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Article

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Accounts receivable overdue and market dynamics: a case study

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Abstract:

Aim: This study aims to find out which market dynamics are currently relevant for accounts receivable levels (specifically overdues), and how lessons learned can be used by credit management.

Design / Research methods: The unique research strategy is characterised as a single case study with design elements at two country units of a company to be named FEED. The classification and overview of relevant market dynamics provide valuable insights for determinants and intercompany differences in receivables, and whether these arise at the country or market level.

Conclusions / findings: The classification and overview of relevant market dynamics provide valuable insights for determinants and intercompany differences in receivables, and whether these arise at the country or market level.

Originality / value of the article: The findings suggest adjustments of the literature in that the interest rate is currently not a relevant factor. Moreover, instead of focussing on costs of capital, an emphasis on default risk is more applicable nowadays, and hence researchers should focus on overdue instead of on receivables in general.

Key words: Accounts Receivable, Overdue, Market Dynamics, Case Study
JEL: G30, Q13

1. Introduction

To be called FEED, is a market leader in feed solutions. Production companies such as FEED generally have relatively large amounts of net working capital. They hold large sums of cash, have large inventories in the form of raw commodities, and have large receivables due to credit sales. Working capital management (WCM)

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efficiency has been relevant for these types of companies for a long time, but the ongoing global economic uncertainty may urge them to optimize working capital practices right now (REL Consultancy 2016). This especially counts for companies whose receivables are largely dependent on the uncertain economic situation of their customers, such as FEED operating in the dairy cow sector, where low milk prices can lead to payment difficulties for dairy farmers.

Similar to other production companies, a large proportion of sales at FEED are done on the basis of trade credit, which creates large receivables. In 2015, about one fifth of the receivables were overdue, slightly more than the company's net income. Obviously, overdues larger than net income pose risks for the business and uncertainty for investors when customers default on debt, especially considering the economic uncertainty in the dairy cow sector. Hence, indicating risky customers to prioritize the reduction of overdue is a relevant topic for FEED. Companies in various commodity industries face similar problems, think of wood and cement producers whose receivables are likely dependent on the economic situation of customers and the market demand for furniture and construction.

Furthermore, FEED has substantial differences regarding receivables and (especially) overdues levels between country units. This is very notable in the dairy cow sector in the Dutch and East German units. Although both areas are geographically close to each other and adopt direct sales to farms, there are a lot of differences between the two because of market dynamics. The Business Dictionary defines this term as follows: *“interaction between forces of demand and supply and the pricing signals they generate. In most free (open) markets any significant part of market dynamics is beyond the control of any firm or group”* (WebFinance Inc. 2016). Hence, as to receivables, this paper considers market dynamics as external factors beyond the control of FEED that influence the demand for trade credit (and hence receivables and overdues). Obviously, more companies endure this problem when they operate across country markets, where varying market dynamics influence receivables and overdues.

FEED is unsure about how market dynamics influence its receivables and overdues, and how these give rise to differences between country units. Recent literature establishes a variety of factors that can give an indication as to how these

arise, among which the interest rate. However, contrary to previous literature (cf. Biais, Gollier 1997; Nilsen 2002; Filbeck, Krueger 2005), the low Dutch and German interest rate might currently be less determining for receivables levels. Furthermore, in standard corporate finance literature, receivables are often regarded as an investment in clients (Hillier et al. 2016). The costs thereof are relatively low nowadays, with the current low interest rates. Combined with the ongoing economic difficulties in many industries (such as the dairy cow sector), default risk may currently be more stringent for trade credit providers than their costs of capital.

Previous literature indicates that because of the late-payment penalty on trade credit, companies are unlikely to generate overdues except when they lack sufficient funds (Petersen, Rajan 1997). Hence, overdues specifically indicate the proportion of receivables with a high default risk. Therefore, a focus on the market dynamics that influence overdues might be appropriate, an area hardly studied thus far. This can give indications of what market dynamics are relevant at times of low costs of capital and high default risk, and how credit management should adapt to them. This can lead to an adjustment of the previously stated factors and will shed new light on whether certain factors are still relevant for receivables and credit decisions today. Moreover, a single case comparison between country units can indicate whether differences in receivables and overdues are market-specific or country-specific.

The objective of this study is to investigate which market dynamics are currently relevant for accounts receivable levels (specifically overdues), and how lessons learned can be used by credit management. Hence, this paper adopts a unique approach by reporting on a case study in the dairy cow sector with an internationally stratified company, thereby examining intercompany differences between two country units of FEED, namely the Dutch and the East German units. Doing so can uncover the respective relevance of country-specific and market-specific factors that drive accounts receivable overdue and subsequent procedures to prioritize risky customers to reduce receivables and overdue. By filling in the gaps indicated, this paper can contribute to the understanding of WCM in general.

The remainder of this paper is structured as follows. First, relevant literature is reviewed. Next, method and data are elaborated upon. Following, relevant market dynamics are discussed and translated towards country unit differences in accounts

receivable overdues. Also, on the basis of previous lessons learned, a recommendation framework is formulated and the findings are discussed. Finally, conclusions for practice and academics are drawn.

2. Literature review

This section will elaborate on literature related to the factors that determine trade credit demand to provide initial guidance for relevant market dynamics (external determinants) that determine receivables and overdue levels (internal processes).

2.1. Accounts receivable overdues

Hillier et al. (2016) consider accounts receivable (AR) as an investment in customers by means of trade credit. The way companies manage trade credit largely influences the amount of their receivables and hence also their overdues.

The terms of sale are decided internally and are the first credit management factor that influence AR. Defining the credit period (the payment term) is part of the terms, which is generally determined by the probability of default, size of the account, and whether the goods are perishable (Hillier et al. 2016). The length of the payment term inevitably influences AR and days sales outstanding (DSO), and consequently overdues. The DSO is calculated as the accounts receivable divided by the one day revenue (REL Consultancy 2016). More efficiency is generated with a shorter DSO due to faster collection of receivables.

Cash terms are another part of the terms of sale. These terms incentivize customers to pay earlier and discourage to generate overdue (by means of penalties). Also, Hermes et al. (2016) confirm enforcement mechanisms as relevant determinants of trade credit. Next to this, the credit instrument (usually an invoice) determines how the terms of sale are communicated and executed. The collection policy determines how the receivables are collected.

According to Howorth and Reber (2003), overdues follow from trade credit demand, and therefore overdues can be viewed as part of AR. Consistent with Petersen and Rajan (1997), Pike and Cheng (2001) indicate that there is a higher likelihood of generating overdue when customers' liquidity is weak. Hence, overdues

specifically indicate the customers within AR with a relatively high default risk. It is therefore that they warrant specific attention.

2.2. Market dynamics

Filbeck and Krueger (2005) find large differences in working capital levels across time. They argue that these differences might be due to external economic factors, i.c. market dynamics. The literature provides several suggestions for market dynamics influencing receivables.

First, the five C's of credit are often used in standard literature (Hillier et al. 2016), as a method to determine a customer's creditworthiness and the risk of default. Hence, these factors influence trade credit: 1) character, 2) capacity, 3) capital, 4) collateral and 5) conditions. Character defines the willingness of the customer, or "mentality" to repay trade credit. Capacity defines how able a customer is to repay trade credit and can be measured in terms of operating cash flows that directly affect the customer's ability to cover receivables. Capital is defined as the reserves the customer has and influences the ability to repay trade credit. Collateral indicates the customer's assets that can be liquidated to fulfill its obligations. Finally, economic conditions influence the customer's ability to repay trade credit. Trivially, it can be challenging to collect AR when debtors are experiencing economic hard times.

Second, Biais and Gollier (1997) found that small companies increase their trade credit as a consequence of an increase in the interest rate. Nilsen (2002) found similar results for both small and large companies. Hailemariam (2001) studied multiple cases in Eritrea. In order to finance operations, managers preferred internally generated funds (e.g. trade credit and retained earnings) instead of bank loans due to high interest rates, except when operational losses prohibited this. Moreover, Filbeck and Krueger (2005) argued that higher interest rates would make it less beneficial for customers to fulfill payments early, thereby stretching the AR of collectors. However, EU short term interest rates EU have been dropping from 5.11% in October 2008 to -0.29% in July 2016 (OECD Finance Department 2016). Therefore, it might be that this market dynamic currently is less influential on receivables.

Third, Petersen and Rajan (1997) found that companies resort to use more trade credit when banks do not provide funding. A tradeoff is visible between the flexibility of banks and the amount of trade credit (and hence receivables). Furthermore, Biais and Gollier (1997) found that companies that lack the connections with banks for receiving loans resort to use more trade credit. Moreover, Howorth and Reber (2003) found that habitual late payments correlate positively with the difficulty of getting credit from banks.

Fourth, Petersen and Rajan (1997) found that more trade credit is given to larger companies, hence indicating a positive relationship between customer size and receivables. Peel, Wilson and Howorth (2000) found that large companies generally endure more late payments from customers. They did not investigate customers' size as a variable affecting receivables. Ng, Smith and Smith (1999), and Wilson and Summers (2002), link the size of the creditor to credit decisions, but they also do not investigate how customer size affects AR of the creditor.

Finally, Hermes et al. (2016) found that competition levels influence trade credit for wholesalers. This factor was also suggested by Filbeck and Krueger (2005). High levels of competition can decrease market power for suppliers. With relatively high market power, customers may demand longer payment terms and are more likely to switch to the competition. However, Hermes et al. (2012) indicated that trade credit prevents customers from switching. Similarly, Petersen and Rajan (1997) found that companies offering trade credit can get the advantage of gaining more customer information, increasing dependency of the customer to the supplier, and using the assets of the customer as collateral for AR.

Based on the above, major market dynamics influencing AR are as follows: character, capacity, collateral, capital, conditions, competition, interest rate, banks, and customer size. These factors provide a categorization and overview of relevant market dynamics to be indicated by the case study. Taken together, lessons can be learned for credit management to improve AR (reduce overdues) with a procedure that incorporates relevant market dynamics by prioritizing customers with the highest likelihood of default and generating overdue.

3. Method and data

The overarching methodological framework of this paper is an explorative case study with design elements. Yin (2014: 16) describes a case study as follows: “A case study is an empirical inquiry that investigates a contemporary phenomenon (the “case”) in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident”. A design study is meant to offer a solution or correction to a present problem. Its first (diagnosis) stage can be completed by a case study, during which the detection of the problem and the gathering of the data is executed. The aim of this research particularly asks for a case study, since the improvement of AR overdue practices based on lessons from market dynamics is a practical and unclear delimited phenomenon that can be affected by various factors. FEED’s involvement in the dairy cow sector is especially interesting because of substantial differences in AR overdues in view of market dynamics.

A standard component of a case study is a protocol, in which an overview, data collection procedures, questions for data collection and guidelines for the case study report are described (Yin 2014). Whilst the protocol was updated frequently from new knowledge, sticking to it increased the reliability of this research. In analyzing the case, this research strives towards analytical generalization to generalize the findings towards notions that can be applicable to other cases (Yin 2014). The second research stage offers an improvement to diminish the problem. It is labelled as the design stage, during which specific recommendations for FEED AR overdue practices based on previous lessons from market dynamics are formulated.

3.1. Multiple data sources

A field researcher had the possibility to combine multiple sources of data when being intern at FEED for about half a year. In this way, information from different sources could be balanced and verified. According to Yin (2014) this is a major benefit of a case study in comparison to other research methods. The practice of triangulation is followed in that interviews, literature and internal documentation are combined to obtain a deep and complete understanding of the case. The collection of information from different sources should aim to corroborate the same finding, a

method that is labeled by Yin as *converging lines of inquiry*. This is supported by Jick (1979), who states that a greater accuracy can be achieved in this way.

3.2. Interview method

A technique of snowball sampling was adopted, whereby interview subjects refer potential future subjects. Thereby, the subject automatically becomes an assistant in the research (Biernacki, Waldorf 1981). The FEED Finance Director Netherlands provided the first subjects to start with. After these subjects were interviewed, the amount of referrals increased until the study was completed. The information gathered during previous sessions determined the choice of topic for subsequent interviews.

In order to preserve flexibility, interviews were conducted in an unstructured way. This was needed because of subjects' different expertise and the unknown relevance of certain information during the first research stages. Open questions enable to get a broad sense of the case, because subjects are free to elaborate on whatever they think is relevant and can provide clarification if needed. In order to benefit from triangulation, results from previous interviews were checked during the next interviews. Notes were taken and discussed with the subject at the end of each interview. Thereby the validity of the data was preserved as well as possible.

The key interview findings were summarized in a data matrix, which gave an overview of the subjects, the interviews, key topics, and key findings. Pre-interviews were held to specify the case. Some of these remained unused. Moreover, some findings were omitted because of irrelevance to the analysis, or when statements given were not corroborated. After the pre-interviews, the standard interviews were held. Evaluation interviews with specialized staff, directors and executives were held at multiple occasions to verify key findings. Individual interview reports were anonymized in order to protect the so-called innocent. Multiple interviews could be conducted with the same subject if desired and usually lasted 1 to 1.5 hours. In total, 19 subjects were interviewed over 34 unstructured interviews.

3.3. Diagnosis stage

In the first stage of this study, existing literature, internal documentation and unstructured interviews were conducted in order to get a deeper understanding of the market dynamics that influence AR overdues. These interviews were designed to diagnose how differences in AR overdues between country units arise, and to recognize potential opportunities of improving AR overdue practices on the basis of lessons learned. Moreover, the interviews were used to verify previous findings from other data sources and provide feedback for the research. In this way, information was triangulated. Some company-specific information in this paper was slightly adjusted for confidentiality reasons, without affecting the argumentation and analysis.

3.4. Design stage

During the second stage of this study, a recommendation framework was designed to improve FEED AR overdue practices by prioritizing customers likely to generate overdue. This was done on the basis of the lessons learned during the diagnosis stage. Furthermore, evaluation of the framework was conducted by comparing it to previous literature, and to what extent the included factors were country-specific or market-specific. Finally, the main findings of the case study were highlighted and where possible generalized for both practical and academic purposes, thereby providing suggestions for future research.

4. Market dynamics overview

In this part, the first section of the diagnosis phase, an overview of relevant market dynamics influencing AR overdues at FEED is developed. An initial list of drivers was indicated by previous literature and complemented by other documentation and unstructured interviews.

When investigating FEED AR overdues, the most relevant market dynamics can be classified as follows: 1) business cycle, 2) dairy farm financial structure, 3) farmer mentality, and 4) third party market participants. This categorization is as complete

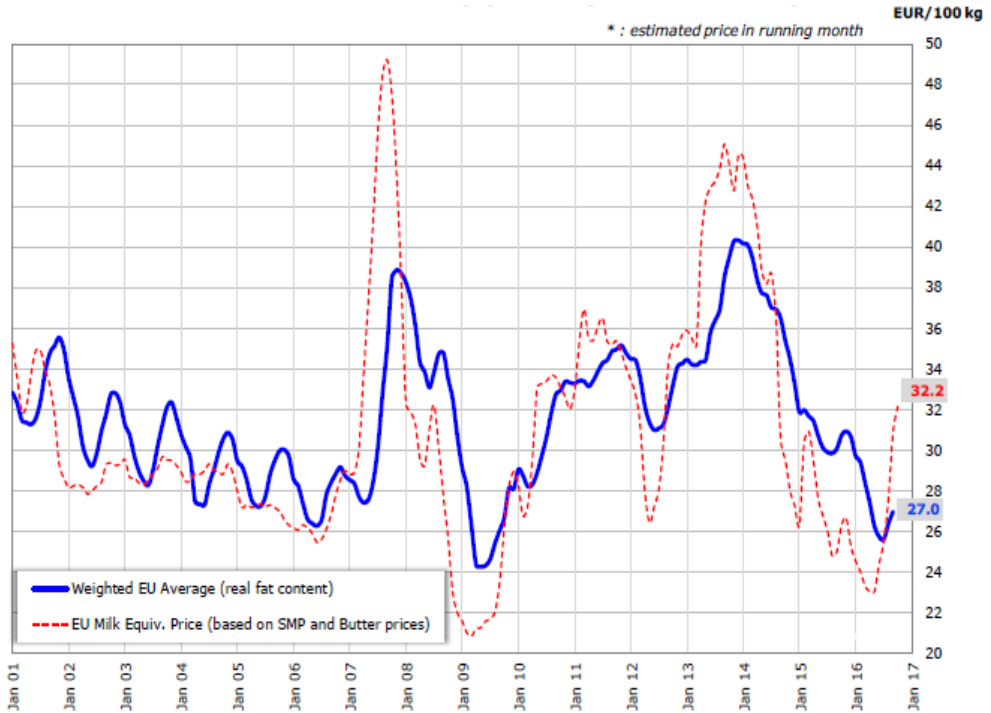
as possible, since no further categories that qualify to be considered as market dynamics were identified during the interviews. The categories and individual market dynamics were formulated iteratively by interviews and were verified during evaluating interviews with specialized senior staff and higher management. The market dynamics cannot be fully considered as independent determinants, since they can complement, reinforce or counteract each other.

4.1. Business cycle

Guided by previous literature, and based on multiple interviews, this study indicates the business cycle (more specifically the milk price) as the most relevant market dynamic for overdue in the FEED dairy cow sector. Milk prices reflect general economic conditions and are directly related to lower operating cash flows for dairy farmers, which is consistent with standard literature (Hillier et al. 2016) regarding conditions and capacity. The business cycle can be viewed as an agglutination of these factors, whereby a low milk price pressures and delays other expenses such as animal feed. The problem is illustrated by growing overdues, and a growing amount of customers asking for deferred payments during low milk price periods. Supported by multiple interviews, the business cycle is negatively related to FEED overdue. An anti-cyclical movement is confirmed (all else being equal) throughout.

Anticipating the abolishment of the milk quota in April 2015, milk prices for EU producers decreased significantly (Centraal Bureau Statistiek 2016), see figure 1. This is largely due to oversupply of milk in the Netherlands and Ireland. Together with a lagging demand of dairy products in China's stagnant economy and a Russian boycott on EU agricultural products, this makes for an exceptional long period of low EU milk prices. According to specialized staff members, this is why many EU dairy farmers currently do not have the financial resilience to survive. This is supported by the claims in the sector, stating that the majority of dairy farmers did not allow for such an extreme situation in their liquidity planning. Hence, and supported by evaluating interviews, the business cycle is defined as the first market dynamic category.

Figure 1. Developments in the European raw milk price



Source: European Commission (2016).

4.2. Dairy farm financial structure

Guided by previous literature, based on various interviews, and supported during evaluating interviews, this paper now identifies a second relevant market dynamic category for overdues in the FEED dairy cow sector. This category comprises market dynamics related to the financial structure of farms and how this determines their abilities to fulfill FEED receivables. For convenience, two relevant subcategories are singled out: farm debt ratio and farm size.

Farm debt ratio. On the basis of multiple interviews, the debt ratio is identified as a relevant market dynamic related to financial structure, consistent with standard literature (Hillier et al. 2016). The debt ratio affects the capacity to repay trade credit, is proportional to the amount of collateral of a farm, and relates to its amount of capital reserves. First, debt-financed farms have relatively high fixed costs due to interest and rent expenses and have low capital reserves because of previous

investments. This burdens other payments and generates overdue. Second, higher fixed costs raise the vulnerability for market fluctuations, e.g. a milk price decline. An EU study by Ernst & Young (2013) confirms this. Hence, the debt ratio market dynamic interacts with the business cycle, strengthening its influence on FEED overdue. It is also indicated that the degree of farms being financed by debt positively relates to overdues.

Farm size. Farm size in terms of number of animals is also viewed within FEED as a relevant market dynamic with respect to financial structure. This is confirmed by Petersen and Rajan (1997) regarding to size as a determinant of trade credit. Farm size interacts for a large part with farm debt ratio and the business cycle. First, large farms tend to be more growth oriented and are thus more likely to attract debt and endure liquidity shortages when confronted with lower milk prices. Generating overdue due to low milk prices is reinforced by heavy investments in dairy farms, increasing rent and interest expenses. Second, unlike smaller farms, large farms have more labor costs that cannot be reduced fast when needed, which adds to their financial inflexibility during economic troughs and increases the likelihood to generate overdue. Furthermore, trivially the number of animals is directly related to the amount of feed needed. FEED sells the majority of its feed on credit. Hence, the larger the farm, the higher the absolute amounts of overdue are generated. Thus, it can be stated that farm size positively relates to FEED overdue. It influences the financial structure of farms through the debt ratio and financial vulnerability to the business cycle.

Farmer mentality. Based on literature and various interviews, this study now indicates a third relevant market dynamics determinant for overdues in the FEED dairy cow sector. It refers to the farmers' personal thread of thinking and how this influences their way of fulfilling FEED receivables. Two subcategories are distinguished here: degree of input drive and payment mentality.

Degree of input drive. Multiple interviews identify input-oriented and output-oriented customers. Input driven customers mainly decide upon prices and payment terms. Output driven customers look beyond this and focus at bottom line output (milk quality and quantity per cow). The latter group makes use of sophisticated measurement techniques to calculate both the feed expenses and the according

output. Hence, feed prices and payment terms can thus be compensated by a more than proportional output growth. It may be reasoned that due to their focus on payment terms, input driven customers extend their payments and are more likely to generate overdue. In principle, this market dynamic can be positively related to FEED overdue, but no clear further support for a relation between input drive and FEED overdue was identified.

Payment mentality. Customers differ in willingness to pay for animal feed, in line with the character factor (Hillier et al. 2016). The majority of customers have a good payment behavior. A small portion of the customers is responsible for the majority of payment problems. Collection is harder for this group, and these individuals are responsible for a continuous level of overdue. Furthermore, a worse payment mentality is linked to a higher DSO, and hence to higher overdue levels. Trivially, customer payment mentality negatively relates to FEED overdue.

4.3. Third party market participants

Guided by previous literature and based on various interviews, this paper identifies a fourth determinant for AR overdues in the FEED dairy cow sector. This category comprises market dynamics related to other market participants that influence the farmers' behavior as to FEED receivables. Three subcategories are delineated: FEED competitors, dairy factories and banks.

FEED competitors. In principle, competition levels affect the market power of FEED negatively. Higher levels of competition create more bargaining power for the customers to negotiate lower prices and longer payment terms. This is consistent with Hermes et al. (2012) and Hermes et al. (2016) and supported within FEED in that higher competition levels in general imply longer payment terms. A customer's tendency to switch to competitors is based upon the following aspects: 1) advisor quality and relationship, 2) feed quality, 3) other interactions (e.g. credit control), and 4) price and payment terms. In competitive markets, FEED needs to improve on these aspects in order to survive. FEED is thus forced to comply with competition standards in competitive markets with regards to payment terms and loosen AR overdue practices. Nevertheless, while this market dynamic can be positively related to FEED overdues and is therefore incorporated in the categorization, no clear

further support for a real relationship between competition levels and FEED overdues could be identified.

Dairy factories. Farmers are inevitably dependent on the payment from dairy factories for the pickup of milk. Different factories adopt (slightly) different payment dates and frequencies, influencing the operating cash flows of the farmers and therefore their capacity to pay for other expenses such as animal feed. Hence, it can be reasoned that the longer it takes for dairy farmers to receive the “milk money” relative to the delivery of animal feed, the higher overdue (considering payment terms as equal overall). Whereas this market dynamic is positively related to FEED overdue and therefore is incorporated in the categorization, no clear further support for a real relationship between dairy factory payment date and FEED overdue could be identified.

Banks. FEED interviewees tell that banks are important third parties influencing the financial structure of farms. When banks are less flexible in their credit providence towards customers, the latter group is more likely to have liquidity problems and thus to generate overdue. This is in line with Petersen and Rajan (1997) and Howorth and Reber (2003). Banks are currently more precautious in credit providence towards dairy farms. First this is due to increased EU dairy cow sector regulation from 2007 onwards, leading to more financial uncertainty, as is generally confirmed in the sector. Second, the liquidity of dairy farms has fallen significantly due to the current low milk prices in the EU. The above mentioned mechanism is particularly prevalent during periods of economic difficulty, illustrating once again the interdependency of market dynamics as to financial structure, the business cycle and bank flexibility on overdue.

5. From market dynamics to AR differences

In this section, covering the second part of the diagnosis phase, differences in AR are elaborated first. Second, the most relevant market dynamics responsible for these differences are indicated in order to provide guidance for the recommendation framework.

5.1 Differences in accounts receivable

Interviews point at significant differences between the Dutch and East German unit with respect to AR (and especially overdues) which are particularly prevalent in the dairy cow sector, thereby supporting the relevance of this case study. The accounts receivable ratio for the Dutch unit is less than half of the accounts receivable ratio for the East German unit. The DSO for the Dutch unit was also much lower than for the East German unit, indicating a considerable discrepancy. The same counts for the overdue ratio. The data shows a clear reduction in overdues for the East German unit though. It is indicated that high 2013 and 2014 milk prices partially explain the reduction of overdue in these years extending towards most of 2015, and lower milk prices in 2015 and 2016 led to an overdue increase. These “lags” are caused by gradual improvement (deterioration) of private financial buffers of farmers, following an increase (decrease) of the milk price and influencing their payment abilities.

Obviously, overdues would be poor indicators if payment terms differ significantly. However, there are no significant differences. Since the East German unit orders relatively more raw material feed due to the larger size of farms in this area (large farms can mix the raw material into full feed themselves), this can partially contribute to the larger DSO for this country unit. All else being equal, these slight differences in payment terms cannot be the full explanation of the major discrepancies in DSO and overdue.

A higher DSO and overdue can actually contribute to FEED’s performance in case it contributes to customer retention. This is consistent with findings from Hermes et al. (2013). However, the healthy financial lever in the East German unit is already surpassed, indicating that customers use outstanding trade credit to finance other expenses. Hence, FEED strives to further reduce the East German overdue significantly in the near future.

5.2. Market dynamics at play

5.2.1. Business cycle

Based on interviews and supported by a basic regression analysis, the major cause for the differences in AR overdues between the Dutch and the East German

unit is the milk price, which is significantly lower in the latter area. This is shown in figure 2 along standardized milk prices paid by the major dairy company in East Germany, Deutsches Milchkontor GmbH (DMK), and the major dairy company in the Dutch area, Royal FrieslandCampina N.V. (RFC). The main reason for this discrepancy is the ability of dairy factories to add value to raw milk. RFC can turn raw milk into high-value-added products like baby milk powder. Hence, it is able to provide milk suppliers with relatively high milk price. Milk in East Germany is more locally consumed and less transformed in the process. DMK and other dairy companies are therefore adding less value to their products here and provide relatively low milk prices. A few dairy companies in East Germany do possess the ability to add more value to milk, e.g. Müllermilch. Yet, these companies do not (have to) pay higher milk prices to dairy farms, since their low-value-adding competitors are not doing this either.

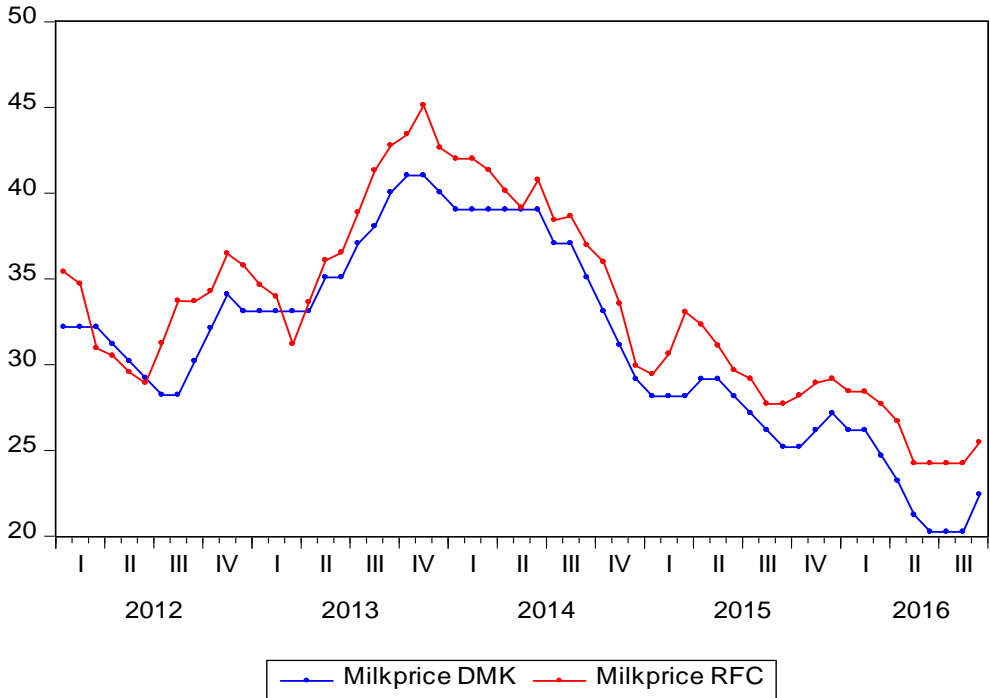
Internal FEED data from 2012 until 2016 show that overdues for the East German unit changed almost immediately after a downward move of the milk price in that area. Dutch dairy farms however, appeared to generate overdues only after a few months. This might indicate that East German dairy farms are more sensitive to milk price changes compared to the Dutch area due to their relatively poor financial structure and a lack of financial buffers to absorb negative cash flows. The differing response of overdues to business cycle changes was also found during multiple interviews.

A force potentially counteracting the above discrepancy is the size of dairy farms. Dairy factories usually provide a premium upon the milk price for larger suppliers because these suppliers can provide them with fully loaded milk trucks and the ability to transport milk over longer distances, providing additional advantages. Since the size of dairy farms in East Germany (measured by the number of cows) is generally a multitude of Dutch dairy farms, this counteracts the above mentioned forces and decreases the discrepancy in milk prices.

However, the relatively low milk prices in East Germany remain the major factor contributing to the differences in AR overdues. It must be noted though, that the discrepancy in overdues is likely to increase in the near future due to planned phosphate regulation in the Netherlands. Confirmed by LTO Nederland (2016), this

reduces the amount of allowed manure and is likely to reduce the number of animals in total. Therefore the milk production is likely to decrease, adding an upward force to milk prices in the Netherlands.

Figure 2. Standardized milk prices; 2012 until September 2016



Source: LTO Nederland (2016).

On the basis of the argumentation above, the business cycle market dynamic is a relevant market dynamics for explaining the country unit differences in AR overdues and will therefore be included as a foundation for the recommendation framework in the next section.

5.2.2. Dairy farm financial structure

Farm debt ratio. Based on multiple interviews, the second factor causing differences in AR overdues refers to farms in East Germany being usually more debt-financed than farms in the Dutch area. After the old communist system collapse

in East Germany, the buildup of new private farms often required debt funding. The debt-focused approach is reinforced recently by strong increases in land values in East Germany, which have more than doubled in the past decade. This increased collateral for dairy farmers, which they used to attract more loans from banks and benefit from economies of scale. Yet, the ratio of liabilities to land value has worsened as well, making dairy farmers even more vulnerable to economic troughs. This is in contrast to the situation in the Dutch area, where many Dutch family-owned farms were inherited and are relatively small, and therefore more equity-financed. Farmers in the Netherlands also have invested heavily in new barns and equipment in the recent years before the abolishment of the quota, even doubling their investments per kg of milk in the past ten years (Rabobank 2016). Nevertheless, Dutch dairy farms are still relatively more equity-financed.

Hence, farms in East Germany have higher relative fixed costs (rent and interest expenses) compared to their Dutch counterparts. This makes them particularly more susceptible to the business cycle. They are more likely to defer payments and generate overdue during low milk price periods. This confirms the link between the business cycle and the debt ratio established earlier. Moreover, a combination of low milk prices and a deteriorated financial structure leads to more farm bankruptcies in East Germany nowadays.

On the basis of the argumentation above, the farm debt ratio market dynamic is a relevant variable for explaining the country unit differences in AR overdues and will therefore be included as a foundation for the recommendation framework in the next section.

Farm size. Based on various interviews, the discrepancy in financial structure is reinforced with the average farms in East Germany being of considerable larger size. A larger proportion of customers have more than 500 animals (defined as the XXL customer segment) in East Germany than in the Dutch area. East German customers are more susceptible to liquidity shortages during periods of low milk prices due to high fixed costs and inflexible labor costs, thereby having a negative impact on AR overdues at FEED. However, the size discrepancy between the areas is likely to decrease. Dutch farms are gradually increasing economics of scale due to mergers and the inability to find successors.

On the basis of the argumentation above, the dairy farm size market dynamic is a relevant variable for explaining the current country unit differences in AR overdues and will therefore be included as a foundation for the recommendation framework in the next section.

5.2.3. Farmer mentality

Input vs. output drive. Based on interviews, East Germany is more input oriented in general, whereas the Dutch sector is more output oriented. This discrepancy is illustrated with a high adoption rate of a software platform developed by FEED to give customers more technical and economic insights into their farms and maximize the quality and quantity of milk per animal (FEED 2016). However, less East German customers make use of the platform. There are two reasons for this discrepancy. First, historical usage of the platform has been less given the short history of FEED in East Germany (since 2012). Second, East German farms use more raw materials as feed, and these are low value-added products for which it is hard to gain a competitive advantage. For FEED, differentiating from competitors on a technical level is hard in this product segment. Since customers in East Germany are thus more input oriented, they tend to be more price and payment term oriented.

Interviews tell that the above contrasts result in relatively more switching behavior, and more price and payment term drive in East Germany. This may be one explanation for the slightly longer average payment terms in East Germany and hence a longer DSO, but does not grasp the discrepancy in overdues. Also, as stated earlier, no clear further support for a positive relationship between input drive and FEED overdues could be identified.

On the basis of the argumentation above, the input/output drive market dynamic does not provide substantial explanation for country unit differences in AR overdues and will not be included as a foundation for the recommendation framework in the next section.

Payment mentality. There is not much country unit difference in willingness of customers to fulfill payments. The payment mentality for the both areas is good: customers pay when they are able to. This factor can be merely responsible for individual differences within each area. However, interviews urged to include a

measure of trustworthiness or payment behavior in the recommendation framework. On the basis of the argumentation above, the payment mentality market dynamic does not provide substantial explanation for country unit differences in AR overdues but will be included as a foundation for the recommendation framework in the next section.

5.2.4. Third party market participants

Competition. The market in the whole of Germany is more fragmented compared to the Netherlands: there are more competitors for FEED and the market share is lower. In the Netherlands, FEED has a relatively high market share, which is likely due to the long term presence in the country and several acquisitions. In East Germany the market share is much lower and the number of competitors is higher. The lower market share may be partially due to the relative short presence of FEED in the area, only acquiring the East German unit in 2012. This leads to a more leading position for FEED in the Netherlands, whereas in East Germany it has to follow the competition in prices and payment terms in order to prevent customers from switching to competitors. Therefore this factor may partly explain why payment terms in East Germany are longer, and thus result in a higher DSO. However it does not clearly capture why overdue in East Germany is considerably higher compared to the Dutch area.

On the basis of the argumentation above, the competition market dynamic does not provide substantial explanation for country unit differences in AR overdues and will not be included as a foundation for the recommendation framework in the next section.

Dairy factories. In the Dutch area, the majority of dairy farmers is paid by RFC on the 14th every month, whereas in East Germany dairy factories like DMK pay dairy farmers on the 20th each month. However, the payment terms adopted in both regions are suited towards these payment dates. Customers that request to pay after the receipt of milk money, instead of paying after 7 or 21 days of delivery, are billed on the date in accordance with the respective milk factory. Therefore it can be assumed that this issue is unlikely to result in differences with regards to overdues between both areas. Furthermore, no broad support for a significant positive

relationship between dairy factory payment dates and FEED overdues could be identified.

On the basis of the argumentation above, the dairy factory market dynamic does not provide substantial explanation for country unit differences in overdue and will therefore not be included as a foundation for the recommendation framework in the next section.

Banks. Based on interviews, banks in East Germany usually employ less flexible credit conditions for dairy farmers compared to banks in the Dutch area. First, this is due to a more formal culture in Germany where a contract usually is not renegotiated after being signed, whereas in the Netherlands this is more accepted. Second, the German banking sector is relatively more regulated, historically more focused on agriculture and less risk diversified than the main Dutch agricultural banks. Therefore, German banks are currently more constrained and have less flexibility in providing credit to farmers. Third, East German “Landesbanken” are less willing to provide credit, since farmers in this area have relatively more financial distress. This leads to a higher cost of capital, less credit availability and shorter repayment periods, eventually raising fixed costs for dairy farmers even further and increasing the likelihood of generating overdues. Combined with the business cycle, debt ratio and farm size, this adds to the financial inflexibility of East German dairy farmers.

On the basis of the argumentation above, the bank flexibility market dynamic does provide substantial explanation for country unit differences in AR overdues. However, it amply follows from the farmers’ financial structure and it would be very difficult to alter bank flexibility. Furthermore, due to uncertainty regarding the implementation of phosphate laws in the Netherlands, Dutch banks are increasingly strict in their credit providence. Hence, this market dynamic will not be included as a foundation for the recommendation framework.

5.3. Foundation for recommendations

A summary of the findings in the diagnosis stage is given by table 4. The columns specify the respective market dynamic categorization belonging to each market dynamic subcategory and its perceived influence (positive or negative) on AR overdues. The remaining columns specify the situation in the Dutch and East

German units, and the effect of the respective market dynamic on the differences in AR overdues between both country units.

Table 1. Overview of market dynamics influencing overdue

Market dynamic Category	Subcategory, specific for dairy cow sector	Effect on overdue	NL	GER	Effect on AR differences
Business cycle	Standardized milk prices	-	High	Low	Confirmed
Financial structure	Farm debt ratio	+	Medium	High	Confirmed
Financial structure	Farms size by number of animals	+	Low	High	Confirmed
Mentality	Degree of input Orientation	+	Low	High	Not substantial
Mentality	Degree of payment mentality	-	High	High	Not substantial
3rd parties	Competition level	+	Low	High	Not substantial
3rd parties	Dairy Factory payment date	+	14th	20 th	Not substantial
3rd parties	Degree of bank flexibility	-	Medium	Low	Confirmed

Source: Authors' own elaboration

Some market dynamics appear to have no substantial influence on AR overdue differences. The most relevant and usable market dynamics are used to build a recommendation framework upon: the business cycle, dairy farm financial structure and payment mentality.

6. From market dynamics to recommendation framework

In the design part, the lessons on market dynamics in the previous sections will be utilized to build a recommendation framework for improving AR and reducing overdue by prioritizing customers likely to generate overdue. First, general framework requirements are reviewed. Next, a dynamic risk segmentation procedure, its extensions, and its limitations are discussed.

6.1 General framework requirements

Based on multiple interviews, the AR collection policy can be more proactive when adopting the business cycle as a forward looking indicator. FEED needs to anticipate the customers' financial structure based on the current movement of the milk price and adjust collecting policy accordingly, by being stricter when the milk price starts to rise after which farmers will gradually build financial resilience and to loosen as soon as the milk price falls. The few-months' lag between the rise (fall) of the milk price and improvement (deterioration) of the financial structure of the farmers allows for a suitable forward-looking indicator. In line with business cycle market dynamics, a dynamic procedure should assess a customer's riskiness to generate overdue by anticipating on the farmers' financial structure based on the milk price.

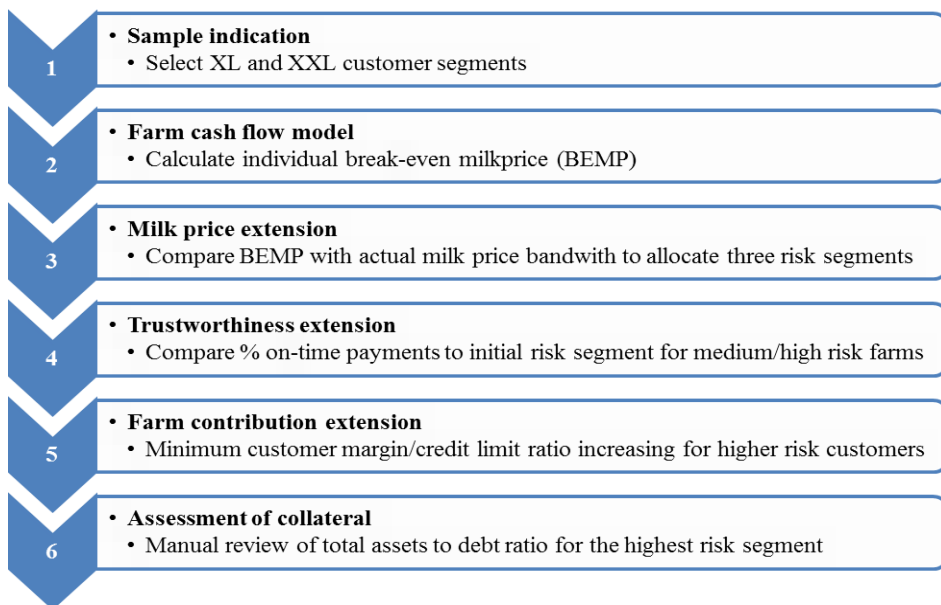
There is a need for flexible collection policy targeted towards the customer's financial structure, in line with the second relevant market dynamic. Overdue procedures are conducted "manually" after overdues occur, which sometimes means the credit limit (the maximum amount of credit outstanding to a single customer) has already been surpassed. Part of this "ex-post" management involves looking at the customer financial data and bringing in a customized solution whenever overdue is problematic. This costly and time-consuming process should rather be substituted by proactive action. Also, policies do not structurally differ upon the financial structure of the customer. Furthermore, there is a need for more insight in customer financials. Therefore, in line with previous lessons from the customer's financial structure market dynamic, the procedure needs to include an additional set of variables regarding the financial health and collateral of the customer and adjust their perceived riskiness accordingly.

6.2. Dynamic risk segmentation procedure

To incorporate the above requirements, this study proposes a dynamic risk segmentation procedure that categorizes customers into risk segments (low, medium, high). The procedure was designed iteratively to generate a funnel effect, filtering and narrowing down the number of customers likely to generate overdue along the steps, eventually leaving the top priority customers in the highest segment. The six

steps and their sequence are shown in figure 3. General framework requirements are met by proactively categorizing key customers on the basis of the milk price, combined with an analysis on financial structure, which allows FEED to adjust overdue procedures based on risk segments, thereby prioritizing the process of collecting AR. Finally, the procedure forms a structural tool to easily communicate decisions towards upper management and to gain insights into customer payment behavior.

Figure 3. Steps in the dynamic risk segmentation procedure



Source: Authors' own elaboration

Step 1. Sample indication:

First, based on interviews (with one staff member disagreeing), yearly information collection and analysis is most beneficial with the largest customers. The procedure is currently tested for the XL (200-500 animals) and XXL (more than 500 animals) customer segments. This is consistent with literature regarding customer size and case study findings regarding the customer size market dynamic. Information is available from the FEED customer relationship management (CRM) system. In this step, customers are not allocated to risk segments yet.

Step 2. Farm cash flow model:

Second, individual customer cash flows are investigated, in line with literature regarding capacity and connects to the business cycle and debt ratio market dynamics. Based on advices during interviews, this study therefore uses a quick scan (Farm Credit East 2016) to indicate operational cash flows with relatively little information. The most important variables for the quick scan are as follows: 1) sold milk quantity per cow in kg, 2) farm size in number of animals, 3) costs of labor per kg milk, 4) costs of feed per kg milk, 5) fixed costs per kg milk, 6) other expenses per kg milk, 7) family living expenses per kg milk, and 8) non-milk income per kg milk. The first and second variables are merely needed to calculate the others. The third, fourth, fifth and sixth variable need to be calculated to gain an overview of the farm’s cash flow expenses. The seventh variable is added to give an indication of the total cost price per kg milk. Finally, the eighth variable is subtracted to provide an indication of net costs of production (i.e. the break-even milk price). A German example calculation is given in table 5.

Table 5. Example calculation of farm costs per kg milk

	Average
	7/14 - 6/15
Costs per kg sold milk	Cent/kg
Raw material feed	7.9
Total feed	9.5
Labor costs	7.1
Other expenses	10.1
Fixed costs	6.1
Total cash flow expenses	40.7
Family living expenses	2.5
Total cost price	43.2
Non-milk income	3
Break-even milk price	40.2

Source: Koesling Anderson (2015).

The analysis needs to be conducted yearly with a combination of 1) available data from the CRM system, 2) farm financial statements, 3) publicly available reports, and 4) sales department representatives. In this step, customers are not allocated into risk segments yet.

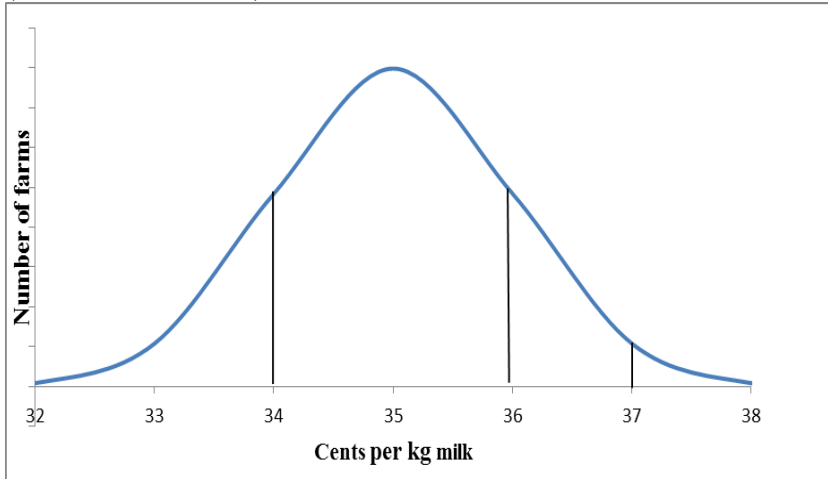
Step 3. Milk price extension:

Third, based on literature regarding conditions, the market dynamics analysis, and the framework requirements, the business cycle needs to be included as a forward looking indicator to anticipate customers' future cash flows. FEED staff points out to initially allocate customers in risk segments after this step is conducted. This can be done by utilizing the break-even milk price from the previous step and comparing it with the actual milk price, thereby generating a robust indication of the customer's cash margin and its likelihood to generate overdue. Therefore, a monthly review of the actual milk price corresponds with an immediate potential shift to a higher (or lower) risk segment of individual customers when the milk price passes the predefined bandwidth from the individual break-even milk price (BEMP). The initial bandwidth is defined as the actual milk price subtracted by the lowest BEMP in the total sample per region. This bandwidth is divided into three sections, one for each risk segment. For every region, the width of these sections is defined as a fixed number of cents per kg milk. Using data from the CRM system, customers are allocated in risk segments matching the section their BEMP belongs to (cf. figure 4).

Step 4. Farmer mentality extension:

Fourth, based on the market dynamics analysis and advices from interviews, a yearly revise of previous payment behavior should be included in the procedure. This is consistent with the literature regarding character and the mentality market dynamic. Based on combined staff member advices, this measure of trustworthiness is defined as the Euro value of on-time payments as a percentage of the total Euro value of payments per customer. To correct for occasional payment delays (such as international bank transfer delays), five days are added to the due date to calculate the definitive on-time payment threshold. On-time payments percentages are compared with the average per region and consequently divided into two groups.

Figure 4. Example of risk segment allocation with milk price of 37 cents per kg milk, maximum BEMP deviation of 1 cent (high risk farms) and 3 cents (medium risk farms)



Source: Authors' own elaboration

Customers whose mentality (e.g. untrustworthy; below average on-time payments) differs substantially from their initial risk segment (e.g. medium risk) need to shift to another risk segment (e.g. high risk). One staff member disagreed with this procedure and proposed a manual review of trustworthiness in this step, but no further support for this notion was identified. Information is available from FEED's credit management system.

Step 5. Customer contribution extension:

Fifth, interviews point out that the procedure also should include an earnings element. Hence, yearly gross customer contribution margins (which differ between total feed and raw material feed customers) are compared with the credit limit to give indications. The minimum ratio should be increasing for higher risk segments, thereby exerting less tolerance towards higher risk segments. Below the respective ratio of a risk segment, customers are automatically allocated to a higher risk segment. The data needed are available in the FEED CRM system.

Step 6. Assessment of collateral:

Sixth, interviews indicate that a final assessment needs to be conducted to include the amount of collateral a farmer has. This is consistent with literature regarding size and collateral and the size and debt ratio market dynamics. Hence, farm assets and debt ratio need to be reviewed yearly. Based on advices, this can be done manually and conducted merely for customers in the highest risk segment. Data can again be drawn from the CRM system.

Additional remarks:

The procedure needs to be conducted per owner, instead of per legal entity. Otherwise, farmers with multiple business entities can form an unseen risk. As mentioned above, all steps are followed on a yearly basis with exception of step three, which is reviewed monthly as a forward looking indicator. Regardless of this frequency, one may run the entire procedure in the case of major macroeconomic events. Thus, the flexibility of the procedure is preserved. The risk segments generated from this procedure allow FEED to prioritize customers based on likelihood to generate overdue and to match collection policy accordingly. FEED can then act proactively to agree on payment plans with customers likely to generate overdue, or adjust payment terms based on the average BEMP. Furthermore, high risk customers can be denied extra trade credit and should fulfill their payments before an additional delivery of feed.

6.3 Framework limitations

Staff members indicate a need for customer information. Regarding future customers, financial statements requirements should be included in FEED's terms and conditions. Yet, a small proportion of the existing customers might be unwilling to provide this information. This unwillingness can be translated into risks and hence the customer may be allocated automatically in the highest risk segment. Moreover, information availability of farms has recently improved, since banks are increasingly strict regarding farm financial statements. Also, the data availability at large farms (which are focal in the procedure) is relatively good.

6.4 Framework evaluation

The framework provides several interesting contributions to the existing literature. Large farms are selected in procedure step 1, after which their operating cash flows are calculated in procedure step 2 and compared to the business cycle in procedure step 3. This is consistent with the literature regarding size, capacity and condition factors. In the analysis, the business cycle was viewed as an agglutination of capacity and conditions factors. These market dynamics were incorporated in the framework due to their relevance for accounts receivable and overdues and their contribution to country unit differences. Interviews with staff members pointed out that West- and East Germany can be seen as separate markets here, since the latter has considerably larger farms and substantially lower milk prices. This leads to considerable intra-country differences regarding AR overdues, and between the Netherlands and East Germany, whereas the Netherlands and West Germany are more similar. Hence, although previously labelled as country differences, actually rather market differences were found.

In procedure step 4, payment mentality was reviewed and found to be consistent with the literature on the character factor and the payment mentality findings. Due to its relevance for AR and overdues, it was incorporated in the framework. However, it appeared not to contribute to country unit differences, but to individual differences within each market. Hence, differences were not found on a country or market level, but on an individual level.

In procedure step 5, customer contribution was reviewed. It is rather an internal earnings than a market dynamics requirement that was not found in the case study or in the literature as a factor influencing AR or overdues. However, the gross contribution amount can be linked to customer size, which is consistent with literature on the size factor. Due to the link between customer size and the demand for feed type, East German farms generally have a lower contribution ratio (but a higher gross contribution amount) compared to West German farms since the contribution ratio on raw material feed is lower. This indicates intra-country differences and between the Netherlands and East Germany, mainly due to the size market dynamic. Hence, differences were not found on a country level, but rather on a market level.

In procedure step 6, collateral was reviewed. This is consistent with the literature regarding collateral and capital factors, and the findings where the debt ratio can be viewed as an agglutination of collateral-, capacity- and capital factors. It was relevant for AR and overdues, and country unit differences. West- and East Germany can be seen as separate markets, since the latter has farms with generally higher debt ratios, and the first is similar to the Netherlands. Thus, differences were rather found on market levels than on country levels.

Both the input drive and dairy factories were not incorporated in the framework, which is consistent with the literature and the case study where they were not found to influence AR and overdues. Input drive differs between the Netherlands, and the whole of Germany. Hence this can be seen as a country level difference. However, dairy factory payment dates differ between East- and West Germany. Thus, this difference rather acts on the market level.

Bank flexibility was not included in the procedure due to implementation difficulties. However, consistent with the literature, it was found to be relevant for AR overdues and country unit differences. Based on previous sections, differences in this aspect were found on the market level, which is largely due to differences in size, debt ratio and the business cycle between the Netherlands and West Germany on the one hand, and East Germany on the other.

Competition levels were not included in the procedure due to its irrelevance for the case at hand. This is likely due to FEED's policy on limited adjustment to competitor payment terms and its unclear relationship with overdue. Differences in this aspect were found on a country level, since competition is much fiercer in the whole of Germany than in the Netherlands.

Finally, in sharp contrast to previous literature, the interest rate never came forward in the case study and was not incorporated in the framework. This is likely due to the current low interest rate, making it irrelevant as a market dynamic for AR overdues. This is reinforced by the current low costs of capital in general, making default risk relatively more important for credit decisions. Hence, the framework was tailored towards factors that determine overdues (which have more emphasis on default risk) instead of receivables in general.

7. Conclusion

This research study has created an overview and categorization of relevant market dynamics and designs a recommendation framework for FEED. Based on the literature, interviews and other documentation, an overview and categorization of relevant market dynamics influencing AR overdues for FEED in the dairy cow sector is given. With the help of interviews and various documents, AR overdue differences between the Dutch and East German units are discussed and explanatory market dynamics for these discrepancies are defined, resulting in the foundation of a recommendation framework. The framework is designed and evaluated on the basis of previous literature, ultimately developing extensive procedures for prioritizing customers and improving AR overdue practices in the dairy cow sector.

Regarding practical contributions for FEED, this study provides in-depth insights into market dynamics giving rise to AR overdues and subsequent differences between country units. This knowledge can be utilized for improving evaluation of country unit data. Second, it can be used for guiding and structuring communication towards investors, giving them deeper understanding of risks. Third, the recommendation framework makes credit decisions more insightful and customer-specific by prioritizing customers. Thus, procedures, guidelines and other credit decisions can be adjusted to improve FEED overdue. Fourth, the dynamic risk segmentation procedure provides a structural tool to communicate credit decisions from the credit control department towards senior management, thereby improving mutual alignment, and transparency, while saving time. Fifth, after some modifications, the framework can be extended towards other sectors, such as the swine and poultry sector with the price of piglets, broilers or eggs to be used as a business cycle variable. Sixth, the recommendation framework allows for a better customer service towards low-risk segments; these customers will be less bothered by FEED credit control since priorities shift towards high-risk segments. Finally, after modifications, the framework can be used by FEED's sales department when evaluating prospective customers' potential payment behavior and likelihood to generate overdues.

In addition, this research contributes to the literature by examining a relatively

uncharted area of WCM. The overview and categorization are partially consistent with previous literature and provide unique insights into market dynamics determining AR overdues, thereby guiding future research into what extent these factors are market-specific or country-specific. Second, this case study is unique in that it uncovers how discrepancies in AR overdues arise between country units, thereby supporting future research regarding intra-company AR differences. Third, whereas the literature has indicated competition levels as a relevant market dynamic for trade credit, this study shows that its relationship with AR overdues is unclear and further research is required. Moreover, competition was not indicated as a relevant market dynamic influencing country unit differences, suggesting that company policy regarding adjustment to competitor payment terms was of influence. Fourth, in sharp contrast to previous literature, the interest rate was not indicated as a relevant market dynamic for AR overdues and country unit differences. Also, today's low interest rate and economic uncertainty shifts the focus of credit decisions from costs of capital towards default risk, and hence a focus on what factors specifically determine overdues instead of receivables as a whole is asked for. This is shown by a recommendation framework with market dynamics determining likelihood of customers generating overdue standing central in most of its steps and interest rates being excluded.

A view of receivables as an investment in clients should therefore focus on customer relationships, instead of the costs of providing credit. Hence, this case study emphasizes a relationship between WCM and trust, and shows that a trust-based view of inter-company relationships (cf. Nooteboom 1996) is useful. Moreover, WCM as part of risk management shifts partially away from financial risk (particularly interest rate risk), and nowadays focusses more on credit risk, where evaluating and accepting (or rejecting) customers is key. Therefore, this phenomenon provokes a cascade towards operational risk, and consistent with Heijes (2016), a focus from financial risk towards operational risk can be depicted.

Trivially, this study has limitations that can guide future research. Although it investigates intercompany differences in AR overdues, it does not cover how the differences translate into country unit profitability. The literature highlights how shorter collection time of receivables is correlated with higher profitability, but

aggregates this relationship across companies. Thus, company-specific research is urged to investigate potential differences between country units. Also, this paper investigates the market dynamics influencing AR overdues for a single company within a single industry. Hence, investigation of other companies, industries and/or countries is helpful. Such a study can indicate the respective relevance of competition levels for overdues, which remain inconclusive after this research. Moreover, future research into the influence of the interest rate on credit decisions at similar companies may uncover the respective relevance of interest rates for working capital management at other companies, such as in specific highly levered industries or in regions outside of Western Europe. Finally, after research-based adjustments, the market dynamics overview and categorization, and the subsequent recommendation framework can be applied in other sectors and/or companies.

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