

Distressed Trade Credits: The Case of Debt Collection Agencies

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Abstract

There are very few studies analyzing collection agencies and the determinants of their success in collecting delinquent trade credit. This lack of research contrasts with the empirical importance of trade credits, for example, trade credits in Germany amounted to 250 billion € or 12 percent of Germany's domestic GDP in 2006. In this study, we focus on the distribution of collection rates and the influence of the following four main variables: exposure at default, age of the account, i.e., the time period from the invoice date to the handover to the collection agency, prior experience of the collection agency with the debtor and the average prior collection rate (if there is prior experience). Our analyses reveal that collection rates are positively related to exposure at default and the prior collection rate. The age of the account has a negative impact on the collection rate. Experience with the debtor has a negative influence on the collection rate and thus appears a negative sign for the debtor's ability and/or willingness to pay.

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1. Introduction

Trade credits represent the main source of short-term financing for firms. In Germany, supplier credits and advance payments made by customers amount to an average of 15.8 percent of total assets. For small and medium size firms with total sales up to 50 million €, that same figure is over 20 percent. In other European countries, the shares seem to be even higher (Deutsche Bundesbank 2012). Therefore, it is hardly surprising that numerous theoretical and empirical papers address trade credits.¹ In spite of the vast literature, however, the question of distressed trade credits remains an important gap in the literature.

In addressing distressed trade credits, third-party debt collection agencies are important actors. The association of German debt collection agencies (Bundesverband Deutscher Inkassounternehmen - BDIU) represents 90% of the German collecting market.² By the end of 2011, the BDIU had 560 member agencies that acted for approximately 500,000 clients and that had receivables of about 5 billion Euros under management (Krüger 2011). The figures indicate that most of all firms with a great number of small receivables outstanding tend to hand over the collection process to a specialized agency (Bakst 2009). Most receivables originate from trade credits, whereas bank loans predominantly are collected by the banks themselves.

Because debt collection agencies (DCAs) are rarely addressed in the literature, some remarks about the characteristics of a DCA's business seem in order. Obviously, a DCA is a type of financial intermediary. As is known from the theory of intermediation (cf. Diamond 1984), for a multi-stage transaction to be more efficient than a single transaction the additional costs of delegating some task to an agent must be outweighed by a reduction in the net costs the agent must incur compared to the principal's costs. This reduction, in turn, may be caused by a type of specialization effect that results in lower costs of collecting money or in higher proceeds, respectively. The conjecture of a specialization effect may be motivated by the fact that the core business of a DCA is collecting money. Another reason for the improved

¹ Cf., e.g., the excellent survey by Peterson and Rajan (1997) or the more recent contributions to theory (Cunat 2007) and evidence (Huyghebaert 2006) on trade credits.

² Because our data have been provided by a German collection agency, we report certain figures about the German market. Unfortunately, there is no broad statistical database for this market. See Fedaseyeu (2011, esp. section 3) for an overview of the U.S. collection industry.

efficiency of DCAs results from the different types of incentives the DCA is faced with compared to the creditor.

DCAs typically suffer from a bad image. This is caused by the fact introducing a DCA causes additional expenses for the debtor that seem to be avoidable at first glance. The threat of increasing the costs of not paying on time, however, improves the incentive to pay whenever it is possible. Thus, even though these additional costs may be wasted from a social perspective *ex-post*, the overall efficiency may be enhanced *ex-ante*. This logic is underscored by the anecdotal evidence that the most important activity of a DCA is the first telephone call. To the debtor, this experience indicates that further hesitation to pay bills that are due will become quite expensive.

A DCA has a different relationship with her customers than has a supplier has with his buyers or a bank has with its borrowers. In case of a trade credit, the buyer is the primary customer in itself. If, instead, the supplier engages a DCA, he is the customer of the DCA and the debtor is the customer of the supplier, not the DCA. Therefore, the DCA is obligated only to her own customer's, i.e. the supplier's interest. Trade credits indicate that the supplier is typically interested in an ongoing profitable customer relationship. *Ex-post*, this may lead to an increased willingness to make substantial concessions to the customer in the event of the latter's delinquency or even default (cf. Burkart and Ellingsen 2004). Concessions become beneficial *ex-post* by allowing for flexible solutions and ensuring a profitable continuation of the customer's firm - instead of a liquidation which is associated with the loss of future profits. This type of flexibility, however, comes at the cost of corrupting the customer's incentives to pay in time or even to avoid a default in the first place. Because a DCA receives a share in the proceeds of the collection process but does not participate in the supplier's profits with respect to future business with the debtor, her threat to act quite rigorously is definitely credible. This argument is strengthened by the fact that a DCA generally acts as a common agent for multiple principals (cf. Fedaseyeu 2012). Of course, the same logic applies to a situation where a bank provides a loan to a borrower. For a supplier, however, the propensity to choose a DCA is even higher because collecting money is far from being the supplier's core business.

For DCAs, the main field of activity is to collect past-due receivables that have already been demanded by the supplier, i.e., the demand note already has been sent by the creditor, but the receivable has yet not been paid. Thus, most of the receivables tend to be somewhat fresh. A

second typical feature of the collection process is its standardization. In the first stage of the collection process, the agency is involved with pre-court activities such as telephone calls and a pre-collection letter. Sometimes, payment by installment is agreed upon. The next step is the entitlement to obtain a court order followed by the enforced collection. For its services, the DCA receives certain fees and a percentage of the amount collected. While the share of the proceeds comes at the expense of the supplier, the fees are added to the debtor's exposure.

There are similarities between the pure collection of money and factoring because factors also collect money. But factoring typically includes the transfer of all rights associated with the receivable, including the default risk. Therefore, the factor buys the receivable at a substantial discount, accounting for the costs of collecting, the default risk, and the period of time until the payment is due. As opposed to DCAs, factors also provide liquidity to the supplier selling the receivable.

Obviously, confidentiality is a key policy factor of DCAs. Therefore, data on collection files are hard to obtain. Fortunately, a major German DCA has been willing to provide a large sample of files that, to the best of our knowledge, constitute a unique dataset in the empirical research on distressed trade credits. Our final sample consists of more than 150,000 receivables from three industries against both commercial and private debtors.

Based on these data, our paper contributes to the literature in the following ways: (1) We first present empirical evidence on the success of DCAs. (2) We analyze the determinants of the success of DCAs. (3) The figures presented indicate to suppliers under which circumstances delinquent trade credits should be handed over to a DCA. (4) We compare our results with those on recovery rates of bank loans, which allows for a discussion about the efficiency of DCAs relative to banks.

The remainder of the paper is structured as follows. Section 2 reviews the scarce literature regarding DCAs. Hypotheses are presented in section 3. Section 4 follows with a description of the underlying data set. Section 5 presents the empirical results. Section 6 concludes.

2. Previous Empirical Research

Numerous previous studies underscore the importance of trade credit as one of the main sources of financing for firms in today's economies (cf. e.g., Elliehausen and Wolken 1993; Kohler et al. 2000; Giannetti 2003; Aktas et al. 2012). Rajan and Zingales (1995) report that

the trade credit share of total assets is 17.8 percent in the United States and more than 25% for European countries such as Germany. Because of the importance of trade credit, it is not surprising that there is abundant academic literature on the topic both with respect to theoretical contributions and empirical evidence. The initial focus of empirical research that mainly started with Meltzer (1960) is the explanation for the widespread use of trade credit despite its implicit high cost.³ Both financial theories such as advantages in lending over financial institutions because of asymmetric information or superior liquidation options, and non-financial motives, e.g., price discrimination or a guarantee for quality, are extensively tested in empirical research (e.g., Petersen and Rajan 1997; Ng et al. 1999; Nilsen 2002; Wilson and Summers 2002; Huyghebaert 2006; Giannetti et al. 2011). More recent papers explore the prevalence of trade credit across countries, amongst other topics (e.g., Fisman and Love 2003; Beck et al. 2008) and in developing countries (e.g., Ge and Qiu 2007; Love et al. 2007; Hyndman and Serio 2010).

Despite this sizeable existing literature, there are very few studies that address trade credit with respect to financial distress. Atanasova (2007) and Molina and Preve (2009, 2012) examine the effect of financial distress on the demand and supply of trade credit. Boissay and Gropp (2007) explore the extent to which firms use trade credit defaults to relax liquidity constraints.⁴ Surprisingly there is no study focusing on the recovery of distressed trade credit, to our knowledge. This is in strong contrast to rich literature on recovery rates and their determinants for bank loans that is largely driven by the introduction of the internal ratings-based approach in the Basel Accord (cf. e.g., Davydenko and Franks 2008; Grunert and Weber 2009; Bastos 2010; Khieu et al. 2012). Trade credit is merely included in the paper of Hamilton and Carty (1999) as a small sub-sample of 21 out of 195 credits. For those 21 trade credits they observe a recovery rate of 74 percent.

DCAs that regularly handle distressed trade credit for suppliers as third-party providers are similarly rarely ever mentioned in empirical research despite their importance. Thomas et al. (2012) compare in-house collection of unsecured consumer bank credit to a DCA that purchases credit files from banks and Fedaseyeu (2011) investigates the effect of debt DCAs on the supply of consumer credit. Conversely, the use for the management of trade credit is

³ Cf. Ng et al. (1999) for an overview of trade credit terms and the associated implicit cost.

⁴ Cf. Cunat (2007) for the theory behind trade credit suppliers as liquidity insurance providers.

the focus of several studies (e.g., Smith and Schnucker 1994; Summers and Wilson 2000; Soufani 2002).⁵

3. Hypotheses

There is hardly any formal theory of collecting money where comparative statics may be derived from. Thus, we must apply a more general economic logic to derive testable hypotheses. In this study, four hypotheses are proposed to examine the effect of potential determinants of the collection rate. These hypotheses cover the effects of the exposure at default, the age of the account, prior experience with the debtor, and, if applicable, the debtor's repayment history.

The logic of our first hypothesis seems to be quite simple at first sight: Greater effort is undertaken to collect the amount at stake when the amount is higher. However there may be a countervailing effect as well: After being contacted by a DCA, debtor with a small liability may choose to pay quickly to avoid further costly disputes with the DCA. Given a certain distribution of the ability to pay, the second effect should lead to higher collection rates in cases of lower exposure. However, the debtor with small exposure might try to avoid a handover to the DCA altogether by paying small amounts upon the first reminder, which would mean that the DCA would have only very troubled debtors in case of small amounts. In sum, we conjecture that the first, effort-based channel has a greater impact than the second, stating our first hypothesis is the following:

Hypothesis 1 (Exposure at Default)

A higher exposure at default results in a higher success of the DCA.

A supplier typically will not delegate the collection of his claims until difficulties arise. Likewise, the first reminder is due to the supplier. The DCA becomes involved only when the debtor fails to react to the reminder. In general, the longer it takes to obtain a reaction from the debtor, the harder it becomes to collect money. Because of the latter's bad ability or bad willingness to pay. In both cases, debt collection is more difficult and costly if more time has passed since the first invoice. Therefore we propose the following:

⁵ For a comprehensive theoretical basis cf. Mian and Smith (1992).

Hypothesis 2 (Age of the account)

An increase in the age of the account lowers the success of the DCA.

The “DCA’s prior relation to the debt” by itself means the borrower has failed to meet its obligations in the past at least to a certain extent, which is bad news *per se* (selection effect). Conversely, one of the typical results when empirically investigating bank loans is the positive role of experience with certain specific borrowers (relationship effect). The bank gathers information about how to address the borrowers business, how to pursue certain collection strategies, how to exploit collateral, if necessary, and how to decide to invest in its future business relationship with the borrower. We hypothesize that the selection effect dominates the relationship effect, as DCAs do not have the same close relationship with debtors as banks, leading to the following:

Hypothesis 3 (Experience)

Experience with the debtor, is a bad sign for the willingness and/or ability to pay and leads to a lower success.

As discussed under hypothesis 3, prior experience may have both positive and negative implications. Within the group of debtors that were in the collection process before, a bad repayment history must certainly be viewed as a negative predictor of the expected success of the collecting process. Whether it is related to unwillingness to pay or inability to pay, if the success was lower in the past, the same is expected in the future, leading to the following:

Hypothesis 4 (Repayment history)

Clients with lower success in the past will show a lower success in the future.

4. Data and Descriptive Statistics

4.1 Data

To measure the success of DCA we introduce the term “collection rate”.

The collection rate (CR) is calculated as the ratio of payments made by the debtor to the exposure at default and the damage caused by the delay.

$$\text{Collection Rate (CR)} = \frac{\text{Payments by the Debtor}}{\text{Exposure at Default} + \text{Damage caused by Delay}}$$

The damage caused by delay includes interest on the outstanding amount, in addition to legal and other collection fees. Because interest is included in the damage caused by delay, payments made by the debtor do not have to be discounted.

Except for the macroeconomic variables, which are taken from the Statistical Offices of the German federal states, we analyze data provided by a major DCA in Germany. The primary data-base contains information for 254,536 collection accounts of individuals and companies. The accounts originate only from trade credits and were submitted to the DCA by creditors from 1998 to 2009. Debtors are located throughout the entire country. While the calculation of the collection rates or other variables is made on the account level, an account may actually consist of one or more invoices.

Most of the accounts originated between 2004 and 2008 and were handed over to the agency by firms in three industries.⁶ Therefore, we exclude accounts that originated prior to 2004 or later than 2008 (39,012 accounts) and from creditors in other industries (8,369 accounts). We further delete accounts that have not yet been closed (4,800 accounts). Finally, we exclude certain accounts with incomplete or irregular information (44,885 accounts).⁷ As a result, a set of 157,470 accounts constitutes our final sample.

While the collection rate is the dependent variable, we use different characteristics to identify its potential determinants. When choosing such characteristics it has to be taken into account that DCAs typically have limited information on the debtor. As opposed to bank loans there is typically no in-depth data collection performed for trade credit loans before the credit decision; for example, there is no information on the debtor's financial reporting. For these reasons, the relevant information is taken mostly from the collection account itself.

With respect to the factors of potential influence, we first must define the variables referred to in the hypotheses. The exposure at default (*EAD*) is the amount unsettled when the account is handed over to the DCA. We use the natural logarithm because the distribution is highly

⁶ Because of data confidentiality the specific industries are not stated.

⁷ Examples of irregular information are a negative age or a mismatch between data about the payment and on the aggregated account level.

skewed to the right. The time period from the invoice date to the transfer of the account is referred to as the age of the account (*AGE*); it is measured in days. The dummy variable experience (*EXP*) is set to one if the debtor has a record with the DCA. If *EXP* = 1, the debtor has been the subject of previous collection actions from this specific DCA.⁸ In case the DCA has prior experience with a certain debtor, we represent the repayment history of the respective debtor by the average prior collection rate (*APCR*).

The second type of characteristics generates control variables. First of all, a dummy for the legal form (*CORP*) is included. If *CORP* = 1, the debtor has the legal form of a corporation; otherwise the debtor is an individual or a partnership. The collection rate of individuals and partnerships should be higher because of the owners personal liability. The number of times that the debt claim was reduced before transfer to the DCA serves as a proxy for the intensity of the customer complaint (*IOCC*). In certain cases, the debtor asks for payment by installment (*INSTALL*). If the agency agrees, the respective dummy takes the value of one. Depending on specific conditions, the agency uses different collection procedures. We control for the matters if a debtor was insolvent (*INS*) at the time the account is transferred to the agency (*INS* = 1) or if the exposure is small (*SMEAD* = 1). Small exposures are generally claims of 100 € or less. Because corporate and private debtors are included in the database, both the GDP growth rate (*GDP*) and the unemployment rate (*UR*) are used to control for the macroeconomic conditions in the debtor's federal state for the year in which the account handed over to the DCA.⁹ An important factor characterizing the collection prospects may be the industry sector of the creditor. We use industry dummies as control variables. Throughout our regressions, we also include but do not report dummies for the respective years.

A short description with factors of potential influence is presented in table 1.

{insert Table 1}

⁸ We cannot identify whether the debtor is or has been in a collection process with another DCA.

⁹ In accordance with the Basel Committee on Banking Supervision (2006), paragraph 468, and the Basel Committee on Banking Supervision (2011) banks must consider macroeconomic conditions in predict recovery rates. Furthermore, the Basel Committee on Banking Supervision (2005) recommends the use of GDP growth and of the unemployment rate when predicting recovery rates of bank loans.

4.2 Descriptive Statistics

Table 2 reports the average exposure at default is 661 €. The median, however, is 185 € which is significantly below the average value. Thus, the distribution is strongly right-skewed. The age of the account represents the length of the period between the day when payment became due until the loan was turned over to the DCA. Loans were on average turned over to the DCA after 90 days. With a median of 66 days the distribution is also right-skewed. Past experience with the debtor is a dummy variable taking the value 1 if there was a previous account for the same debtor. This was the case for 35 percent of the accounts. In those cases the repayment history was calculated as the average collection rate of all past delinquent accounts from the same debtor. This average past collection rate reaches values in that range from 0 to 100 percent and with a mean of 62 percent.

{insert Table 2}

Correlations between independent variables are presented in table 3. Because of the general low level of correlations that are close to zero, we do not discuss individual correlations.

{insert Table 3}

5. Results

5.1 Distribution of Collection Rates

As can be inferred from table 4, the collection rate over all collection accounts averages approximately 65 percent. At 40 percent the standard deviation is relatively high compared to bank loans, which results from to the strong bimodal distribution of the collection rate. 30 percent of the cases are at either the zero or 100 percent limit. At 66 percent, the volume-weighted collection rate is nearly the same as the unweighted rate. No clear differences exist among the years the account was originated, i.e. the year the claim was handed over to the DCA.

{insert Figure 1}

{insert Table 4}

The average collection rate is very close to the (approximately) 75 percent recovery rates reported for bank loans discussed above. Moreover, the strong bimodal distribution is consistent with findings in previous studies by Stahrenberg (1995) for trade credits and most studies on bank loans, such as Asarnow/ Edwards (1995), Carty (1998), Renault/ Scaillet (2004), Davydenko/ Franks (2008) and Bastos (2010), but with Carty/ Lieberman (1996) and Grunert/ Weber (2009) who find a unimodal distribution for bank loans.

5.2 Determinants of Collection Rates

5.2.1 Baseline Results for the Entire Sample

To test our hypotheses, we estimate Tobit models. Tobit models are chosen for estimation because the collection rate is a limited dependent variable with a strong bimodal distribution.¹⁰ We examined for multicollinearity, and detected no apparent problems as was expected from the low correlations among the independent variables (as shown in table 3).

Table 5 shows the results of the first estimation covering the entire sample. All independent variables except repayment history are included. In the second model (see table 6) the sample is reduced to cover only those debtors with whom the DCA has past experience to test the influence of repayment history. Both models exhibit an F-value that is statistically significant at the 0.1 percent level. The Pseudo-R² in both models is at an acceptable level of around 5 percent and over 13 percent respectively. No important changes of the coefficients appear in comparison of the four estimations with the different use of industry and year dummies in both models except that for GDP growth shows a surprising sign in regression (1) and (2) but loses significance when year dummies are included. Therefore, we only discuss the results of the regression using industry and year dummies (column 4) below.

¹⁰ As robustness check we conducted an OLS regression as well. The qualitative results remain unaltered.

{insert Table 5}

The exposure at default (log(EAD)) shows the expected significant positive effect on the collection rate (hypothesis 1). An increase in the exposure at default by 10 percent would result in a nearly 0.3 percent higher collection rate; an increase by one standard deviation at the mean would lead to an average increase of approximately 5 percent. It seems that more effort is put into the collection of a higher exposure at default, which pays off in terms of a higher collection rate. This seems plausible because a greater effort generally means higher collection costs that can only be justified for the collection of higher amounts in an efficient debt collection process. The greater ability or willingness to pay related small claims seems to have only a minor effect if any.

Hypothesis 2, which predicts a negative relationship between the age of the account and the collection rate, can be confirmed. An increase of the age of the account by one standard deviation, i.e., by approximately 90 days, would result in a 4 percent lower collection rate. Thus, the collectability of a delinquent account decreases with time, i.e., the older the debt the harder it is to collect. The reason behind this may be that such debtors are in financial distress and only have insufficient assets to pay off all their creditors, which results in a race for the debtor's assets. Those creditors that are fast are more likely to recover their debt whereas creditors that wait too long might be forced to take their share from what is left in the bankruptcy proceedings.

According to hypothesis 3, having experience with the debtor leads to a lower collection rate; on average, that collection rate is approximately 4 percent lower than that for debtors with no prior experience. In contrast to bank loans, experience with the debtor does not increase the collection rate for DCA. Instead, prior collection accounts appear to be a sign for bad debtors. This seems plausible because debtors with several collection accounts are often on the verge of insolvency and may be unable to remit payments on their delinquent accounts anymore.

With respect to the control variables, the collection rate of corporations is higher. This is surprising because corporations do not have a personal liability for their owners.

We find a negative relationship between the intensity of the customer complaint - measured as the number of debt claim reductions before handover to the DCA - and the collection rate.

This seems reasonable because complaints might be a sign of a diminished willingness and/or ability to pay.

Payment by installments significantly increases collection success. This may result because may be that payment by installments tends to be initiated by the debtor, which might be a sign of a higher motivation to repay the debt and thus, of a generally greater willingness to pay. Also, allowing more time and more certainty in planning might help the debtor procure the required money. In addition, as the DCA has to agree to the debtor’s proposal, there might be a selection effect.

Similarly, the collection of a delinquent account that was transferred after insolvency proceedings significantly decreases the collection rate. This is likely because the distress is far advanced and all creditors only receive the proportion of bad debt equal to the dividend in insolvency. Thus, potential advantages related to DCA collection expertise do not apply in this case.

Special procedures used for small claims exhibit a lower collection rate, an average, which may indicate that agencies do not invest as much effort as they do with higher claims in this special process. The might reason could be that costs of an intense collection process are too high in relation to the outstanding claim. This result also further supports hypothesis 1.

There is no clear influence of GDP growth on the collection rate. This finding is in contrast to the intuition that debtors in financial distress have better chances of improving their financial situation when GDP growth is higher and consequently can better pay back their debt. On the other hand, focusing on the unemployment rate confirms the typical expectations.

Table 6 shows the results for the second Tobit model that covers collection accounts only for those debtors with whom the DCA has past experience.

{insert Table 6}

The newly introduced variable repayment history (APCR) shows a highly significant positive effect at all conventional levels (hypothesis 4). Moreover, it shows a remarkable economic significance with a marginal effect of 46 percent. This means that an increase of the average prior collection rate by one standard deviation would result in approximately 16 percent

higher collection rates. It therefore seems that with the bad signal of prior experience, a good repayment history is a quality characteristic that implies both a greater ability and a stronger willingness to pay. All other independent variables remain significant with the exception of GDP growth which shows an insignificant effect. However, the significant effect of the rate of unemployment still supports the importance of macroeconomic conditions in the prediction of collection rates for DCAs.

5.2.2 Analyses of Extreme Collection Rates

Because of the strong bimodal distribution of the collection rate, we performed further analyses to examine in more detail the factors that lead to the collection of nearly the entire amount and which factors are responsible for a relatively low collection rate. For this purpose, two additional variables were generated. First the dummy variable CR90+ was created and takes on the value 1 if the collection rate is greater than 90 percent (and 0 otherwise); this is the case in 41 percent of the collection accounts. The dummy variable CR10- was created with a value of 1 if the collection rate is lower than 10 percent, which applies to 25 percent of collection accounts. We conducted a logistic regression for both variables. As a robustness check the same was done for the limits 0 (CR0-) and 100 percent (CR100+). Table 7 shows the results. Because the dependent variables CR0- and CR100+ essentially lead to the same effects as the variables CR10- and CR90+, in the following we refer only to the latter two.

{insert Table 7}

All factors relating to the proposed hypotheses are statistically significant. The exposure at default and the age of the account show results in line with previous multivariate analyses. The results are consistent with previous analyses (table 5) if the coefficients in column (1) for CR90+ show the same sign as in the previous Tobit models and the opposite sign in column (2) for CR10- as dependent variable. Prior experience with the debtor is in line with previous results for CR10- also. Notably, it also shows a positive effect for CR90+, albeit considerably less pronounced than for CR10- , which indicates a probability of achieving a collection rate over 90 percent is higher if there was prior experience with the debtor. This is contrary to expectations, based on previous results based on previous results. Therefore, it appears that

although prior experience in a general sign is a sign for debtors in poor financial health, better knowledge of the customer still helps to collect the entire amount owed if the financial situation allows for it. Therefore, two forces are at work, and the selection effect has the stronger weight than the relationship effect.

Control variables are also statistically significant in all cases except GDP growth for very high collection rates (CR90+). Intensity of customer complaints, payment by installments, insolvency, small exposure at default and macroeconomic conditions all show results consistent with previous multivariate analyses. Only one irregularity relating to the variable corporation was found. Contrary to our expectation it shows a negative effect for CR90+. This could be because the fact that individuals and partnerships may also be liable with their private assets, resulting in an increased probability to realize a very high collection rate, although overall collection success is higher for corporations.

5.3 Tests of Robustness

To test the robustness of our principal findings, we divide the entire sample into subsamples; these tests refer to the regression analysis presented in column 4 of table 5.¹¹

First, we repeat the analysis for all of the three industries separately. As result, the signs of the coefficients and their significance stay the same for all of the independent variables except “Experience” and “Corporation”. No changes of the (negative) sign and the significance level of Experience occurs for industry 1 and 2. However, the effect of Experience is not longer significant with respect to industry 3. Over the entire sample corporations exhibit higher collection rates. This is the same looking at the industry 1. Surprisingly, Corporation has a significant negative relationship to the collection rate in the analyses regarding industry 2 and 3.

Second, we look at subsamples for each year. Signs and significance levels stay the same for all independent variables except for corporation in the years 2004 and 2005. In these two years Corporation shows a negative effect.

¹¹ We do not show tables to conserve space but detailed results are available from the authors on request.

Third, we test whether individuals and partnerships exhibit different effects in comparison to corporations. Signs and significance levels remain the same as for the entire sample for all independent variables.

In summary, the results for the entire sample are very stable when examining different subsets of the entire sample. Only the control variable corporation seems to behave differently in certain instances.

6. Conclusion

Trade credits play an important role in the short-term financing of firms. If a customer is unable or unwilling to pay, DCAs are often contacted to collect the outstanding amount. The most important characteristic of DCAs is that they have no business relationship to the debtor and therefore act solely in the supplier's interest.

Using a large sample of more than 150,000 distressed trade credits from one of the largest German DCA we first investigate the distribution of collection rates and then analyze potential influencing factors on these rates.

The non-weighted mean of the collection rate amounts to 65 percent. Weighting the single collection rates by volume leads to an average (nearly unchanged) collection rate of 66 percent. The distribution of collection rates with most values close to 0 or 100 percent supports the assumption of a bimodal distribution for recovery rates in credit risk models.

The proposed hypotheses are confirmed. The hypothesis that a high exposure at default leads to a higher collection rate appears to be plausible because DCAs are more likely to put more effort into collecting accounts with higher exposure at default. We find a negative relationship between the age of the account and the collection rate. The reason might be the importance of quick action in a creditors' race for the debtor's remaining assets. Creditors that are fast realize more than creditors who wait too long and possibly obtain only what remains after bankruptcy proceedings. According to our hypothesis the collection rate is lower if the debtor has gone through a collection process with the agency before. It appears that prior experience with the debtor is a sign for either a lower willingness or ability to pay. Notably, past experience with the debtor seems to help achieve a very high collection rate, i.e., past experience appears to help collect the entire amount if the financial situation allows for it even though in general it is a sign for a bad debtor. In cases with prior experience with the debtor

the collection rate is positively related to the average past collection rate. Therefore a good repayment history seems to be a good sign for a higher ability and willingness to pay.

In addition to these factors, an arrangement of pay by installments increases the collection rate. The reason might be the higher motivation of the debtor because - in general - the debtor initiates this type of repayment. The special process for small claims exhibits lower collection rates, because costs for extensive collection efforts are too high compared to the outstanding claim. The results for macroeconomic conditions are mixed with the unemployment rate having a clear negative impact on the collection rate.

These findings differ in comparison to findings related to repayment of bank loans. The average collection rate is slightly lower than the mean recovery rate of bank loans (65 vs. 75 per cent). This may be because banks normally take collateral and have more information about their borrowers. Whereas having experience with the debtor leads to lower collection rates for DCAs, banks use the additional information to achieve higher recovery rates. Furthermore, the collection rate of trade credits is higher for small exposure at default. This factor has no significant influence for repayment of bank loans.¹²

Future analyses based preferably on samples of different DCAs could look to overall success of the different steps in the collection process beginning with the out- of- court dunning process or direct judicial enforcement and the execution of court orders. Moreover, management implications should be a focal point of future research. On the one hand, this might include an analysis of the optimal length of potential work-out efforts and of the entire collection process. On the other hand, a more granular analysis of collection measures such as dunning letters or telephone calls and their respective effectiveness would be useful. Furthermore, building on the results, models for the ex-ante prediction of collection rates might be developed.

¹² See Grunert/ Weber (2009).

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Figure 1: Histogram of collection rates

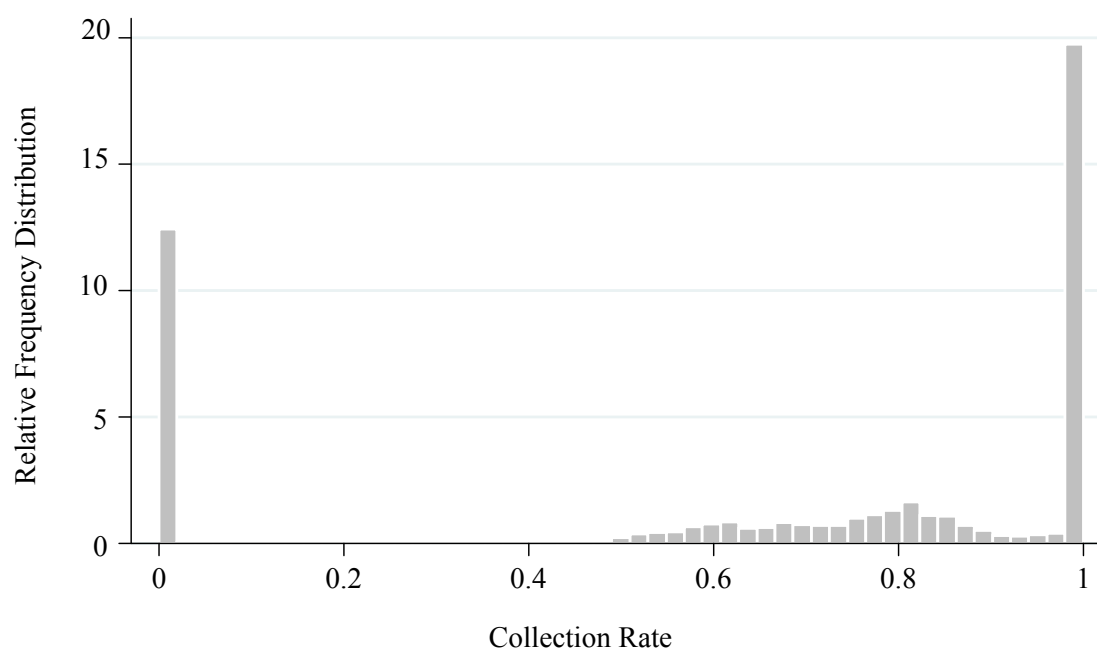


Table 1: Specifications of the Factors of Potential Influence for the Empirical Analysis

A. Main Variables	Name ^a	Description
Hypothesis 1 (Exposure at Default)	log(EAD)	Logarithm of the amount unsettled when account is handed over to the agency
Hypothesis 2 (Age of the account)	AGE	Time period in days from the invoice date to the transfer to the account
Hypothesis 3 (Experience with the debtor)	EXP (0,1)	Set to 1 if the debtor has a record with the agency before, 0 otherwise
Hypothesis 4 (Average prior collection rate)	APCR	Average prior collection rate in case of prior experience (EXP (0,1) = 1)
B. Control Variables	Name ^a	Description
Legal form of the debtor	CORP (0,1)	Set to 1 if the debtor has the legal form of a corporation, 0 otherwise (individual or partnership)
Intensity of customer complaint	IOCC	Intensity of customer complaint (number of reductions of the debt claim before transfer to the DCA)
Payment by installment	INSTALL (0,1)	Set to 1 if payment is carried out by installment, 0 otherwise
Insolvency of the debtor	INS (0,1)	Set to 1 if the debtor is bankrupt at the time that the account is transferred, 0 otherwise
Small Exposure at Default	SMEAD (0,1)	Set to 1 if special procedures for small claims of generally less than 100 € are used, 0 otherwise
Growth of GDP	GDP	Growth of GDP in per cent of the debtor's federal state within the year the account has been handed over to the DCA
Unemployment rate	UR	Unemployment rate in per cent of the debtor's federal state within the year the account has been handed over to the DCA

^a (0,1) indicates that the variable is a Dummy-Variable.

Table 2: Descriptive Statistics for the Factors of Potential Influence

A: Main Variables

Variable ^a	Mean	SD	Median	Min	Max
EAD	661.37	3987.59	185.06	0.01	393575.40
AGE	89.79	91.50	66.00	1.00	1969.00
EXP	0.35	0.48	0.00	0.00	1.00
APCR	0.62	0.34	0.67	0.00	1.00

^a N = 157470 for all variables except ACR with N = 55725.

B: Control Variables

Variable ^a	Mean	SD	Median	Min	Max
CORP	0.67	0.47	1.00	0.00	1.00
IOCC	0.04	0.93	0.00	0.00	235.00
INSTALL	0.03	0.16	0.00	0.00	1.00
INS	0.00	0.04	0.00	0.00	1.00
SMEAD	0.11	0.32	0.00	0.00	1.00
GDP	1.99	1.18	2.00	-2.00	5.20
UR	9.36	3.74	8.50	4.10	20.40

^a N = 157470 for all variables.

Table 3: Description of the Correlations between the Factors of Potential Influence

	1	2	3	4	5	6	7	8	9	10
1 log(EAD)										
2 AGE	0.14*									
3 EXP	-0.09*	0.03*								
4 APCR	0.23*	-0.13*	n/a							
5 CORP	-0.03*	-0.07*	-0.09*	0.00						
6 IOCC	0.06*	0.04*	-0.01*	0.01	0.01*					
7 INSTALL	0.10*	0.03*	0.01*	0.05*	-0.13*	0.00				
8 INS	0.03*	0.01*	-0.02*	0.00	0.01	0.07*	-0.01			
9 SMEAD	-0.43*	-0.02*	0.10*	-0.30*	0.07*	-0.01*	-0.03*	-0.01*		
10 GDP	-0.01*	-0.02*	0.00	0.00	0.12*	0.01	-0.01*	-0.03*	0.00	
11 UR	0.05*	0.02*	-0.06*	-0.02*	0.00	0.00	0.04*	0.02*	-0.07*	-0.02*

* Significant at the 0.001 level.

Table 4: Descriptive Statistics for the Collection Rate

A. Collection Rate	N	Mean	SD	Median
Total – unweighted calculation	157470	0.65	0.40	0.81
Total – weighted calculation	157470	0.66	0.41	0.88
B. Collection Rate (year of transfer)	N	Mean	SD	Median
2004	10847	0.68	0.39	0.83
2005	19958	0.67	0.39	0.82
2006	41691	0.66	0.39	0.81
2007	41823	0.64	0.41	0.81
2008	43151	0.65	0.40	0.81

Table 5: Results of the Tobit Regression Analyses of Factors Influencing the Collection Rate

Independent Variables	(1)	(2)	(3)	(4)
log(EAD)	0.0270 *** (32.59)	0.0288 *** (34.05)	0.0267 *** (32.34)	0.0285 *** (33.88)
AGE	-0.0005 *** (-32.84)	-0.0005 *** (-32.23)	-0.0005 *** (-32.24)	-0.0005 *** (-36.19)
EXP	-0.0430 *** (-21.89)	-0.0428 *** (-21.82)	-0.0435 *** (-21.59)	-0.0425 *** (-21.21)
CORP	0.0189 *** (9.22)	0.0258 *** (11.72)	0.0192 *** (9.36)	0.0260 *** (11.86)
IOCC	-0.0155 *** (-5.10)	-0.0152 *** (-5.00)	-0.0153 *** (-5.07)	-0.0149 *** (-4.96)
INSTALL	0.1580 *** (41.05)	0.1590 *** (42.47)	0.1570 *** (41.47)	0.1560 *** (41.97)
INS	-0.5301 *** (-36.19)	-0.5310 *** (-36.50)	-0.5350 *** (-35.06)	-0.5423 *** (-35.27)
SMEAD	-0.2321 *** (-62.02)	-0.2100 *** (-52.16)	-0.2352 *** (-61.60)	-0.2110 *** (-50.35)
GDP	-0.0026 *** (-3.42)	-0.0035 *** (-4.63)	0.0019 (1.69)	0.0022 * (1.95)
UR	-0.0038 *** (-15.80)	-0.0041 *** (-17.09)	-0.0033 *** (-12.63)	-0.0036 *** (-14.01)
Industry-Dummies	no	yes	no	yes
Year-Dummies	no	no	yes	yes
Observations	157470	157470	157470	157470
F	1068.1 ***	922.6 ***	765.4 ***	694.9 ***
Pseudo R ²	0.049	0.050	0.049	0.050

***, **, * means statistical significance at the 0.1%, 1% and 5% level. Values shown are marginal effects for the unconditional expected value of the dependent variable calculated at the mean for metric variables and zero for dummy variables.

Table 6: Results of the Tobit Regression Analyses of Factors Influencing the Collection Rate – Accounts of Debtors with Prior Experience Only

Independent Variables	(1)	(2)	(3)	(4)
log(EAD)	0.0353 *** (24.07)	0.0377 *** (25.25)	0.0343 *** (23.35)	0.0343 *** (23.35)
AGE	-0.0003 *** (-13.68)	-0.0003 *** (-12.82)	-0.0003 *** (-13.38)	-0.0003 *** (-12.64)
APCR	0.4690 *** (78.34)	0.4620 *** (77.06)	0.4690 *** (78.58)	0.4630 *** (77.47)
CORP	0.0185 *** (5.52)	0.0280 *** (7.72)	0.0172 *** (5.06)	0.0289 *** (7.89)
IOCC	-0.0151 * (-2.44)	-0.0152 * (-2.41)	-0.0154 * (-2.39)	-0.0154 * (-2.34)
INSTALL	0.1440 *** (20.38)	0.1441 *** (20.41)	0.1470 *** (19.98)	0.1462 *** (19.94)
INS	-0.3160 * (-2.47)	-0.2921 * (-2.12)	-0.2990 * (-2.43)	-0.2734 * (-2.04)
SMEAD	-0.1590 *** (-26.68)	-0.1321 *** (-20.55)	-0.1660 *** (-28.33)	-0.1410 *** (-22.01)
GDP	-0.00246 (-1.84)	-0.0029 (-2.03)	0.0005 (0.23)	0.0014 (0.63)
UR	-0.0053 *** (-11.99)	-0.0058 *** (-13.15)	-0.0043 *** (-9.01)	-0.0048 *** (-10.01)
Industry-Dummies	no	yes	no	yes
Year-Dummies	no	no	yes	yes
Observations	55725	55725	55725	55725
F	1404.0 ***	1191.2 ***	1006.2 ***	898.7 ***
Pseudo R ²	0.134	0.136	0.135	0.137

***, **, * means statistical significance at the 0.1%, 1% and 5% level.

Table 7: Results of the Logit Regression Analyses of Factors Influencing Extreme Collection Rates

Independent Variables	(1) CR90+	(2) CR10-	(3) CR100+	(4) CR0-
log(EAD)	0.0829 *** (17.97)	-0.1120 *** (-17.40)	0.1410 *** (16.96)	-0.1190 *** (-18.37)
AGE	-0.0009 *** (-14.11)	0.0026 *** (34.92)	-0.0012 *** (-8.42)	0.0026 *** (34.92)
EXP	0.0507 *** (4.49)	0.3570 *** (27.49)	0.0234 (1.20)	0.3561 *** (27.38)
CORP	-0.3920 *** (-32.83)	-0.4500 *** (-30.82)	-0.6200 *** (-31.66)	-0.4390 *** (-30.03)
IOCC	-0.0462 ** (-2.74)	0.0804 *** (4.81)	-0.0181 (-1.09)	0.0814 *** (4.68)
INSTALL	1.6730 *** (41.90)	-1.3491 *** (-24.39)	0.2331 *** (5.06)	-1.4090 *** (-24.81)
INS	-2.4480 *** (-8.51)	3.3910 *** (16.49)	-1.1680 ** (-3.02)	3.2912 *** (16.63)
SMEAD	-0.3790 *** (-17.15)	1.1553 *** (50.71)	-0.6542 *** (-14.41)	1.1520 *** (50.56)
GDP	0.0048 (0.70)	-0.0215 ** (-2.68)	-0.0018 (-0.16)	-0.0217 ** (-2.69)
UR	-0.0079 *** (-5.18)	0.0279 *** (15.77)	0.0021 (0.79)	0.0279 *** (15.71)
Intercept	-0.2770 *** (-7.44)	-1.0490 *** (-22.33)	-2.4120 *** (-40.02)	-1.0190 *** (-21.68)
Industry-Dummies	yes	yes	yes	yes
Year-Dummies	yes	yes	yes	yes
Observations	157470	157470	157470	157470
Mean of CR-variable	0.41	0.25	0.09	0.24
Wald χ^2	5462.9 ***	11647.2 ***	2319.5 ***	11687.6 ***
Pseudo R ²	0.031	0.078	0.026	0.078

***, **, * means statistical significance at the 0.1%, 1% and 5% level.