to 0.24%. In 2011, the data and the ratios were approximately the same as in 2010. This confirmed the low default rate for corporate trade finance.

Essentially, sound corporate credit management or good credit insurance results in a default rate of approximately 0.2% of the exposure. In addition, small firms that have no active credit management, either in-house or outsourced, have a ratio of approximately 1.5% or higher. Furthermore, annual report data from credit insurers shows that the handling costs are less than 0.2% of the limit (approximately 0.4% of the exposure). This statement can be made because the

insurers had a published average credit premium of 0.36% in 2010, which was sufficient to cover the risk (0.2%) and handling costs. The 0.36% average premium also forms a good basis for the calculation of the financing costs of receivables, which must be added to the Euribor rate (i.e. credit interest base amount for 3 months). Because the Euribor was quite low over the past few years, corporates could strongly optimize their return on their total assets. More importantly, a corporate could improve its EBIT to net debt ratio, which supported the rating that the group would receive. These two facts indicated that the selling of receivables could be a very inexpensive method of obtaining significantly less costly financing than a company loan from a bank.

3.3.4.1. Further efficiency calculations on corporate trade finance

A further calculation can be made: The 72 German production companies that were surveyed in Research 2 had receivables at 13% of the size of the companies' turnover. The average open receivables volume of a production company was therefore approximately 15% of its annual turnover. Furthermore, in a model calculation, a company with a turnover of euro 1 billion had open receivables of euro 150 million. Approximately 75% of the open receivables, which corresponded to euro 110 million, could be sold. Using the previously described receivables risk premium of 0.36% and the market risk premium for bank lending to mid-sized firms of approximately 2.5% or more, the calculated advantage for the financing of receivables was approximately 2%. The annual earnings advantage was thus euro 2.2 million. The impact of a better rating was difficult to calculate because it led to lower financing costs only in certain balance sheet situations. Probably 20% of the companies were affected. For that 20% of firms, an improvement in the rating due to a better EBIT to net debt ratio would improve the costs by an additional euro 1 million; this calculation was based on a reduction in the credit costs of 0.5% (source: bond price difference for various B ratings). This decrease could thus be used in the modelling with the assumption of a euro 200 million financial debt to obtain a total improvement of euro 3.2 million. Because the average company that has been described had equity of approximately euro 350 million, an active trade finance management could improve the return on

equity by nearly 1%. In smaller firms (SMEs), the lending and debt rates were higher, given an equity profit improvement of over 1%. The four research studies presented in this manuscript showed that corporates increasingly considered corporate trade finance as a strategic tool for the optimization of earnings. However, the realization of additional earnings required some changes in corporate trade finance, the first of which was the introduction of credit portfolio management.

The surveys showed that the financial crisis had an impact on all the analyzed regions and that it affected small firms as well as global players. Research 2 therefore confirmed the empirical findings of Research 1. Research 2 also confirmed that part of the necessary "security net" was installed prior to the insolvency of Lehman Brothers in 2008, which many considered the starting point of the financial crisis. Without this security net, the firms would have been hit much harder during the crisis.

3.3.4.2. Organization of the portfolio concept in corporate trade finance management

To develop the organizational needs for corporate trade finance management that enable a corporate credit portfolio strategy, the existing organizational structures were included for viewing and examination. The basic variants of the organization of corporate trade finance management include two basic polar types and a hybrid of these:

centralized corporate trade finance management;
decentralized corporate trade finance management; and
partially centralized corporate trade finance management.

Centralized corporate trade finance management combines nearly all of the functions of credit management in one organizational unit, which is historically called "credit management". The centralized unit defines the framework (credit policy), handles the credit analysis, makes the credit decisions and hedges the receivables exposure with credit assurance and the bank. The marketing/sales

department is involved only in the formulation of the sales and payment conditions. However, it should be noted that the marketing and sales departments in most firms are able to veto the corporate trade finance management decisions under certain conditions.

A high degree of centralization indicates that corporate trade finance management has greater specialization and expertise. Companies that use centralization differentiate more between the various instruments of trade finance than other organizational variants. As an example, each customer risk is also an inherent country risk. In a centralized corporate trade finance organization, the total risk per country for the firm/group is also controlled; an action that is not possible in a decentralized organization. Furthermore, if a well-rated financial group has a subsidiary in a high-risk country, the country risk should be considered because the local government can stop money transfers or conversions. This activity typically belongs to treasury or the central trade finance unit.

3.3.4.3. Monitoring credit limits of the portfolio concept in corporate trade finance

The monitoring of credit limits in a centralized trade finance unit occurs more frequently than in other forms of organization (VCI 2000, p.4 f). The limits, which are valid over the complete order processes, are monitored at least twice and sometimes during every phase of the implementation. In addition, these limits are determined by a respected centralized unit and are thus enforced more consistently. Because the classical credit insurers did not decide credit limits during the financial crisis, the firms with a centralized trade finance organization could determine the additional risk exposure and decide how to handle the risk. In this specific situation, the units could use their contacts at the export agencies to obtain the needed credit coverage.

The large portfolios of customers can be split based on a variety of factors, such as payment behaviour, region and/or size of the firms. This enables the use of defined collection strategies with cost-efficient solutions for each customer. Automated

electronic reminders and phone calls are executed by credit collection specialists to increase the efficiency of the collection process. In the case of high value payments, a call to the customer several days before the payment is due is a good strategy. In the case of small amounts when payments are overdue, however, centralized units typically install an inexpensive but rapid-response device that blocks further deliveries.

Companies that have no organizational "corporate trade finance or credit management unit" but perform its functions, are considered companies with a "decentralized corporate trade finance management". It can be assumed that individual specific functions have grown and that these functions have been assigned to individual departments. This organizational variant is marked by a strong division of responsibilities. Furthermore, the participation of other departments in the different functions is much more obvious than in the centralized organization. Another feature of companies with a decentralized organization is that some individual functions, such as the definition of rating categories, are either not performed or are less frequently performed. The tools used for the credit insurance handling are limited, and thus often lead to the buying of standard credit insurance.

3.3.4.4. Partially centralized corporate trade finance management

The term "partially centralized corporate trade finance management" means that there is a unit that executes some, but not all, of the essential functions of the centralized corporate trade finance management. These functions are assigned to different organizational units. In an organization with a partially centralized corporate trade finance management, the analysis is performed by the named unit and the decisions are taken by the specific departments, particularly marketing/sales. The marketing/sales department is responsible for the decision to insure, the choice of hedging instruments that are used, and the determination of the credit limit. If a decentralized trade finance unit evolves to have a partially centralized organization, the general rules and guidelines are centralized and the operative steps are retained by the "old" organizational units.

The evaluation of the most appropriate organization for a firm can be made only by a benchmark study that analyses the associated costs and tasks of each variant. The evaluation should consider the corporate trade finance management and the overall success of the company. Therefore, it is necessary to identify the appropriate internal and external costs. The main objectives and targets to which the organizational forms of trade finance management can be benchmarked are the minimization of:

•working capital;

• loan losses; and

• cost of credit protection and monitoring, which should not affect the revenues.

These objectives partially compete with each other and must therefore be appropriately weighed against each other. A reduction in losses can be achieved through a tightening of the credit rules or a shorter payment period, which would reduce the working capital and simultaneously reduce the sales or the potential sales revenue because not all customers will accept less favourable terms. An improvement in the cash discount terms will also reduce the outstanding receivables, and the impact on the margin is immediately apparent. Another possibility is to reduce the losses through increased hedging (security and insurance). This approach is linked with higher costs that can either be external, such as insurance or letters of credit, or internal, such as personnel and IT costs. Ultimately, all the costs related to the corporate trade finance process must be analyzed together.

3.3.4.5. Examples for the corporate trade finance management

The major topics to consider are the following:

a) Relevance of the working capital: The most important data included are the open receivables, which are distributed by region (i.e. domestic vs. foreign) and status (period outstanding vs. overdue and average DSO). To identify the key figures, it is also necessary to determine the number of active customers and the number and average amount of invoices and credits issued.

b) Relevance of unpaid sales: In the context of unpaid sales, the data on receivables, the receivables' dunning levels and the number of debtors with bankruptcy proceedings are collected. A regional breakdown is then possible.

c) Relevance of the cost of credit protection and monitoring: The handling costs for the external service providers, such as the banks, insurance companies and collection agencies, should be included. In addition, there are a number of fees, i.e. insurance (premiums) or guarantee fees, costs for letters of credit, bills of exchange and collection. A reduction in costs occurs through the services received from credit insurers and banks. However, all the corporate internal costs of the corporate trade finance management process need to be determined through the necessary personnel and IT capacity. Furthermore, material costs and other costs associated with credit management need to be assessed.

Further indications can be determined through a comparison of the revenues, the firm size and staff numbers. It is clear that only precise analyses of the various costs in relation to their appropriate benchmarks show the strengths and weaknesses of the different organizational processes; therefore, these are necessary for conclusions to be drawn on the efficiency of the processes. It must not be ignored that this type of analysis involves a significant amount of effort. As a general rule, a centralized trade finance organization enables efficient and inexpensive credit insurance because it balances the different receivables positions. Single, customized solutions, e.g. bank guarantees, make a decentralized trade finance organization more efficient because such organizations are close to the business that is executed. However, even in these cases, a central data warehouse can support and improve the processes.

The organization of corporate trade finance management in an international group is not always centralized or decentralized, and is often determined by the country's practices. Typical procedures that are used in different regions are the following (ICC 2011):

North America	in-house credit analysis
Europe	in-house credit analysis and/or credit insurance

Africa:	bank-secured (letter of credit)
Asia:	bank-secured (letter of credit) and in-house credit analysis
Japan:	in-house credit analysis and credit insurance
Oceania:	in-house credit analysis
Latin America:	in-house credit analysis (e.g. lack of credit insurance offers)

Furthermore, deliveries to emerging markets are often secured by the export agencies. Since approximately 2005, credit insurers globally cover the customer's non-payment risk. It is now technically possible to globally concentrate corporate trade finance. The only limiting factor concerns the knowledge of a regional language when speaking with the debtor.

3.3.4.6. Risk-controlling corporate trade finance with the portfolio approach

A similar assessment of customer risk can be made using a scoring model. In this instance, a portfolio's credit risk can be determined, as shown in Table 14.

Table 14: Example of a method to illustrate and evaluate the credit risk of a portfolio
(Source: Own slide)

Risk class	No risk	Low risk	Normal risk	High risk	Unacceptable Risk
Average default rate	0,00%	0,25%	0,75%	1,25%	3%
mEuro volume	500	1,000	800	600	200
mEuro securities	0	200	400	200	100
mEuro risk volume	500	800	400	400	100
mEuro default expectations	0	2	3	5	3

A corporate trade finance portfolio allows, in contrast to individual coverage, the use of taking high risks with certain limits because general failure prevention is not always the aim and a specific loan loss is accepted. Thus, the portfolio approach allows, in comparison to an individual assessment, a higher turnover of goods and an increased total return (Broens 2009, p. 50). Furthermore, it enables the use of portfolio hedges for the management of the individual risks that are combined in the portfolio. In addition, local units can handle the credit insurance contract themselves, which brings in local knowledge about the customers. This is the case even if the contract was obtained centrally to gain the best price offer, because the centralized unit can use economies of scale during the contracting process. Risk can be reduced if the group protects itself externally, only when the total claims exceed the firm's risk appetite. This coverage is called "XL Insurance" or catastrophe cover. The task of the central unit in this process is to internally allocate the insurance premiums and the claims proceeds to the individual legal entities. For such centralization, the following constraints have to be considered:

1. Not all countries allow domestic companies to obtain foreign credit insurance.
2. The local unit is no longer responsible for defaults. This could lead to a sales behaviour that does not correctly consider the risks derived from the overall view.
3. The insurance tax will be optimized by shifting the external insurance to a tax-optimal location. These places and companies are named captive insurance.
4. All insurance companies are not equally strong in all areas of the credit limit assignment.

3.3.4.7. Best practice for a portfolio approach in corporate trade finance

To achieve best practice in corporate trade finance, the following are needed:

- Implementation of different credit scores and credit limit methods.
- Provision of a work-flow for the approval process.
- Enabling of a data exchange with the credit insurers in which the limits are shown.
- Obtaining information from credit bureaus.
- Preventing delay in payments.

- Solving disputed cases.
- A safe security standard and the appropriate access rights.

Furthermore, the automatic data exchange needs to be filed with the accounting systems and the IT logistics. There are currently software vendors that have developed programs that enable all these processes. However, the accurate product margins on unit costs are not yet integrated and will thus be one of the future tasks for these software developers.

The basic requirement for the success of corporate trade finance portfolio management is the development of a standard credit policy. The most significant rules of credit policy include the following four variables:

Credit period, which is the length of time that buyers are given to pay for their purchases.

Discount conditions, which specify the alternatives given to the seller at the time of the sale. For example, "2/10, net 30 days" means that the discount will be 2 percent; the cash is supposed to be deposited into the seller's account within ten days after the invoice date; and the latest payment date is 30 days from the invoice date. If the payment is made after 30 days, the invoice is due without any reduction.

Credit standards, which describe the financial strength of acceptable credit risk. A higher credit risk boosts sales but also increases bad debts.

Collection policy, which provides guidance on the toughness or laxity allowed in the collection of slow-paying accounts. A tough policy may speed up the collection, but might also anger customers and cause them to take their business elsewhere.

3.3.4.8. Holistic discussion for a portfolio approach in corporate trade finance

The identification of these four topics provides further detail to the corporate trade finance portfolio management policy. This fact can be scientifically proven by a description of the standard process, or determined by the decision of a group of experts. Both forms have a failure rate that is generally lower than that obtained

with decisions that are made by a single credit analyst, because spontaneous decisions are not possible and group decisions are better than those that are made by one person.

In principle, a standardized process can be used for all trade credits (Brealey et al. p.561) because it filters out those risks and limits that cannot be forgiven. An individual research by a credit analyst will be necessary only for those debts that show no clear result, or in cases in which special factors play an important role in the credit evaluation. However, the collection of sufficient information is costly and time consuming. It is to the firm's benefit to expedite the decision-making process as much as possible. Thus, the standard rule of marginal analysis, which states that the process is continued until the marginal costs equal the marginal revenues, is applied. This technique is a sequential decision-making approach (Gallinger et al. 1991, p.367). Therefore, this (deep) credit analysis is not economical for small limits with a low default risk. Each company would therefore individually define its threshold amount.

A standardized process allows the use of automated data processing operations, thereby delivering faster processing and decisions, which means that the subsequent processes can also occur faster. Furthermore, a standardized process reduces the costs, including the information costs (i.e. annual financial statements or credit agency costs), which in turn reduce the number of meetings or discussions with the customer, and results in faster in-house processing. The standard credit rule also enables better implementation of the objectives. The underlying risk setting depends on the maximum acceptable loss amount and the desired maximum variation of the losses in a reporting period. The corporate trade finance portfolio manager is typically responsible for the definition of a firm's credit policy. However, because of the importance of credit, the policy is normally established, or at least formally accepted, by the executive board/committee (Brigham and Gapenski 2007, p.791).

Furthermore, external requirements for the corporate trade finance portfolio management exist because insurers require an examination of the in-house credit

management. The policyholder must demonstrate that the processes and methods satisfy the rules of the credit insurer. In Germany, the common basic requirements are documented for credit management in the MACM rules. These rules were developed by members of the German credit manager organization VfCM. The 120 requirements are divided into six sections: organization, staff, processes, control, systems, and auditing.

3.3.4.9. Future evaluation of the portfolio approach in corporate trade finance

Corporate trade finance portfolio management permits the use of more limits, resulting in better controls. The portfolio results help sales planning and the pricing of sales because there is interaction between the creditworthiness of the company, the acceptability of the prices and the development of the sales volumes. New developments in EDI support the portfolio approach. These are internet portal solutions (i.e. Elemica and GHX pharmaceuticals) that have been expanded from order management to ensure timeliness of payment. In many businesses, corporate trade finance portfolio management is still considered to be top priority for the senior management. However, at a time when "cash is king" (liquidity) there is the key to that target accounts receivable with a good collection and credit evaluation. Last should include an avoidance of receivables with high default risk. Furthermore, a good credit policy is no luxury and is certainly an instrument that is a burden for sales and profit for firms that want to improve the result of their working capital. Thus, good corporate trade finance portfolio management is a value for each firm and it provides severe financial and operational benefits.

Thus, interaction with a customer never stops; especially not when the delivery of the products is made or when the service is completed. Instead, customer relationships should be maintained, allowing marketing and sales to directly benefit from these actions. A customer-oriented credit manager not only takes care of the payment and clears the accounts receivable, but also forms strong bonds, which delivers often the real important customer's behavioural information over a long period of time. The elevation of the accounts receivable to an important strategy is only possible, when there is transparency throughout the company

concerning credit and sales information, from the collections department, through the finance and account management, to the chief financial officer (CFO) and chief executive officer (CEO). This transparency enables that all the business functions reach a similar and steady way of acting in the management of customer relationships, and have the ability to rapidly identify the reason why payments are delayed, which allows qualified and fast response in accordance with the planned customer's segment.

3.4. Corporate trade finance and its economic validation on a macro level. Research 4: The impact of a financial crisis and the resultant changes in corporate trade finance, especially from a corporate treasurer's perspective

The economic evaluation of corporate trade finance and the impact of a financial crisis have been researched in many papers; however, this is a unique evaluation due to the use of micro data from globally active treasurers and credit managers. An evaluation of the following points follows:

The risk that a company/group takes in its credit management is based on its defined risk appetite and external alternatives. During a financial crisis, the probability of credit default increases. Therefore, corporates must theoretically reduce their risk appetite to achieve the same nominal risk volume. However, in the financial crisis of 2008, corporates could not follow this logic because the financial industry (banks and credit insurers) also reduced their risk and thus the opportunity for the corporates to outsource their risk was no longer as prevalent. The survey results show that almost a third (30%) of the participating corporates expanded their business and increased their credit limits for customers during the financial crisis. This behaviour was most pronounced in the corporates that were based in the ME&A, where two out of three respondents reported increased credit limits. The corporates in Asia-Pacific and Latin America reported a similar change, in which 60% and 57%, respectively, implemented higher limits. In other continents, the situation is similar to the behaviour before the crisis: two out of three companies in Europe (east, central and west) and North America reported unchanged credit limits. In terms of revenue size, the smaller companies (below

€50m turnover) changed the most as a result of the financial crisis. Approximately 50% of these small companies reported higher credit limits. In contrast, only 20% to 35% of the larger companies increased their credit limits.

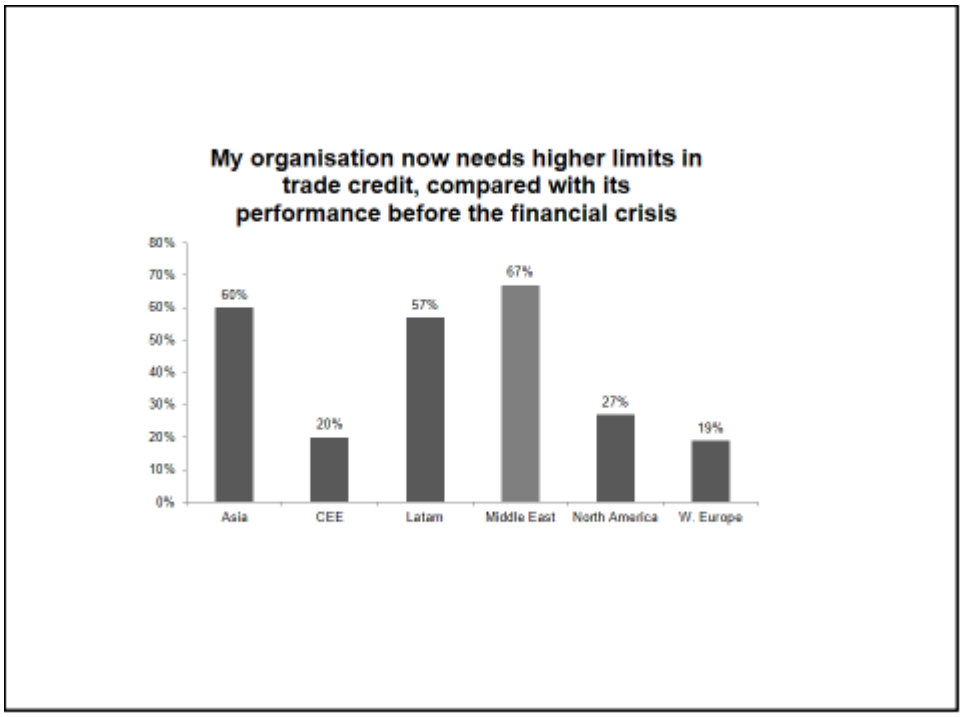


Figure 13: Percentage of companies that increased their limits in trade credit as a result of the financial crisis

The credit analysts reported that having comprehensive knowledge of their customers' accounts helped control the default and late-payment risks. The financial crisis did not generally lead to lower credit lines. In fact, 56% (31 responses) of the surveyed credit analysts indicated that the credit limits in their companies were at the same level as before the crisis.

3.4.1. Credit outsourcing and credit insurance

In a financial crisis, companies re-think their financial strategy and business objectives. This internal assessment includes an evaluation of their credit insurance; this is reflected by the finding that 33% of the surveyed companies

reported changing their credit insurance policy as a result of the crisis. The companies based in the ME&A (44%), Latin America (43%) and CEE (40%) most strongly illustrated this trend. This behaviour was not as pronounced as in Western Europe (34%), Asia-Pacific (33%) and North America (25%). A breakdown of the responses by company size showed a stronger differentiation. The medium-sized companies most seldom reported the use of a new strategy (7%), whereas 50% of the companies in the smallest revenue category reported a change in strategy, which is similar to the results found in the credit limit changes. In addition, 46% of the "smaller" multinationals (US$ 1 to 9.9 billion) changed their credit insurance policy.

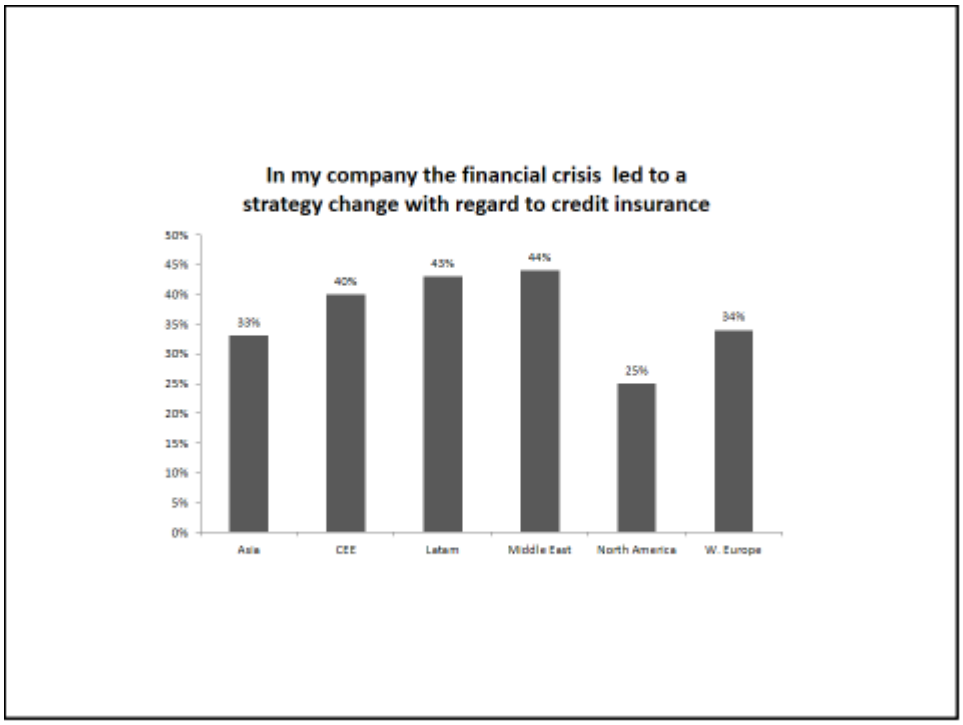


Figure 14: Percentage of companies that reported a strategy change in credit insurance as a result of the financial crisis

Furthermore, the credit analysts reported that a significant majority of the companies (78%) did not alter their credit insurance policy as a result of the financial crisis. It is surprising that more corporates actually reduced their credit insurance (58%) than the number of companies that increased it.

3.4.2. Trade finance instruments: Letters of credit

Letters of credit (LCs) are used for international sales transactions. As a result of globalization, which has given corporates access to credit information outside their home country, LCs are used only for long distance sales or deliveries that exhibit a high credit risk. Therefore, the impact of the financial crisis on the LC strategy is not applicable to all the surveyed participants. Under these conditions, the number of participants who reported a different LC strategy (24%) is presumably more than the number that would be obtained had the surveyed companies solely included exporters.

The analysis of the regional responses shows that LCs have differing impacts in different countries. In the ME&A, 56% of the companies reported a change in their LC behaviour. The percentage of companies in CEE that reported an LC behaviour change was 40%. This finding could be the result of the lower risk appetite of banks and credit insurance companies in these regions, which is in agreement with other reports. In the other regions, more than 70% of the responding companies reported no change in their LC strategy. In addition, the size of a company did not appear to affect its LC behaviour because all of the revenue categories exhibited ratios of between 13% and 31%.

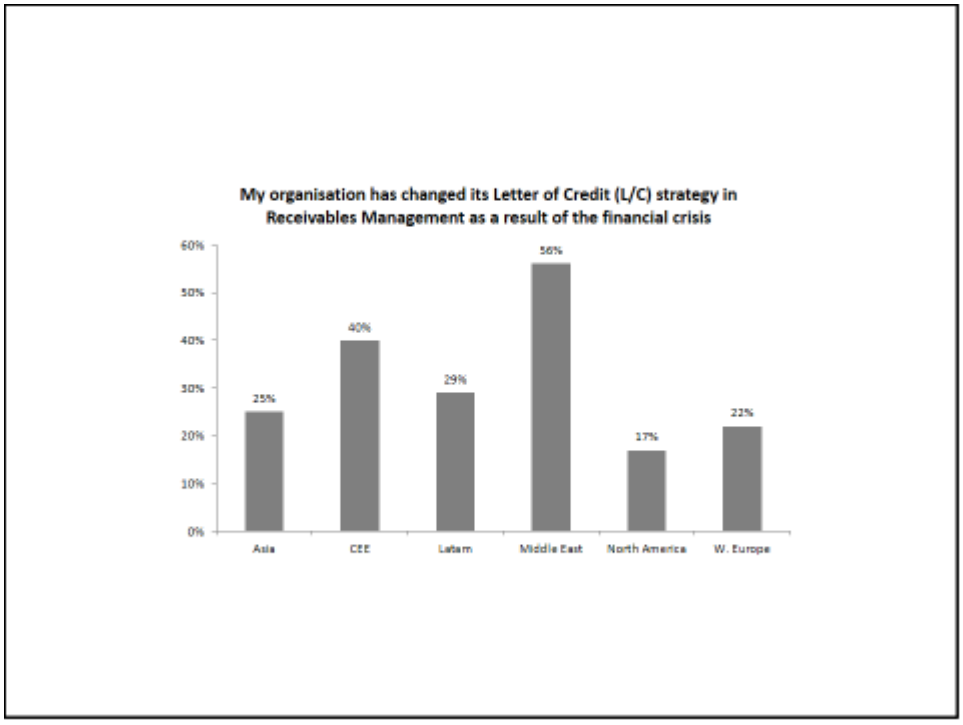


Figure 15: Percentage of organizations that changed their use of letters of credit (LC) strategy in Receivables Management as a result of the financial crisis

Approximately 75% of the responses from the corporate credit experts reported an unchanged LC behaviour due to the financial crisis. The remaining responses mainly expressed an increased use of this bank product. It is very possible that corporates that do not obtain a sufficient credit insurance limit use more letters of credit. Five of the surveyed participants had reduced their letters of credit coverage.

3.4.3. Impact of Basel III

In response to the weaknesses of the financial crisis, bank regulators globally created new basic principles for the management and supervision of liquidity. Because this was led by the Bank for International Settlements, the principles were named the Basel III rules. The proposed new minimum quantitative standards have different risk horizons. The goal of this reform is to achieve a balance between a stable financial system and the avoidance of a credit crunch. The reform also limits and reduces the liability of public authorities and taxpayers. Furthermore, the new

principles should have only small dampening effects on economies. An evaluation of the new rules gives the impression that the higher capital adequacy requirements (capital adequacy ratios) lead to a high equity demand.

The research question focused on the impact that the Basel III regulation plan, which requires that banks have increased equity to reduce the possibility of future financial crises, would have on corporate trade finance. Sixty-five percent of the firms were concerned about Basel III in relation to corporate trade finance. Of these, the Asia-Pacific corporates were the most concerned; 81% of the respondents based in Asia-Pacific responded "I am concerned". However, many firms from the other regions (57% to 67%) were also concerned about the new rules and exhibited strong doubt about the fairness shown to trade finance by the Basel III regulators.

The analysis of the responses and the company sizes showed that the largest corporates experienced the highest doubt about the impact of the new regulations. Eighty-four percent of the companies with a turnover of more than US$ 10 billion showed concern with the impact that Basel III will have on trade finance. The analysis of the smallest firms showed that 75% of these companies were concerned about Basel III. The medium-sized corporates experienced the lowest concern rate, at 59%. The credit analysts had a different view: 56% of the surveyed credit analysts felt that the new global banking regulations (Basel III) require higher risk premiums, due to the financial crisis in trade finance.

3.4.4. Biggest economic challenge of today

Approximately 60 participants (40%) responded to the open question regarding the biggest challenge that was faced during the financial crisis. Some participants indicated that their main challenge stemmed from bank borrowing. Therefore, one lesson that was learned from the recent financial crisis was that a supplier is the most stable credit grantor for other companies. The second most-mentioned challenge concerned the public sector companies and (late) payments.

The credit analysts indicated that the impact of the financial crisis in some countries was very strong. This was particularly true for the emerging markets and Southern Europe. There are several challenges that the (poor) emerging markets faced: a) the banks open letters of credit only on a cash basis, b) the banks do not have sufficient rating to obtain credit from international banks, and c) the country risk cannot be overlooked in a crisis situation.

The final general credit topics that were raised by the credit analysts included the lack of bank financing and thus the increased customer demand for working capital finance. Further questions that were generated included the possibility of longer credit terms, partially due to the new bank restrictions for customers, and the banks' prior commitments.

3.4.5. Discussion of research 4 on corporate trade finance on a macro level

The surveys showed that the financial crisis had had an impact on all the analyzed regions and that it affected small firms as well as global players. The research showed the empirical findings and could confirm them by data and values. Concerning reaction to the financial crisis, the research showed the active handling of the groups and gave information on the changes that had already influenced the balance sheet and/or profit and loss results.

Despite the serious impact of the financial crisis, countries and companies continue to finance trade. Trade finance will always be a part of the trade business. The availability of trade finance is critical for the sustenance of emerging markets and for small- and medium-sized enterprises that rely on short-term trade finance for their trading activities. Consequently, it is not surprising that trade finance has been accepted as a recognized factor in the global trade and finance fields (Senechal 2011). Leading global banks observe significant growth in total trade finance and feel the need to cooperate within the corporate community and with the regulators (Ahearn 2011 and Cotti 2011). Finally, firms and commercial banks will optimize their trade finance methods, making the utilization of trade finance even more attractive.

Historically, a typical treasury department was invisible to many parts outside. Even inside a firm, there was not often contact to the operations, i.e. if it performed its tasks successfully, then the business units, the board of directors and senior management, paid little to no attention to its activities. In many organizations, the treasury ensured an efficient banking structure, adequate liquidity and the safekeeping of cash resources, whereas the rest of the organization focused on operating profit, growth and development. The treasury's role was thus critical, but it was often relegated to a support function with a back-office status because it protected the firm's resources instead of creating value. The financial crisis and credit crunch fundamentally changed the role of the corporate treasurer. There was need for many information about markets and credit from operations; and the role was not any more a traditionally back-office intensive function but one that is significantly more visible and highly strategic. The crisis also re-emphasized the role of transaction banking as a stable and low-risk source of growth and revenue in many banks. The value and visibility of the treasury have increased because of the new challenges facing organizations that require the treasury's guidance and leadership. In the actual post-crisis and economic recovery environment, companies have changed their behaviour and are increasingly focused on the management of risk and liquidity. Therefore, the treasurer has, in addition to his former duties, to be risk-aware and focus on necessary innovative key issues.

3.4.5.1. Basel III and the corporate treasury

Trade finance products have significantly different risk profiles, default rates and capital uses from other corporate finance products. Multinational corporations increasingly handle their trade finance risk globally, in a portfolio approach. They rely on their business partners, traders and producers in developing countries with weak institutions; while smaller firms generally rely more on bank-mediated trade finance, such as letters of credit (LCs) and guarantees.

Following the financial crisis, it became clear that the concept of Basel II, which

became effective in February 2008, had severe shortcomings and that there was a need for additional change in the regulation and supervision of banking activities. On 12 September 2010, the Basel Committee on Banking Supervision endorsed a new regulatory capital and liquidity regime, referred to as Basel III. In addition to Basel III, a number of regional regulations, such as the Dodd-Frank Act in the US, were implemented. These had an impact on corporate treasuries and certainly modified the dynamics within financial markets as well (Oliver Wymann 2011). Corporate treasurers were affected in a number of ways by the consequences that Basel III had on banks. This was most obvious on the borrowing side, but other product categories also became more costly.

Trade finance had been run in a consistent way for over 500 years. Banks offered letters of credit and other paper-based documents. Electronic data exchange in a standardized format was not always available and there were often at least two banks involved in a trade transaction. This inefficient approach to trade finance became affected by additional Basel III costs because the banks had to increase their equity, which led to higher credit margin needs and business guarantees. As a consequence, some smaller banks left the trade finance business. Other banks altered their strategy and redefined their "sweet spots". In addition, non-bank financial institutions started to play a more active role because they were beyond the scope of the Basel III requirements, which ultimately gave these institutions a competitive advantage.

3.4.5.2. Basel III and low default rates in trade finance

Under these conditions, corporates had to control their trade finance volumes through active management of their trade receivables, which had a direct impact on debt-taking by the banks. The business to business seller had two alternatives: either expand the seller's borrowing and credit risk-taking, or outsource their trade finance needs to a bank. The latter seemed unlikely as the demand for LCs had declined significantly in the past few years. This change was not related to the Basel III capital requirements, but associated with the fact that too much manual work was involved in the use of LCs and that standard electronic datasets were missing.

As mentioned previously, corporates generally have very low default rates on trade finance loans. The annual reports published by German corporate and global credit insurers' showed that an average of approximately 0.2% of the exposure resulted in a default. Even during the financial crisis, defaults among the producers of goods were not very high. This was not only due to better credit management by the corporates, but was mostly based on the simple fact that a sale is short-term. Furthermore, buyers order products at a very high percentage simply because they need the products. As a consequence, a significant negotiation on trade contracts based on speculative price conditions does not typically occur.

It was expected that Basel III would increase the costs of finance significantly. Although the calculation for each bank differed, an interest increase of 0.5% seemed probable. This negatively affected the vast majority of corporates and led to an increased use of in-house trade finance, or a stronger use of new market participants outside the banking regulations (Broens, H. 2010e); so called "shadow bankers". Furthermore, Basel III increased the banks' refinancing costs, which reduced their respective programs to optimize the working capital of corporates.

It is understandable that the Basel Committee wants the banks to be safer than in the past, given the experiences of the recent financial crisis. Banks informed the Committee of the unfair treatment of the guarantee business in trade finance and consequently, the Committee will correct the risk requirements as soon as the banks can document their low default rates in trade finance, which will occur in 2016. From the standpoint of the majority of corporates, financing trade is a core banking business, which allows corporates to focus on bringing the best product to the customer. The corporates therefore need banks to take part in trade finance for at least another 500 years (Broens 2010f).

4. CONCLUSIONS FROM THE FOUR RESEARCHES

The results of the literature analysis and the research analyses are summarized in the next sections. The current research investigated the influence of fiscal emergency of the year 2008 on business trade economics, principally centering on business trade credit risk in times of economic insecurity. This research includes review and investigative data analysis methodologies to examine and assess the impact of economic emergency on corporate trade finance. According to the results, it is noted that trade credit is a high-priced source of funding, thus it is logical to suppose that a company utilizing trade credit when in fiscal distress will acquire additional expenses that later impact the company's general fiscal functioning. It is approximated that the price of fiscal emergency for companies amplifies considerably as they raise their utilization of trade finance if they happen to get into a fiscal emergency. The research studied the impact of fiscal emergency on corporate trade finance and employed numerous accepted theories of trade finance to assess if this augmentation in the claim for trade finance/credit was the result of fiscal emergency.

Furthermore, it recognized and calculated the price of fiscal emergency which had not been dealt with earlier. Companies in fiscal emergency utilize additional trade credit from dealers that is costly and augments fiscal emergency. According to the reactions of business credit specialists, a rise occurs in the utilization of letters of credit from banks that could be a result of inadequate credit insurance, causing companies to have a tendency to utilize letters of credit during fiscal emergency. Additionally certain participants further stated that severe bank credit norms put extensive stress on banks and other financial establishments. Banks have listed an elevated accessibility to credit tools following the fiscal emergency. Nevertheless, apprehension is caused by the declining returns on trade that restrict a company's capability to pay back on time. On average, bigger companies expand their

utilization of trade payables in fiscal emergency, while smaller companies, which have inadequate financing choices, lengthen their trade payables. This reflection is consistent with trade credit theories that point out that bigger companies, when in a fiscal emergency, depend to a lesser degree than smaller companies, on financing from dealers. Additionally, according to the results of investigative data analysis it was recognized that there exists a constructive correlation between the demographic position of the companies and the variables that incorporate: "Average days delinquent" (ADD) 2009, "Current ratio", "Return on sales" (2009) and "Turnover in EUR" (2009). It was noted that "Disputes pertaining to invoices" was chiefly listed within the European Union as compared to other countries, even though the real figure is not particularly elevated. Unconstructive "Return on sales" was listed chiefly in the European Union, as compared to other countries. According to the results of secondary data analysis it was seen that "working capital" seemed to have a noteworthy correlation with "sales expansion", "tangible net worth" and the "EBITDA margin", therefore it was noted that unconstructive "working capital" resulted in decreased or unconstructive "sales growth", "tangible net worth and the "EBITDA margin".

4.1. Actual developments in corporate trade finance

The year 2010 was one of recovery for world trade after the financial crisis of 2008. Trade volumes grew by at least 13.5% (Lamy 2011). In addition, approximately 80% of the total trade transactions, which were estimated to have a total cost of USD 15 trillion, involved a form of credit, insurance, or guarantee (Senechal 2011). "2011 increased the trade volume by 6.6 %, as the Arab Spring disruptions, the earthquake in Japan, and the debt crises in the Eurozone and the US – resulted in uneven performance to the year before and the outlook for 2012 is expected to have a negative carry-over, with annual trade growth forecast to be 5.2 % for 2012 and 7.2 % in 2013."

"Trade finance volumes rose in 2011 and the percentage of trade credit lines that were cut for corporate and financial institutions continued to fall. Of the financial

institutions responding, 51% reported an increase in export LC volumes and 56% an increase in import LC volumes. Considerable increases were also reported for guarantees (39% on the export side and 47% on the import side)" (Lamy 2012). The export agencies increased their business of credit insurances by 19% in 2011 (ICC 2012, p.45). The need for sufficient market liquidity, which started in the financial crisis of 2008, is still a critical factor for firms. Furthermore, such adequate liquidity is crucial for the functioning of markets and the banking sector. If the economy strongly deteriorates, market liquidity suddenly disappears, which causes the banking sectors to require refinancing. The central banks around the globe are then forced to intervene on the liquidity problems that the companies face.

The new system of a web portal for matching trade receivables and liabilities that is linked to a marketplace for trade financing could prove invaluable to banks and firms. The preparation of the data for financing, the buying or securing of receivables by third parties, and the making of credit limit decisions in-house is also part of the system. The buyer inputs the credit-relevant information into the system, which enables the product seller and/or financing company to analyze the default risk of the receivables (see appendix). The availability of the data enables the financing company to rapidly give an indication of whether or not it will be possible to finance/ buy/secure the receivables. As determined in Research 1, credit scoring requires only approximate amounts. Therefore, the financing firm is able to use approximate figures in their decision-making process, which helps the debtor to remain anonymous when a finance company is asked for a price indication.

4.2. Advantage of a new developed solution for corporate trade finance

The new portal makes it possible, without using a bank, to promptly recognize any differences. Thus, payment losses are avoided and/or the turnaround times between delivery and payment are shortened. Furthermore, the web portal enables a better working capital management: by the matching of trade receivables and

liabilities, mismatches will be made available to all parties before maturity. Delay of payment, then, can be authorized only in exceptional cases. Thus, the matching substantially increases interest and liquidity advantages. The majority of the actual collection work can decrease, because the information of a planned payment is available before maturity (Richman and Mutter 2010). Furthermore, a majority of the manual accounting work is now void because debtors and creditors have a stronger interest under the electronic data exchange to harmonize the data records such that both sides have to do the least amount of manual work. End-of-year procedure work: confirmations with debtors on the existence of the receivables are void through this application because the position is confirmed by the matching. This is an improvement because only a random sampling currently occurs. Thus, any deliberate and/or erroneous representations of the data in the annual report are avoided.

In addition, the portal helps banks again become the suppliers of trade finance. Banks have also introduced an electronic standardized irrevocable payment obligation (bank payment obligation, BPO), which can be linked to the web information. This BPO is similar to the confirmation that is given by banks for LCs. The International Chamber of Commerce in Paris has already confirmed this product; therefore, the BPO now receives worldwide status and rights that are comparable to those of LCs (Richman2010). Another advantage of the portal is in currency management: companies have a more exact knowledge of their exposure and banks can thus offer better handling recommendations or even an active management of all the company's trade flows.

4.3. Evaluation of the hypotheses

The following are the hypotheses confirmed through this study:

H1: The corporate trade credit limit has a specific relationship to financial data and ratios

The hypothesis is confirmed by the literature of credit analyzing and by the practitioners' handling. The relationship is circumscribed by narrow ranges, which helps trade buyers, bankers and new credit analysts to set credit limits.

H2: During a financial crisis, companies focus more strongly on a reduced working capital to improve liquidity

The hypothesis concerning working capital development is partially confirmed by the data. The results of the annual reports data show a strong improvement in receivables reduction, while trade liabilities, and especially inventories, were adapted here only to a higher turnover. Higher liquidity is shown by volume and ratios. Although it is now four years since the financial and banking crisis started, there are no hints either in the literature, or in corporate information, that alternative strategies for handling liquidity in a banking crisis exist. The research gives some ideas about what could be done in the future. The author has the impression that treasurers strongly rely on bank products and are still not focused on fundamental alternatives.

H3: The portfolio approach enables corporates to receive better results in trade credit management, comparable to individual credit decisions

The hypothesis is confirmed. The portfolio approach enables companies and groups to optimize their credit management through better credit costs in relation to trade turnover. The new approach requires strict credit guidelines and procedures, higher credit management knowledge and further investments in software support.

H4: The new banking regulation, Basel III might strengthen shadow banking for corporate trade finance

The IMF economist Zamil (2010) considers Basel III an improvement as long as the banks solidly apply the assets and valuation standards and establish good risk management. In addition, this strategy requires assertive regulators. In contrast, other economists evaluate the solution as not being one of the free market; and the manuscript described earlier that the new Basel III regulations, in the actual rules, will lead to higher credit costs for banks than the price calculation for shadow banks. This can only be equalized for banks when they take additional risks to be

competitive. Credit insurance is also affected because the insurers received stricter guidelines that are similar to those proposed in Basel III.

The low default rates in trade finance even in times of crisis justify the confirmation of the hypothesis.

4.4. Outlook for corporate trade finance

As described in the manuscript, corporate trade finance has many options regarding which processes can be kept internal and which can be outsourced. Best practice will differ for each seller. The risk appetite, the size of the company, the market in which it operates, the customer portfolio, the sales strategy, the regional structure and the outsourcing price will have an influence on the identification of a company's best practice. In addition, the market conditions are not stable, which means that the best strategy and best practice may change over time. It is even possible that a split will occur between the finance businesses of banks and corporates. The solutions in trade finance are continuously improving, which often occurs at the micro level. It is even beneficial to end the old-fashioned paper handling in international bank trade finance. The next generation of finance experts will only accept electronic letters of credit that are associated with a database that can be used to easily store and link all external requirements and documents with internal data. If this happens, corporate trade finance will have a great future.

Internet portals that fulfil part of the above-mentioned points already exist. The latest development is that the portals can integrate the financial data of the trade itself (the identity of the seller and the buyer, the invoice number, the currency, the amount, and the due date) with the additional data that are important for credit decisions. This allows the seller and financial institutions to easily make a credit limit/finance offer without delay.

Corporate trade finance has evolved from making individual trade finance decisions to a single portfolio approach. Active portfolio management includes the control and the taking of risks. Corporate trade finance portfolio management is increasingly IT-based and process-oriented, which means that it can be used by

companies that are at least medium-sized and that have a sufficiently large exposure of clients. Large corporations extend this approach towards a group-wide portfolio optimization by using "credit factories", hedging strategies, and central data storage. Historical data, regression calculations, and artificial intelligence are now being used in corporate trade finance (Schmidt et al. 20078). The success of all these improvements can result in an increase in the return on equity of at least 1% for production companies. However, an additional review of best practice by using a scientific approach is required. The ongoing financial crisis has demonstrated the importance of corporate trade finance for the economy. We will not forget, however, that a delivery is a gift until it is paid (Broens 2010e).

As mentioned previously, best practice cannot be determined by regulators. Regulators can only avoid short-term overshooting or the risk of destroying wealth. Therefore, the new Basel III rules, which were initiated by the G20, must aim to improve the stability of the financial system. However, the regulations on capital requirements that were introduced for banks will have a negative impact on trade and export finance. The proposed concept will make bank guarantees in international trade (i.e. letters of credit) more expensive. Because there is no justification for defaults, the corporates will ultimately have to pay for the speculative behaviour of bankers before the crisis, which will result in increased product prices. Fortunately, the regulators will correct this as soon as actual data from the banks is available.

The final question is whether the new activities in corporate trade finance can been considered best practice for the future, or whether there will be further developments. The answer will be strongly influenced by external developments, such as other political and/or economic crises. In addition, best practice also strongly depends on the future financial condition of companies and banks.

REFERENCES

Ahearn, John: An industry outlook on the recovery in Rethinking Trade & Finance: Global Survey 2011, p. 18, ICC Services, 2011, Paris, ISBN 978-92-842-0100-6

Aktas, Nihat, De Bodt, Eric, Lobez, Frédéric and Statnik, Jean-Christophe: The Information Content of Trade Credit, February 12, 2010. Available at SSRN: http://ssrn.com/abstract=1568046, view 2010-08-13

Altmann, Edward, I.: Financial ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy, In Journal of Finance vol. 23, 1968 9, p.589-609, USA

APQC (a member-based nonprofit organization, Houston, USA): Improving Working capital management and Cash Flow Intelligence, Available on apqc.org/ Improving-Working-Capital-Management-and-Cash-Flow-Intelligence, view 2012-07-25

Armitage, Seth: The cost of capital: intermediate theory, 2005, Great Britain, ISBN 10 0-521-00044-0

Arnold, Glen: Financial Times handbook of corporate finance, 2nd edition, 2010, Great Britain, ISBN 978-0-273-72656-2

Ashby, W. Ross: An introduction to cybernetics 3rd edition, 1958, London

Atanasova, Christina: Access to Institutional Finance and the Use of Trade Credit, Financial Management. 2007

Atradius: annual report 2011

Baum, Christopher F., Caglayan, Mustafa & Ozkan, Neslihan 2003: The Impact of Macroeconomic Uncertainty on Trade Credit for Non-Financial Firms, Boston College Working Papers in Economics 566, Boston College Department of Economics

Baetge, Joerg, Hüls, Dagmar, Ulthoff, Carsten: Bilanzbonitätsanalyse mit Hilfe der Bonitätsanalyse mit Hilfe der Diskriminanzanalyse nach neuem Recht, in Controlling 1994, Germany, No. 6, p.320-327

Basel Committee on Banking Supervision: Basel III framework for liquidity, 2011, Switzerland

BASF S.E: annual report 2011

Bastos, R and Pindado, J: An agency model to explain trade credit policy and empirical evidence. Applied Economics, vol. 39, 2007, p. 2631–2642

Bayer AG: annual report 2011

Belyacz, Ivan: Global Financial Crisis, causes and consequences in financial theory, documents of the First International Working Conference on Competitiveness Research, Budapest, 8/9 March 2012

Beranek William: A historical perspective of research and practice in working capital management, in Kim, Y.H. and Srinivasan, V.: Advanced in working capital management: A research Annual Volume 1, 1988, London, p. 3-15

Bernard, Jacques: Trade and Finance in the Middle Ages 900-1500, article 7 in: The Fontana Economic History of Europe - The Middle Ages, edited by Carlo Cipolla, Collins/Fontana, 1977, London, p. 274-275

Biais, B. and Gollier, C: Trade Credit and Credit Rationing. Review of Financial Studies, vol. 10(4), 1997, p. 903–37

Bodie, Zvi; Kane, Alex and Marcus, Alan J.: Essentials of Investments, 9th edition, 2009. USA, ISBN 978-007-127828-7

Böhnisch, Wolf R. / Leichtfried, Gerlinde: Hard Facts und Soft Facts der Führung (Leadership): Erfolgsfaktoren für das Management in: Guserl, Richard und Pernsteiner, Helmut: Handbuch Finanzmanagement in der Praxis, December 2004, München, p.347-386, ISBN: 3409124268

Boissay, Frédéric and Gropp, Reint: Trade Credit Defaults and Liquidity Provision by Firms (May 2007), ECB Working Paper No. 753. Available at SSRN: http://ssrn.com/abstract=985123, view 2010-08-13

Bolero: Bolero signs first e-bill of lading in China, in: Global Trade Review, Volume 11, Issue 4, March/April 2013, London, p. 46

Bonti, Gabriel, Kalkbrener, Michael, Lotz, Christopher and Stahl, Gerhard: Credit risk concentration under stress, in: The journal of credit risk, Vol. 2, Number 3, 2006, Great Britain, p. 115-136, ISSN 1744-6619

Brealey, Richard A. and Myers, Stewart C.: Principles of Corporate Finance, 2000, USA, ISBN-10: 0072352361

Brealey, Richard A., Myers, Stewart C. and Marcus, Alan J.: Fundamentals of Corporate Finance, 6th edition, 2009, New York, ISBN 978-0-07-128527-8

Brigham, Eugene F. and Gapenski, Louis G.: Financial Management: Theory and Practice, 7th edition, 1997, USA, ISBN 0-03-017789-8

Brigham, Eugene F. and Ehrhard, Michael C. Financial Management: Theory and Practice, 12th edition, 2008, USA, ISBN 978-0-324-42269-6

Broens, Herbert: Ways to ooptimize Credit Decisions for B2B Transactions, Business Credit, USA, Vol. 111 No. 8, 2009 p.46-50, and Hong Kong Credit and Collection Management Association,
www.hkccma.com/article_Herbert Broens.htm, view 20-04-2011

Broens, Herbert (2010 a): Standardised Confirmation of Receivables TSU – a new (bank) solution with plenty of potential, SWIFT, Belgien, 2010 and Business Credit, 2010, USA, number 9, p.50-54

Broens, Herbert (2010b): Unlock the Secret of Effective Data Analysis, CCR Magazine, August 2010, Great Britain, p. 56-57

Broens, Herbert (2010c): Ungesicherte Lieferantenkredite von mittelständischen Unternehmen, in: Finanzierung im Mittelstand 04/2010, Duesseldorf, p. 2-4

Broens, Herbert (2010d): Optimierung der Kreditentscheidung, in Exportmanager / FAZ , No. 6, Aug. 2010, Frankfurt, p.12-13

Broens, Herbert (2010e): More is less (about Basel III) in financial I, 3Q 2010, Great Britain, p.30-31

Broens, Herbert: Handelsfinanzierung unter Basel III, in Exportmanager / FAZ , No. 2 , March 2011, p.13-14

Buckham, David, Wahl, Jason and Rose Stuart: Executives guide to Solvency II, 2011, USA, ISBN 978-0-470-54572-0

Buckley, Adrian, Ross, Stephen A., Westerfield, Randolph W. and Jaffe, Jeffrey F.: Corporate Finance Europe, German version, Pape, Ulrich, 2000, New York, ISBN 3-89028-300-4

Bugar, Gyöngyi and Uzsoki, Mate: Changes and Achievements in Gauging Investment Risk, International Management Development Association (IMDA), USA, 2012 Helsinki Conference documentation, p. 271 – 278

Burkart, M., and Ellingsen, Y: In-Kind Finance. A Theory of Trade Credit. American Economic Review, vol. 2004, 94, p. 569–90.

Burnham James: The managerial revolution: what is happening to the world, 1941, New York

Camerinelli, Enrico: Measuring the Value of the Supply Chain, 2009, Great Britain, ISBN 978-0-566-08794-3

Campello, Murillo, Graham, John R. and Harvey, Campbell R.: The Real E§ects of Financial Constraints: Evidence from a Financial Crisis,2009, https://faculty.fuqua.duke.edu/~charvey/Research/Working_Papers/W90_The_real_effects.pdf

Carell, Philip: The Handbook of Risk Management: Implementing a Post-Crisis Corporate Culture, 2010, Great Britain, ISBN 978-0-470-68175-6

Chor, D., and Manova, K.: Off the cliff and back? Credit conditions and international trade during the global financial crisis, Journal of International Economics, 87, 2012, p. 117 - 133

Coenenberg, Adolf G.: Jahresabschluss und Jahresabschlussanalyse, 2003, Stuttgart

Coface S.A.: annual report 2011

COSO - The Committee of Sponsoring Organizations of the Treadway Commission: Internal Control – Integrated Framework to help businesses and other entities assess and enhance their internal control systems. (Committee of

Sponsoring Organizations of the Treadway Commission): Enterprise Risk Management — Integrated Framework, USA Executive summary, http://www.coso.org/documents/COSO_ERM_ExecutiveSummary.pdf, view 2011-04-21

Cotti, Daniel: An industry outlook on the recovery in Rethinking Trade & Finance: Global Survey 2011, p. 18, ICC Services, 2011, Paris, ISBN 978-92-842-0100-6

Creditreform: 2011 Data analyze, Neuss / Germany

Cunat, V: Trade credit: Suppliers as debt collectors and insurance providers. Review of Financial Studies, vol. 21, 2007, p. 491–527

Damadoran, Aswarth: Applied corporate finance, 2006, New York, ISBN 0-471-66093-0

Danielson, Morris G. and Scott, Jonathan A.: Bank Loan Availability and Trade Credit Demand, Wiley, USA, Financial Review, Volume 39, Issue 4, pages 579–600, November 2004

De Blasio, Guido: Does Trade Credit Substitute Bank Credit? Evidence from Firm-level Data, IMF Working Papers 03/166, International Monetary Fund, 2003

Delannay, A.F. and Weill, L. (2004), "The determinants of trade credit in transaction countries", Economics of Planning, 37, 173-193

Deloof, M and Jegers, M: Trade credit, corporate groups, and the financing of Belgian firms. Journal of Business Finance & Accounting, vol. 26, 1999, p. 945–967

Deloof, M and Overfelt, W. V: Trade credit and bank relationships: Evidence from Pre-World War I Belgium. Applied Economics, 2010, p. 1466–4283

Dennis, Michael: Credit and Collection Handbook, Paramus, 2000, NJ, USA, ISBN 0-13-082783-5

Deutsche Bundesbank: Monthly report, 3 2007, Frankfurt

Dewar, James A.: Assumption based planning – a tool for reducing avoidable surprises, 2002, Great Britain, ISBN 0-521-80653-4

Dewing, Arthur Stones: The financial policy of Corporations, 1953, USA

Driscoll, Mary: Working capital management: No Backsliding Expected, in: gtnews, http://www.gtnews.com/article/8320.cfm, view 2011-04-20

Drukarczyk, Jochen and Schüler, Andreas: Unternehmensbewertung, 6thedition, 2009, München, ISBN 978-3800636365

Eaton, J., Kortum, S., Neiman, B., and Romalis, J.: Trade and the global recession, University of Chicago, 2010

ECB: European Central Bank statistics data internet Return on equity: http://sdw.ecb.europa.eu/search.do?type=free&q=return+on+equity; Return on assets: http://sdw.ecb.europa.eu/search.do?type=free&q=Return+on+assets and http://www.ecb.int/paym /t2/html/index.en.html, view 2011-04-15

Eck, Katharina, Engemann, Martina and Schnitzer, Monika: How Trade Credits Foster International Trade, CEPR Discussion Paper no. 8954, 2012

Eckbo, Bjoern Espen: Handbook of corporate finance: empirical corporate finance; 2008, Great Britain, ISBN 978-0-444-50898-0

Eilenberger, Guido: Betriebswirtschaftliche Finanzwirtschaft, 2003, München, ISBN 3-486-25535-5

Elliehausen, G and Wolken, J: An empirical investigation into motives for demand for trade credit, Federal Reserve Board Staff Study, No. 165, 1992

Elton, Edwin, G., Gruber, Martin J., Brown, Stephen J. and Goetzmann, Wilhelm N.: Modern Portfolio Theory and Investment Analysis, 13th. Edition, 2007, USA, ISBN 978-0470-05082-8

Ernst & Young: Risk appetite - The strategic balancing act, Great Britain, 2010, EYG no. DZ0050

EU: European Community Directive 2000/35/EC of the European Parliament and of the Council of 29 June 2000 on combating late payment in commercial transactions in Official Journal of the European Communities, L200/35 from 8.8.2000 Luxembourg

Euler Hermes: annual report 2011

Eurostate: Eurostate is the statistical office of the European Union situated in Luxembourg

Evennett, S.J.: What can be learnt from crisis-era protectionism? An initial assessment; The Berkeley Electronic Press Journals: Business and Politics, 2009, Article 4

FAZ: Mittelständler treten immer mehr Forderungen ab, in: Frankfurter Allgemeine Zeitung 16.3.2011

Fayol, Henri: General and industrial management, 1949, London, 1949, Pitman edition

Firth, Michael A.: Management of working capital, 1976, Great Britain, ISBN 0333187091

Fisman, R and Love, I: Trade credit, financial intermediary development, and industry growth. Journal of Finance, vol.58, 2003, p. 353–374

Fitzgerald, Ray, Business Finance for Managers, 2002, London, ISBN 0 7494 3890 9

Fraser, Lyn M. and Ormiston, Aileen: Understanding financial statements, 13th edition, 2010, USA, ISBN 987-0-13-815327-4

Freund, C.: The trade response to global downturns, World Bank Policy Research Working Paper, 2009, No. 5015

Gallinger, George W. and Basil, Healey P.: Liquidity analysis and Management 2nd edition, 1991, USA, ISBN 0.201-53533-5

Ganguin, Blaise and Billardello, John: Fundamentals of corporate credit analysis, 2005, USA, ISBN 0-07-144163-8

Gentry, James A.: State of the Art of Short-Run Financial Management, in: Financial Management, 1988, USA, vol. 17, number 2, p.41-57

Gräfer Horst: Annual Report - Der US amerikanische Jahresabschluss, 1992, Stuttgart

Grant, James I.: Foundations of economic value added, 2003, USA, ISBN 0-471-23483-4

Gill, Amarjit: Factors that Influence Working Capital Requirements in Canada. Economics and Finance Review, Vol. 1, number 3, 2008

Guariglia, Alessandra and Mateut, Simona: Credit channel, trade credit channel, and inventory investment: Evidence from a panel of UK firms, Journal of Banking & Finance, Elsevier, vol. 30, number. 10, 2006, p. 2835-2856

Günther, Thomas: Unternehmenswertorientiertes Controlling, 2nd edition, München, 2003

Gutenberg, Erich: Grundlagen der Betriebswirtschaft, 1972, Wiesbaden, ISBN 3-409-88011-9

Hennah, David (a): Managing the Cash Conversion Cycle: Where can SWIFT Add Value? In The Standard Chartered Guide to Working capital management 2009 / 2010, Great Britain, p.84-89

Hennah, David (b): The Bank Payment Obligation – bringing a new financial instrument to market, in: ICC books – DC Insight, Q3 2010 issue, Paris

Herring, Richard, Diebold, Francis X., Doherty, Neil A.: The Known, the Unknown, and the Unknowable in Financial Risk Management: Measurement and Theory Advancing Practice, 2010, Princeton, N.J: Princeton University Press, ISBN 978-0-691-12883-2

Higgins, Robert: Analysis for Financial Management, 8th edition, 2007, Singapore ISBN 007-125706

Holub, Hans W. and Bolle, Michael D.: Kurz- und langfristige Analyse ungleich-gewichtiger makroökonomischer Angebot-Nachfrage-Systeme, in: Jahrbücher für Nationalökonomie und Statistik, 1975, BAND: 189, p. 322 Fischer-Verlag 1975, Germany

Homburg, Christian and Krohmer, Harley: Marketingmanagement, Gabler, 2nd edition, 2006, Germany, ISBN 3-8349-0289-6

Howorth, C and Reber, B: Habitual late payment of trade credit: an empirical examination of UK small firms, in Managerial and Decision Economics, vol. 24, 2003, p. 471–482

Hughes, Tony and Steward, Robert J.: Forecasting and Stress testing using model pool level data, in: Moody's Economy, Regional Financial Review, August 2008, USA, p. 25ff

IATA- International Air Transportation Association is an international trade body, created over 60 years ago by a group of airlines. Today, IATA represents some 240 airlines comprising 84% of total air traffic

ICC: International Chamber of Commerce ICC Global Survey on Trade and Finance 2010, ICC Publication No.715, Paris, ISBN 978-3-929621-71-6

ICC: International Chamber of Commerce ICC Global Survey on Trade and Finance 2011, ICC Publication No.710, Paris, ISBN 978-92-842-0100-6

ICC: International Chamber of Commerce ICC Global Survey on Trade and Finance 2012, ICC Publication No.859, Paris, ISBN 978-92-842-0157-0

IMF-BAFT Trade Finance Survey: Survey among banks assessing current trade finance environment, 2009

IMF: Trade Finance in Financial Crisis – Assessment of Key Issues, Seminar Document, IMF Conference on Trade Finance on 15th May, Washington, DC, 2003

Ingersoll, Jonathan E.: Theory on financial decision making, 1987, USA, ISBN 0-8476-7359-6

Irwin, David: Financial Control, 1991, Great Britain, ISBN 0 273 03391 3

ISO 31000: International Organisation for Standardisation Risk management -- Principles and guidelines, 2009, Geneva

Jährig, Alfred and Schuck, Hans Handbuch des Kreditgeschäftes, 4th edition, 1982, Wiesbaden, ISBN 3-409-40039-7

Jaffee, Dwight and Russell, Thomas: Imperfect Information, Uncertainty, and Credit Rationing. In: Quarterly Journal of Economics, vol. 90, 1976, p. 651–66

Jappelli, T. and Pagano, M.: Role and Effects of Credit Information Sharing. in Bertola, G, Disney, R and Grant, C (eds.), The Economics of Consumer Credit: European Experience and Lessons from the U.S. (Cambridge: MIT Press), 2005, p. 347–72

Johnson, S, McMillan, J and Woodruff, C. M.: Courts and Relational Contracts. Journal of Law, Economics and Organization, vol. 18(1), 2002, p. 221–77

Joy, O. Maurice: Introduction to Financial Management, 1977, USA, ISBN 0-256-01880-4

Kallberg, J. G. and Udell, G. F: The value of private sector business credit information sharing: The US case. Journal of Banking and Finance, vol. 27(3), 2003, p. 449–69

Kee, H.L., Neagu, C., and Nicita, A.: Is protectionism on the rise? Assessing national trade policies during the crisis of 2008." World Bank Policy Research Working Paper, 2010, No. 5274

Keown, Arthur J.: Foundations of Finance: The Logic and Practice of Financial Management, 2007, USA, ISBN 7302089965

Keown, Arthur, Martin, John and Petty, William J.: Foundations of Finance, Upper Saddle River, 2006, USA, ISBN 0-13-201929-9

Keynes, John M.: The general theory of employment, interest and money, 1936, London

Klapper, Leora F., Laeven, Luc A. and Rajan, Raghuram G.: Trade Credit Contracts (June 1, 2010). World Bank Policy Research Working Paper Series, 2010.Available at SSRN: http://ssrn.com/abstract=1619170, view 2010-08-13

Klapper, Leora and Randall, Douglas: The impact of the financial crisis on supply-chain financing, International Finance Corporation, USA, Enterprise note No. 13, 2010

Koller, Tim, Goedhart, Marc and Wessels, David for McKinsey & Company: Valuation Measuring and Managing the value of companies, 4th edition, 2005, USA, ISBN 10 0-471-70221-8

Kohler, M., Britton, E. and Yates, T: Trade credit and the monetary transmission-mechanism, Bank of England Discussion Paper, 115, 2000

KPMG: Understanding and Articulating Risk Appetite, 2008, http://www.kpmg.com/CN/en/IssuesAndInsights/ArticlesPublications/Documents/Risk-appetite-O-200806.pdf, view 2011-04-05

Korinek, J., Le Cocguic, J., and Sourdin, P.: The availability and cost of short-term trade finance and its impact on trade, Unpublished Manuscript, 2009

Kulyushin, Evgeny: Analyse von Konernabschlüssen; in Das Creditmanagement als der Informationsaggregator "Kenne Deine Kunden", 2007, Goch, p. 57 -70, ISBN 978-933969-93-4

Lamy, Pascale: Consolidating the recovery of trade and trade finance, in: Rethinking Trade & Finance: Global Survey 2011, p. 9, ICC Services, 2011, Paris, ISBN 978-92-842-0100-6

Lamy, Pascale (2012): A continuing tradition of providing leading information on trade and finance, in: Rethinking Trade & Finance: Global Survey 2012, ICC Services, 2011, Paris, ISBN 978-92-842-0157-0

Lee, Cheng F. and Lee, Allice C.: Encyclopedia of Finance, 2006, USA, ISBN 978-0387-26284-0

Leffson, Ulrich: Bilanzanalyse, 3rd edition, 1984, Stuttgart, Poeschel, ISBN 3-7910-0366-6

Lehmann, Matthias: Der Begriff der Rechtsfähigkeit, in: Archiv für die civilistische Praxis (AcP). 207th vol. , 2007, Germany, 1. Teilband, p. 225-255

Levchenko, A.A., Lewis, L., and Tesar, L.L.: The collapse of international trade during the 2008-2009 crisis: in search of the smoking gun. IMF Economic Review, 2010, 58, 214-253

Liu, Young: The evaluation of classification models for credit scoring: in Arbeitsbericht 2/ 2002, Institut für Wirtschaftsinformatik der Universität Göttingen, Germany

Lough, William Henry: Business Finance, 1917, Great Britain

Love, I, Preve, L and Sarria-Allende, V: Trade credit and bank credit: Evidence from recent national crises. Journal of Financial Economics, vol. 83, 2007, p. 453-469

Malik, Fredmund: Managementperspektiven: Wirtschaft und Gesellschaft, Strategie, Management und Ausbildung, Bern, 1994, Stuttgart and Wien

Malik, Fredmund: Strategy des Managements komplexer Systeme, 5th edition, 1996, Bern and Stuttgart

Malouche, Mariem: Trade and Trade Finance Developments in 14 Developing Countries Post September 2008: A World Bank Survey, World Bank Policy Research Working Paper, no. 5138, 2009

Marotta, G: When do trade credit discounts matter? Evidence from Italian firm-level data. Applied Economics, vol. 37, 2005, p. 403–416

McLaney, Eddie and Altrill, Peter: Accounting – An Introduction, 4th edition, 2007, Great Britian, ISBN 978-0-273-71136-0

McMillan, J. and Woodruff, C. M.: Inter firm Relationships and Informal Credit in Vietnam. The Quarterly Journal of Economics, vol. 114(4), 1999, p. 1285–320

Menz, K. M., Börsenzeitung, 23 April 2010, Duesseldorf

Meltzer, A.H: Mercantile credit, monetary policy, and size of firms, in: Review of Economics and Statistics, No. 42, 1960, p. 429-37

Meyer, Christian: Working capital und Unternehmenswert, 2007, Wiesbaden, ISBN 978-3-8350-0865-5

Michalski, Gregor: Determination of Accounts Receivables Level: Portfolio Approach in Firm's Trade Credit Policy, in: Acta Oeconomica Pragensia, No. 5, 2008, Czech, p. 47 – 56

Mintzberg, Henry: The Nature of Managerial Work, 1973, Great Britain, Harper Row

Moody's Corporation, USA annual report 2011

Müller-Stewens, Günter: Gabler Wirtschaftslexikon,
www.wirtschaftslexikon.gabler.de; view 2012-02-25

Nazir, M.S. and Afza, T.: On the factors determining working capital requirements, Proceedings of ASBBS, vol. 15, number. 1, 2008, p. 293-301

Neumayer, Martina: Bilanzdaten im Kreditmanagement – Beschaffung, Einsatz,

Alternativen in: Das Creditmanagement als der Informationsaggregator "Kenne Deine Kunden", 2007, Goch, Germany, p.127-148, ISBN 978-933969-93-4

Neveu, Reymond: Financial Management, volume 1, USA, 1985, ISBN 9780538061100

Ng, CK, Smith, JK and Smith, R. L: Evidence on the determinants of credit terms used in inter-firm trade. Journal of Finance, vol. 54(3), 2005, p. 1109–1129

Niethen, Susanne: Korrelationskonzepte zur Quantifizierung von Kreditausfallrisiken, 2001, Bad Soden, ISBN 3-933207-28-2, p. 86

Nilsen, Jeffrey H: Trade Credit and the Bank Lending Channel. Journal of Money, Credit, and Banking, vol. 34, 2002, p. 226–253

Oliver Wyman: Serving the new Corporate Treasurer, Authors: Elizabeth St-Onge Axel Miller Michael Wagner, Company analysis, 2011, USA

Oxford English Dictionary

Padmalatha, Suresh und Paul, Justin: Management of banking and financial services, 2nd edition, 2010, India, ISBN 978-91-317-3094-2

Paton, William Andrew: Accounting Theory: With Especial Reference to the Corporate Enterprise, New York, Roland Press Company, 1922

Papaioannou, George: Economic and Market Factors versus Credit Rating Announcements, on Credit Default Swap Spreads, International Joumal of Economics and Finance, Vol. 3, No. 5; October 2011

Pellens, Bernhard et al. : Internationale Rechnungslegung, 2004, Stuttgart, Germany

Petersen, M. A and Rajan, R. G: Trade credit: theories and evidence. Review of Financial Studies, vol. 10, 1997, p. 661–692

Pike, R, Cheng, NS, Carvens, K and Lamminmaki D: Trade credit terms: asymmetric information and price discrimination evidence from three continents. Journal of Business Finance & Accounting, vol. 32(5 & 6), 2005, p. 1197–1236

Quinn, Diana: Corporates look to their suppliers for finance, in: Sibos Issues 27-10-2010, Amsterdam, p.7

Quiri, Pascal and Vernimmen, Pierre: Corporate Finance: Theory and practice/Vernimmen, 3rd edition, 2011, Great Britain, ISBN 978-1-119-97558-8

Raddatz, Claudio: When the rivers run dry: Liquidity and the use of wholesale funds in the transmission of the US subprime crisis, World Bank Policy Research Working Paper No. 5203, 2010

Rajan, R and Zingales, L: What do we know about capital structure? Some evidence from international data. Journal of Finance, vol. 50, 1995, p. 1421–1460

REL Consultancy Group: Improving Shareholder value through Total Working capital management, White Paper, 2003, London

Richman, Jon: Putting an end to the zero-sum game in: Financial I Supply Chain & Trade Finance Handbook 2010, Great Britain, p.30-34

Richman, Jon and Mutter, Alexander: Financial supply chain management: the time is now, in: Trade Finance magazine, 2010, Great Britain, p. 34-35

Rivett, Phil and Speak, Peter: The financial jungle – a guide to finance instruments, 3rd edition, 1991, Coopers & Lybrand Deloitte, Great Britain

Rösler, Peter, Mackenthun, Thomas and Pohl, Rudolf: Handbuch Kreditgeschäft, 6th edition, 2002, Wiesbaden, ISBN 3-409-40041-9

Ross, Stephan A. et al.: Corporate Finance, 7th edition, 2005, New York

Schall, Lawrence D. and Haley, Charley. W.: Introduction to financial management, 1991, New York

Schmidt, Christian, Schuppli, Peter and Laster, David : Die Risikosteuerung der Kreditversicherer (Teil 2), in CM Praxis, p. 8, 4/2007, Kleve-Germany

Schneider, Christian: Controlling Working capital bei Logistikdienstleistern in: Controlling Magazin, 2002, No. 6, Germany, p 540 -546

Schulte, Michael: Bank-Controlling II: Risikopolitik in Kreditinstituten, 3rd edition, 1998, Frankfurt, ISBN 3-933165-12-1

Schumann, Matthias: Was sagt der Jahresabschluss über die Unternehmensbonität? Möglichkeiten für das automatisierte Auswerten von deutschen und internationalen Abschlüssen, presantation at the VfCM-annual meeting, Göttingen, 20.10.2004

Senechal, Thierry: ICC Banking Commission: Three years of leadership bridging the information gap in Rethinking Trade & Finance: Global Survey 2011, p. 10-18, ICC Services, Paris, ISBN 978-92-842-0100-6

Shim, Jae K. et. al.: Budgeting Basis and Beyond, 4th edition, 2012, USA, ISBN 978-1-118-09627-7

Silvermann Michael: Compliance Management for Public, Private, or Non-Profit Organizations, 2008, USA, ISBN 978-0-07-149640-7

Smith, Adam: An inquiry into the nature and causes of the wealth of nations, 1870, Edinburgh

Smithson, Charles W: Managing financial risk, a guide to financial products, 3rd edition, 1998, USA, ISBN 0-07-059354-X

Staele, Wolfgang H.: Management: Eine verhaltenswissenschaftliche Perspektive. 8th edition, 1999, München

Standard and Poors, a sector of McGraw-Hill Corporation: annual report 2011, USA

Steinmann, Horst et. al.: Management, Grundlagen der Unternehmensführung, Konzepte-Funktionalen-Fallstudien, 1997, Wiesbaden

Stone, Bernell K.: The payment pattern approach to the forecasting and control of accounts receivables, Financial Management, Autum 1976, USA, p. 65-82

Subramanyam, K.R.: Financial statement analysis, 10th edition, 2010, New York, ISBN 978-0-07-337943-2

Taleb, G.A., Zoued, A.N. and Shubiri, F.N.: The Determinants of Effective Working Capital Management Policy: A Case Study on Jordan. Interdisciplinary Journal of Contemporary Research in Business, vol. 2, number. 4, 2010, p. 248-264

Terry, Georg R.: Principles of Management, 1977, Homewood, Illinois and Georgetown

Tirole, Jean: The theory of corporate finance, 2006, USA, ISBN 978-0-691-12556-2

Thiel, Dirk: Von der Transaktionsgestaltung zur ganzheitlichen Unterstützung , Controlling, number 2, February 1997, p. 99., München

Thomson Financials: € 176 bn Punishment for the largest European companies for giving poor customer service, survey of 230 credit managers, June -September 2007, in: CFO Europe 11/2007, London

Truck, Stefan, Laub, Matthias and Rachev, Svetlozar T.: The Term Structure of Credit Spreads and Credit Default Swaps - an empirical investigation, 2004 http://www.pstat.ucsb.edu/research/papers/spreads200904.pdf view 2012-12-07

Tsuruta, D.: Bank information monopoly and trade credit: do only banks have information about small businesses? In: Applied Economics, vol. 40, 2008, p. 981–996

Uesugia, Iichiro and Yamashirob, Guy M.: The Relationship between Trade Credit and Loans: Evidence from Small Businesses in Japan, International Journal of Business, 13(2), 2008, ISSN: 1083−4346

Ulrich, Hans: Von der Betriebswirtschaftslehre zur systemorientierten Managementlehre in Wunder, Rolf : Betriebswirtschaftslehre als Management- und Führungslehre, 1994, Stuttgart, p.161 -178

VCI/Broens, Herbert; Arbeitskreis Kreditmanagement: Organisation des Kreditmanagements, in: No. 26, Schriftenreihe des betriebswirtschaftlichen Ausschusses und des Finanzausschusses des Verbandes der Chemischen Industrie (VCI), 2000, Frankfurt, Germany

vanGreuning, Henning und Bratanovic, Sonja: Analyzing Banking Risk: A Framework for Assessing Corporate Governance and Risk Management, 3rd edition, 2009, USA, ISBN 978-0-8213-7726-4

van Horne, James C. and Wachowicz, John: Fundamentals of Financial Management, 13th edition, 2008, Great Britain, ISBN 978-0-273-71363-0

Vernimmen, Pierre: Finance d'enterprise, 1976, Paris, ISBN 224 7024 793

Vishwanath, S.R. Corporate Finance: theory and practice, 2nd ed. 2000, New Dehli, ISBN 978-0-7619-3497-4

von Reventlow, Iven Graf : Neue Wege der Bonitätsprüfung : das Kreditgespräch als Instrument zur Beurteilung der Unternehmerpersönlichkeit / Ludwigsburg [u.a.]: Verl. Wiss. & Praxis, 1992, Schriftenreihe Wirtschafts- und Sozialwissenschaften ; 9, ISBN 3-928238-22-1

Vormbaum, Herbert: Finanzierung der Betriebe. 9th edition, 1995, Wiesbaden, ISBN 10-3409372172

Vural, Gamze, Sokmen, Ahmed Gokhan and Cetenak, Emin Huseyin: Afects of working Capital Management on Firm's performance: Evidence from Turkey. International Journal of Economics and Financial Issues, vol. 2, number. 4, 2012, p. 488-495

Wade, Marcus: Länderrisikoanalyse im Rahmen moderner Kreditrisikomodelle bei Banken: Eine Untersuchung mit besonderem Schwerpunkt auf Marktpreisinformationen von Emerging Markets, 2003, Frankfurt, ISBN-10: 363150344X

Watson, Denzil and Head, Antony: Corporate Finance: principles and practice, 5th edition, 2010, Essex - Great Britain, ISBN 978-0-273-72525-1

Weaver, Samuel and Weston, Fred: Strategic financial management, applications of corporate finance, 2008, USA, ISBN 13-978-0-324-31876-0

Weiss, Bernd Prof.: Jahresabschlussanalyse: Einbindung der „financials“ in die Bonitätsanalyse und das-monitoring im Firmenkundengeschäft, in: Verein für Creditmanagement: Das Creditmanagement als der Informationsaggregator “Kenne Deine Kunden“ 2008, Goch-Germany, ISBN 987-3-933969-93-4, p.1-17

Weiss, Bernd und Wikarek, Martin: Information über Rechnungslegung, in CM Praxis, 4/2007, p.18 ff, Kleve-Germany

Wells, Ron: Global Credit management, 2003, Great Britain, ISBN 0-0470-85111-2

Weston, John F. and Copeland, Thomas E: Financial theory and corporate policy, vol. 2, 1988, USA, ISBN 9780201106480

Wimley, Carl J.: Savvy CFOs analyse trade receivables to reduce debts and enhance cash flows, in: financial I, Q1 2011, ISSN No: 1750-4015, London, p.12

Wilner, B: The exploitation of relationships in financial distress: The case of trade credit. Journal of Finance, vol. 55, 2000, p. 153–178

Witeley, John: Mastering Financial Management, 2003, Great Britain, ISBN: 9781403913364

Wöhe, Günter: Bilanzierung und Bilanzpolitik, 5th edition, 1989, München, ISBN 3800607840

Woolley, Simon: Source of Value: A Practical Guide to the Art and Science of Validation, 2009, Cambridge University Press

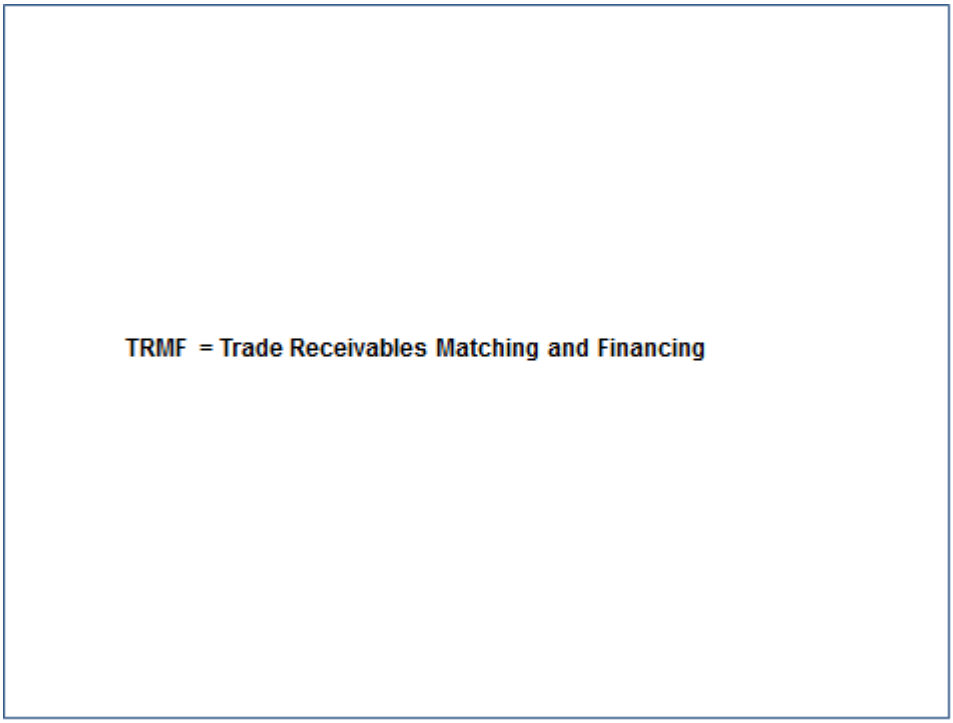
WTO Ministerial Conference: The Fifth WTO Ministerial Conference, Cancún, Mexico, 2003

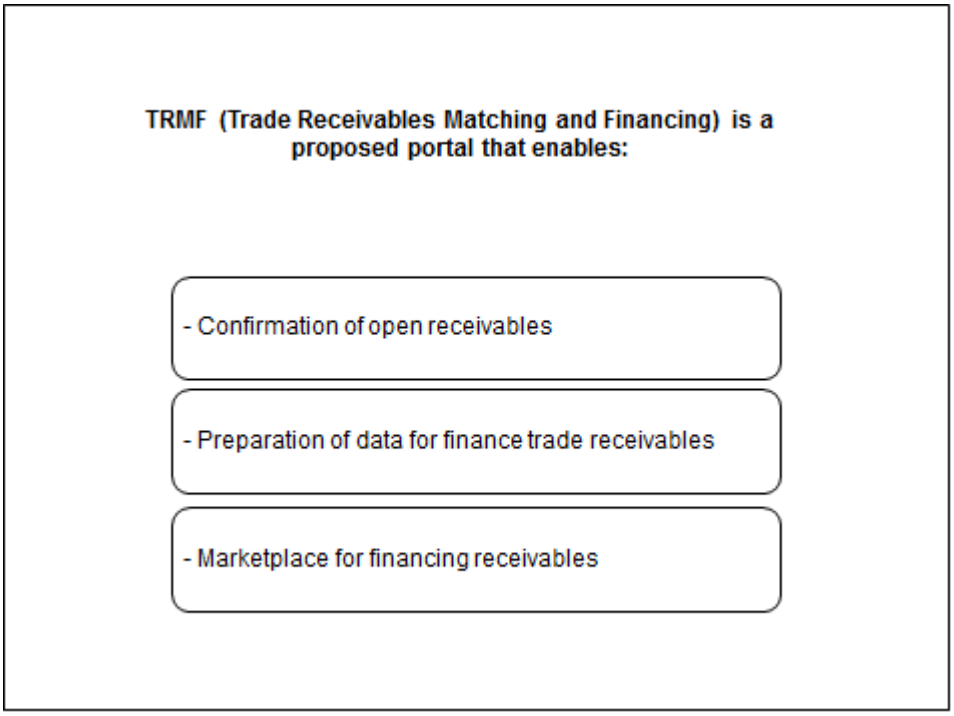
Zahn, Hans E.: Finanzinovationen, 1986, Frankfurt, ISBN 3-7819-2024-0

Zamil, Raihan S: Judgement Day, in: F&D Finance & Development, September 2010, Vol. 47, No. 3 International Monetary Fund, USA

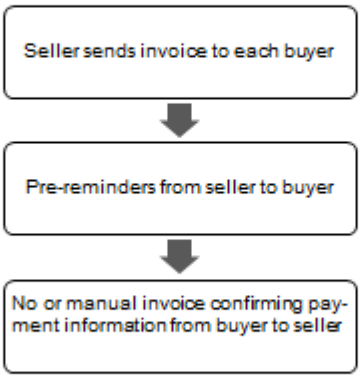
Appendix:

Schematic of the system and method for integrated matching, credit analysis and financing of trade receivables

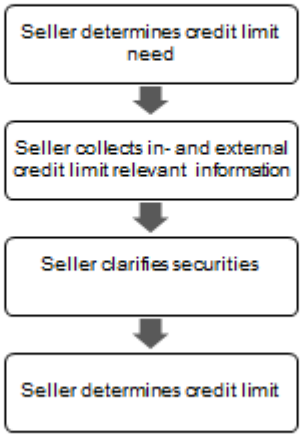


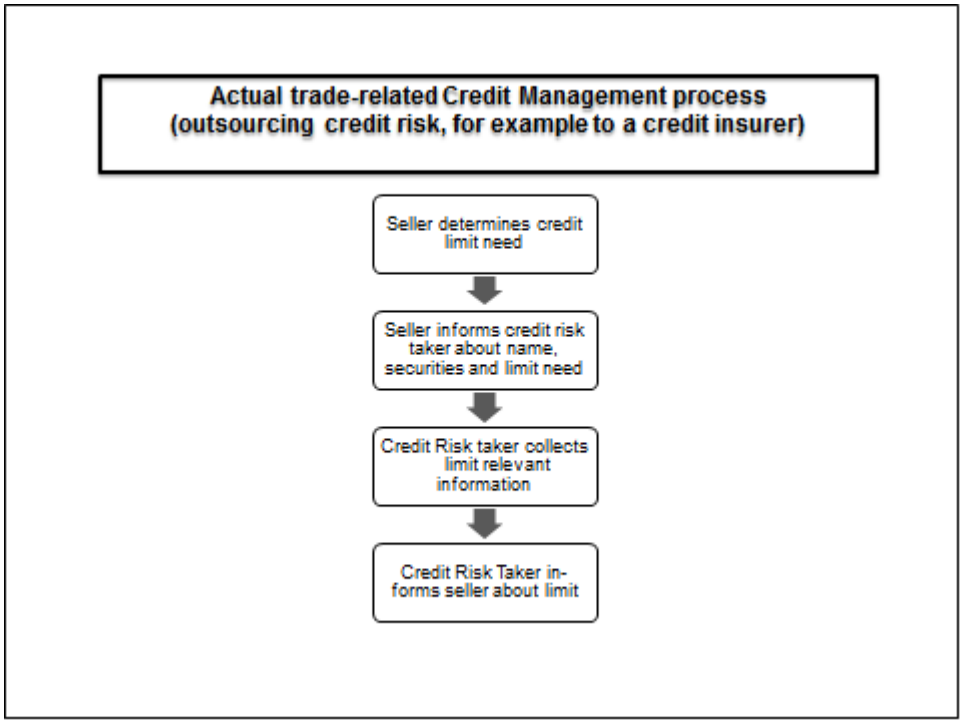


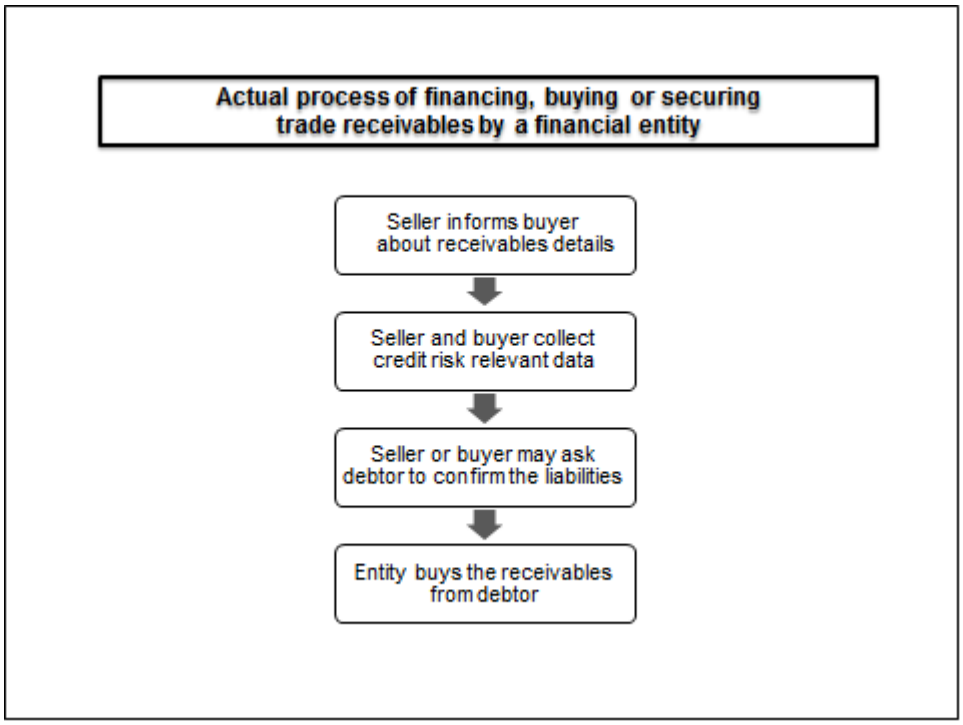
Actual information flow between trade seller and trade buyer in open account payment transactions

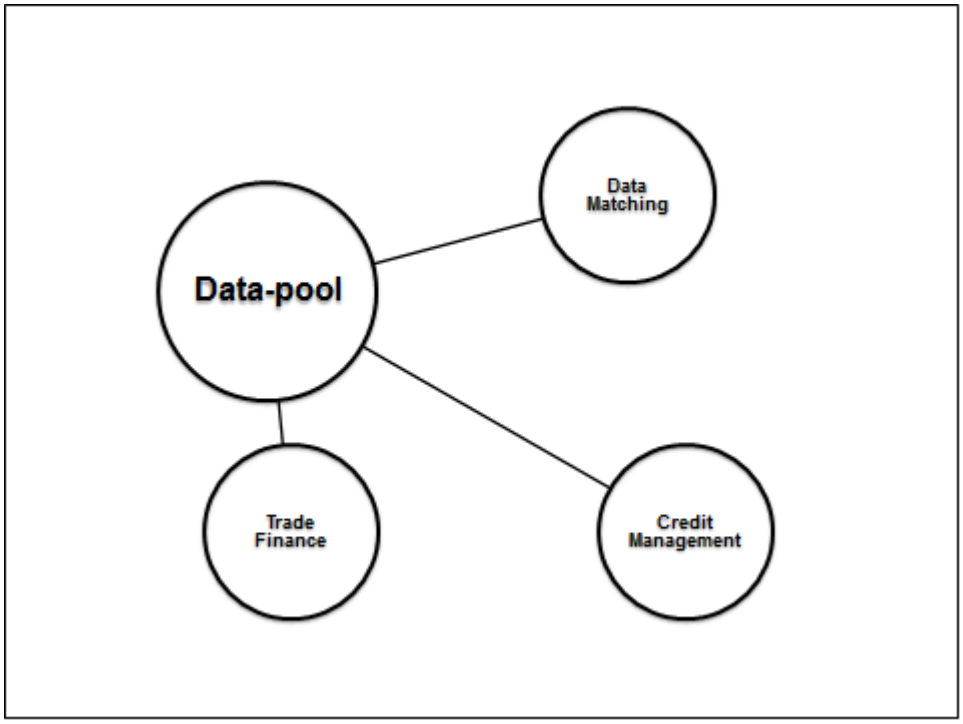


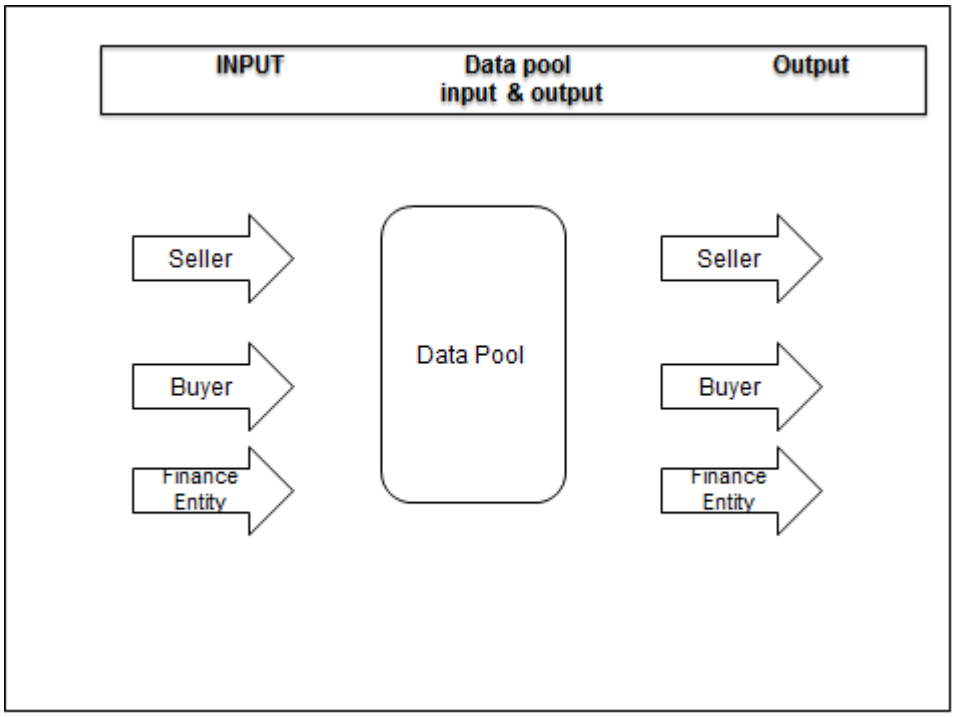
Actual trade-related Credit Management process (in-house)




Actual trade-related Credit Management process
(outsourcing credit risk, for example to a credit insurer)
Seller determines credit limit need
Seller informs credit risk taker about name, securities and limit need
Credit Risk taker collects limit relevant information
Credit Risk Taker informs seller about limit


Actual process of financing, buying or securing trade receivables by a financial entity
Seller informs buyer about receivables details
Seller and buyer collect credit risk relevant data
Seller or buyer may ask debtor to confirm the liabilities
Entity buys the receivables from debtor


Data-pool
Data Matching
Trade Finance
Credit Management


INPUT
Data pool input & output
Output
Seller
Buyer
Finance Entity
Data Pool
Seller
Buyer
Finance Entity

Input – Data Seller

1. Relevant invoice data, that is, buyer, invoice no., currency, amount to pay, value date
2. Average days late in historic payments
3. Number of invoice relevant for point 2
4. Years the buyer is an active customer
5. Finance request yes/no

Position 2, 3 and 4 do not show the exact figure but range, that is, for position 2: 4 = 4 days late and less, 3= 5 – 10 days late, 2 = 11-30 days late, 2 = over 30 days late

Input – Data Buyer

1. Confirming seller's invoice
2. Credit risk relevant financial company data, i.e. annual turnover
3. Other credit risk relevant company data

Positions 2 and 3 show not the exact figure but ranges; i.e. for position 2: 1= less than USD 10m 2= USD 10m – 100m; 3=over USD 100m, details see later example 4

Input – Finance Entity

Marking the invoices, they might be interested to finance

Data output - Buyer

- Relevant invoice data from the seller in a standard data form i.e. seller, invoice No., currency, amount to pay, and due date

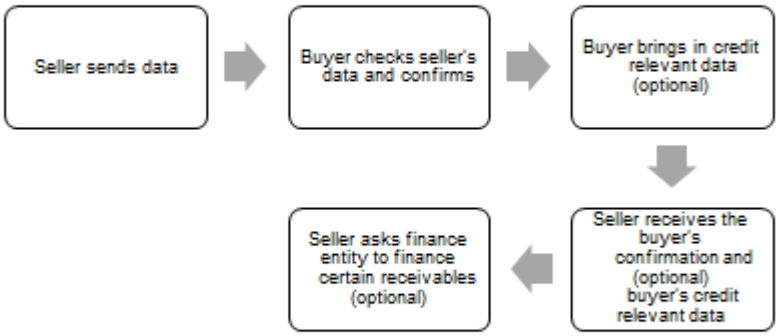
Data output - Seller

1. Confirming the invoice data by the buyer
2. Credit risk relevant financial data about the company of the debtor, that is, annual turnover, equity, net earnings
3. Other credit risk relevant data of the debtor
4. Invoices, the financial entity might be interested to finance

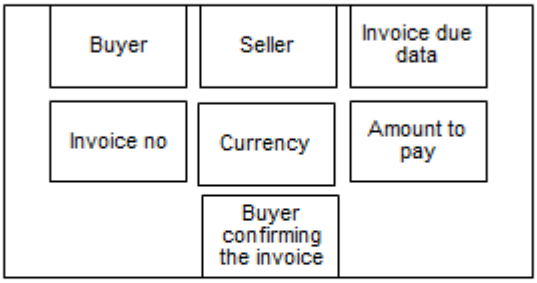
Data output – Finance Entity

1. Relevant invoice data, that is, buyer, invoice no., currency, amount to pay, value date,
2. Average days late of the debtor to the seller in historic payments,
3. Number of invoice relevant for point 2,
4. Years the debtor is an active customer for the seller,
5. Credit risk relevant financial data of the debtor, i.e. annual turnover, equity, net earnings,
6. Other credit risk relevant data of the debtor

The Process



Data relevant for matching receivables - liabilities:



Data relevant for Credit Management and receivables financing

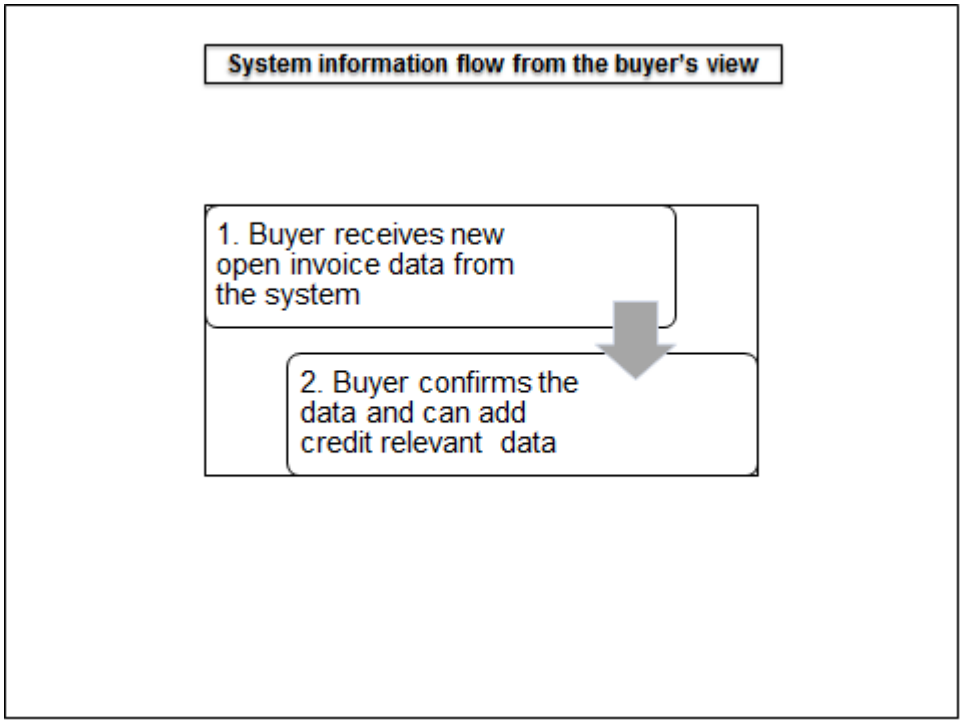
All possible (stored) data

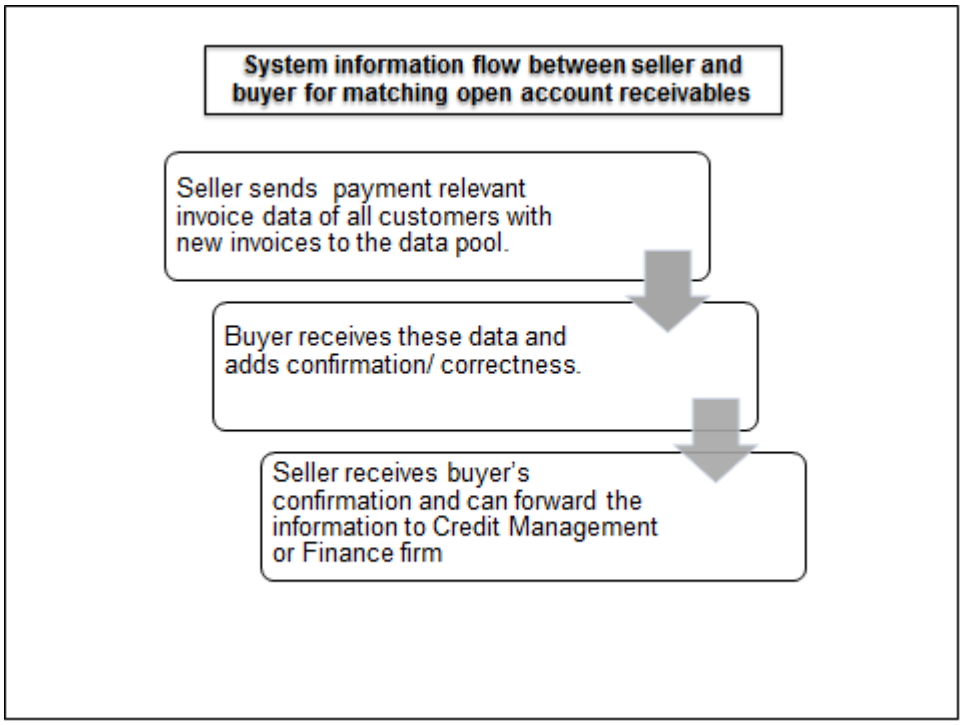
System information flow from sellers view

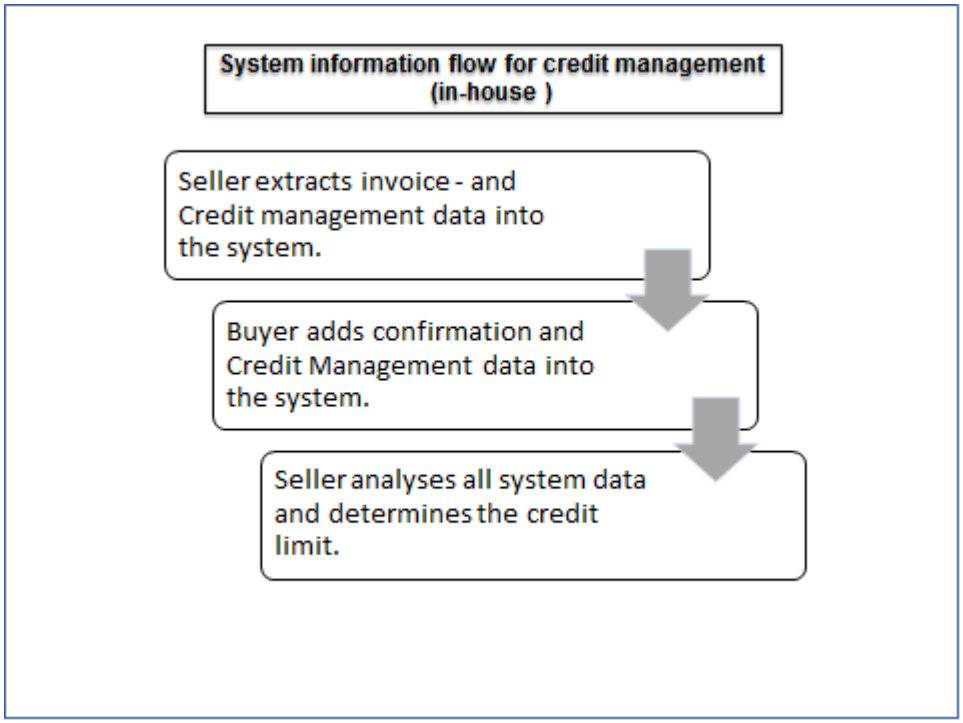
Seller sends payment relevant invoice data of all named customers to the central data-pool

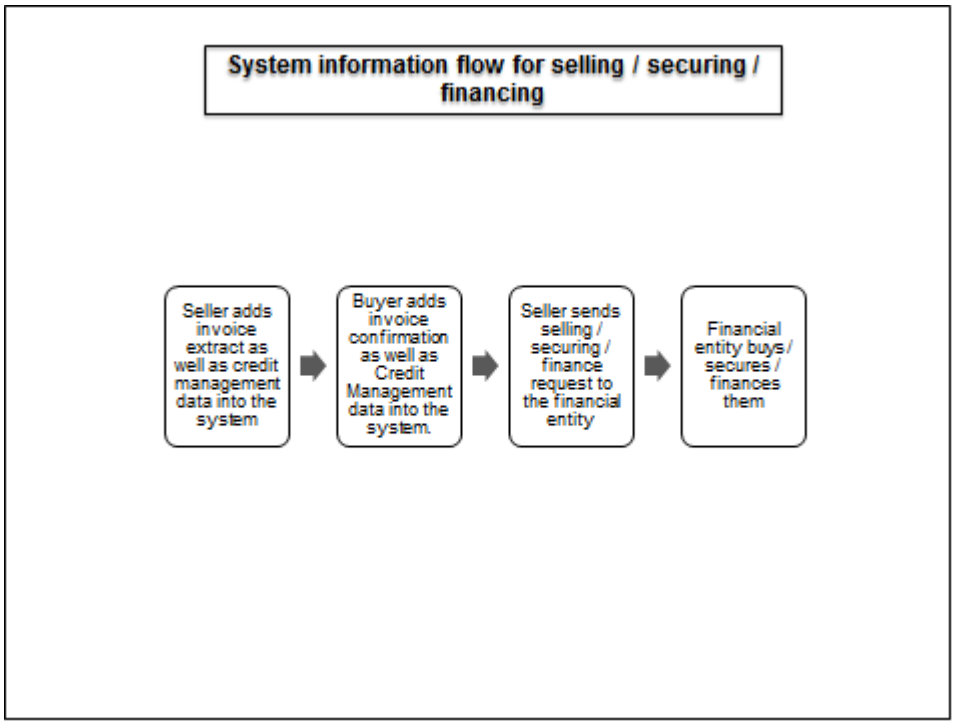
Before due, seller gets from central data-pool details of which invoices are accepted by the buyers and the relevant credit data.

Seller will send finance/sell- / secure relevant positions to one or several finance entities.


System information flow from the buyer's view
1. Buyer receives new open invoice data from the system
2. Buyer confirms the data and can add credit relevant data


System information flow between seller and buyer for matching open account receivables
Seller sends payment relevant invoice data of all customers with new invoices to the data pool.
Buyer receives these data and adds confirmation/ correctness.
Seller receives buyer's confirmation and can forward the information to Credit Management or Finance firm


System information flow for credit management (in-house)
Seller extracts invoice - and Credit management data into the system.
Buyer adds confirmation and Credit Management data into the system.
Seller analyses all system data and determines the credit limit.


System information flow for selling / securing / financing
Seller adds invoice extract as well as credit management data into the system
Buyer adds invoice confirmation as well as Credit Management data into the system.
Seller sends selling / securing / finance request to the financial entity
Financial entity buys / secures / finances them

Example 1: Seller's input

Seller's name : King

Control Number*	Buyer Number*	Buyer Name	Invoice Number*	Currency*	Amount*	Due Date *	Average days late	Number relevant invoices	Customer relation in years
1	123	Miller	12345	USD	1.000	110901	1	2	3
2	123	Miller	12346	EUR	500	120901	1	2	3
3	33	Smith	2323	USD	700	110922	2	2	2

* = must be filled out

Average days late: 4 = 4 days late and less, 3= 5 – 10 days late, 2 = 11-30 days late, 2 = over 30 days late

No. relevant invoices: 1 = 1 - 3 invoices, 2 = 4 - 9 invoices, 3 = 11 and more invoices

Customer relation in years: 1 = 2 years and less, 2 = 3 - 5 years, 3 = 6 years and more

Example 2: Buyer's view

Buyer's name : Miller

Control No	Seller no*	Seller Name	Invoice No*	Currency*	Amount*
1	22	King	12345	USD	1.000
2	22	King	12346	USD	2.000
3					

* Always filled out

Example 3: Buyer's Input 1

Buyer's name : Miller

Control Number*	Seller Number*	Seller Name	Invoice Number*	Currency*	Amount*	Due Date *	Confirmation
1	22	King	12345	USD	1.000	110901	Yes
2							
3							

Example 4: Buyer's Input 2

Buyer's name : Miller

Net worth [a]	2
Net earnings[b]	1
EBIT [c]	1

Turnover [d]	1
Total assets [e]	2
Years company exist [f]	3

a) 1 = Below USD 100.000 , 2 = USD 100.000 - 1.000.000, 3 = USD 1.000.000 - 50.000.000 , 4 = over USD 50.000.000
b) 1 = below 50.000; 2 = USD 50.000 - 500.000 , 3 = USD 500.000 - 10.000.000 , 4 = over USD 10.000.000
c) 1 = below 50.000; 2 = USD 50.000 - 500.000 , 3 = USD 500.000 - 10.000.000 , 4 = over USD 10.000.000
d) 1= below USD 1.000.000, 2 = USD 1.000.000 – 50.000.000, 3 = over USD 50.000.000
e) 1= below USD 500.000, 2 = USD 500.000 - 5.000.000, 3 = USD 5.000.000 – 50.000.000, 4 = over USD 50.000.000
f) 1 = 1 – 3 years, 2 = 4 – 7 years , 3 = 8 years and more

Example 5: Seller marking of the invoices that should be perhaps forfait (sells)

Seller's name : King

Control No.	Buyer no.*	Invoice no.*	Currency*	Amount*	Due date*	Request to sell/ finance
1	25	12345	USD	1.000	110901	Yes
2	25	23232	USD	50.000	120901	Yes
3	27	98767	EUR	500	120901	No

*Already in the system

Example 6: Finance Request

Control No.	1
Seller no.	22
Seller's country	USA
Buyer no.	123
Buyer's country	USA
Invoice currency	USD
Invoice amount	1.000
Due date	110901

Average days late	1
No. relevant invoices	2
Years relation	3
Buyer's net worth	2
Buyer's net earnings	1
Buyer's EBIT	1
Buyer's turnover	1
Buyer's total assets	2
Years buyer exist	3