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DISCUSSION PAPER

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Mandatory Financial Information Disclosure and Credit Ratings

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Abstract
When firms are forced to publicly disclose financial information, credit rating agencies are supposed to improve their risk assessments. Theory predicts such an information quality effect but also an adverse reputational concerns effect because credit analysts may become increasingly concerned about alleged rating failures. We empirically examine these predictions using a large scale quasi-natural experiment in Germany, where firms were required to publicly disclose annual financial statements. Consistent with the reputational concern hypothesis, we find an average increase in credit rating downgrades that is entirely driven by changes in the discretionary assessment of the credit analysts rather than changes in firm fundamentals. Analysts tend to give positive private information a lower weight in their risk assessment, while they put a higher weight on negative public information. A last set of results indicate that professional credit providers understand that the resulting downgrades are not warranted, while unsophisticated lenders did indeed reduce the provision of trade credit in response to the rating downgrades.

JEL Classifications: *G14; G18; G24; M41*
Keywords: *Credit Ratings; Disclosure Regulation; Private Firms, Reputational Concerns*

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I. Introduction

Over the last decades, policymakers have enacted several changes to reporting regulations that have increased corporate financial transparency. Forcing firms to provide standardized financial statements to the public is a key element of those regulatory ambitions. If properly enforced, it becomes harder to hide and manipulate financially relevant information, which should improve the quality of risk assessments (Seligman, 1983; Gigler, 1994; Rock, 2002; Cheng, Liao, and Zhang, 2013). Empirical studies have indeed documented a variety of capital market benefits related to stricter reporting regulations introduced over the last decades (see e.g., Leuz and Wysocki, 2016, for an overview).

Studies focusing on credit ratings, however, show that Credit Rating Agencies (CRAs) have become more conservative over the same period (Blume, Lime and Mackinlay, 1998; Baghai, Servaes and Tamayo, 2014), i.e. firms receive on average worse than warranted and less accurate credit ratings. This is somewhat surprising given the improvement in quantity and quality of publicly available information.[1]

In this paper we examine the decrease in credit rating accuracy in greater detail and offer an explanation for the conundrum. Our argumentation draws on theory suggesting that public information disclosure can have adverse effects if it crowds out the effective usage of private information (e.g., Morris and Shin, 2002; Angeletos and Pavan, 2007; James and Lawler, 2011). The driving force behind this crowding out effect is that informed professionals care about their reputation with uninformed decision makers (e.g., Morris, 2001; Prat, 2005; Ottaviani and Sørensen, 2006). In the case of CRAs, credit analysts are reluctant to use their private information, because rating failures based on private information are more likely to be attributed to misclassifications than rating failures based on public information (e.g., Mariano, 2012). In simpler terms, analysts would rather be wrong, but with a public justification for their choices. The risk of

[1] For example, Dyer, Lang, and Stice-Lawrence (2017) documents that firms disclose drastically more information over the period 1996 to 2013. The increase is driven by various changes in standards and disclosure requirements that occurred. Abroad literature shows that these regulatory reforms led to various capital market benefits for firms (see Leuz and Wysocki, 2016, for an overview). Other scholars, however, document significant increases in credit rating conservatism around these law changes. For example, Alp (2013) finds that there is significant increase in rating conservatism after 2002 when SOX was implemented. Similarly, Jorion, Liu and Shi (2005), document an increase in conservativism after Regulation Fair Disclosure.

being (wrongly) accused of a rating failure leads analysts to issue credit ratings that confirm credit ratings predicted from publicly available financial statements even if they are in possession of contradictory private information. The mechanism is very similar to herding in financial markets where security analysts have incentives to follow the mainstream opinion even if they are privately better informed (Scharfstein and Stein, 1990; Trueman, 1994).[2] The reputational concern hypothesis predicts that credit rating accuracy declines in response to increased corporate financial transparency.

Furthermore, if credit analysts are penalized more heavily for overly optimistic ratings than for overly pessimistic ratings (Bolton, Freixas, and Shapiro, 2012; Xia, 2014, Dimitrov, Palia, and Tang, 2015), analysts will be biased asymmetrically in providing overly conservative ratings. The reasoning is twofold. First, the costs of rating failures for clients are much greater in case of missed defaults as compared to any other rating failure (Bolton, Freixas, and Shapiro, 2012; Xia, 2014). Second, the likelihood that a client detects a credit rating failure is highest if a firm actually defaults. Intuitively, it is unlikely that a client complains about a speculative grade assigned to a firm that remains solvent, while an optimistic grade assigned to a firm that subsequently defaults may expose the CRA to criticism. Given the greater reputational risk in case of missed defaults, it is especially private information that positively deviates from public information, which is less likely to be used to determine a firm's credit rating (see Xia, 2014, for a similar argument).[3] Hence, next to a decrease in accuracy, we expect that increased financial transparency leads to more conservative ratings.

Assuming that reputational concerns are the driving mechanism, we further expect that rating downgrades are solely driven by changes in the discretionary personal assessment of the credit analysts, and not by changes in firm fundamentals. Lastly, we predict that credit analysts will put less (more) weight on positive private (negative public) information in their credit risk

[2] Prior empirical examinations of earnings forecasts support reputational concern-motivated herding theories (e.g., Hong, Kubik, and Solomon, 2000; Clement and Tse, 2005).

[3] Xia (2014) shows that S&P provides more conservative ratings once they face competition from Egan-Jones Rating Company (EJR), an investor-paid CRA. The ratings of EJR provided new information to market participants about firms' creditworthiness. They find that S&P analysts started to mimic the rating of EJR, especially in the case when EJR gave a more conservative rating compared to S&P. An increase in publicly available information about firms' creditworthiness led to an increase in reputational concerns for S&P analysts, and as a consequence led to more conservative ratings.

assessment, consistent with the idea that public information disclosure crowds out the effective usage of private information.

It is worthwhile to note that the reputational concerns hypothesis does not necessarily imply a negative impact of disclosure regulation on capital markets or credit supply. It might well be the case that lenders take an unwarranted negative impact on credit ratings into account when making lending decisions (Baghai et al., 2014). In such a scenario, additional financial information might still lead to improvements in credit allocation, which in turn might even indirectly improve the credit ratings for some firms. Our empirical examination aims to disentangle the negative effects on credit ratings from analysts' reputational concerns and the positive consequences associated with information availability. Specifically, we expect firms' credit ratings and rating accuracy to improve once we control for changes in the discretionary personal assessment of the analysts.

To shed light on the economic relevance of disclosure-induced credit rating conservatism we also study the implications on firms' access to (trade) credit. A large literature in finance documents that ratings are useful for credit providers to make credit decision, and that changes in ratings convey useful information to capital providers (e.g., Hand, Holthausen, and Leftwich, 1992; Kliger and Sarig, 2000). If CRAs provide overly conservative ratings, it might thus decrease firms' ability to attract debt. However, other studies suggest that debt yields are largely shaped by other factors than ratings (e.g., Campbell and Taksler, 2003), and that market participants view conservatism as an additional factor to take into account when pricing debt (Baghai et al., 2014). If debt providers might become more reluctant to rely exclusively on credit ratings when making lending decisions, this would (partially) mitigate the impact of more conservative ratings on firms' access to credit. Hence, the credit rating to debt sensitivity might decline. Given these different arguments, we test if credit providers change their reliance on credit ratings once firms become required to disclose financial information.[4] In addition, we expect that more sophisticated users of

[4] Such a finding would also be consistent with prior literature that documents improvements in firms' access to bank debt financing following disclosure regulation (e.g., Florou and Kosi, 2015; Balsmeier and Vanhaverbeke, 2018; Deno, et al., 2020).

credit ratings (i.e., banks) are more likely to change their reliance on credit ratings compared to less sophisticated users (i.e., trade credit providers such as suppliers). The latter group might be more likely to act upon unwarranted credit rating changes because they do not have the necessary in-house knowledge and resources to run additional independent checks of a firm's creditworthiness.

To empirically examine our hypotheses, we exploit the introduction of a mandatory disclosure regime in Germany. Since 1987, Germany has required all private limited-liability firms to publicly disclose financial statements. However, due to a lack of enforcement, only approximately 5% of private firms had complied with these requirements before 2006 (Bernard, 2016; Breuer, 2021; Breuer, Leuz, and Vanhaverbeke, 2022). In 2007, a change in the enforcement regime led more than one million firms to disclose their financial statements to the public for the first time.

Our empirical setup focuses on those private limited-liability firms operating in Germany that were obliged to start disclosing financial statements from 2007 onwards. In a difference-in-differences design, we compare the impact of disclosure regulation on credit ratings of these firms with three different control groups: (1) Private unlimited-liability firms operating in Germany that were neither before nor after the reform required to disclose financial statements, (2) private limited-liability firms operating in Austria that were enforced to disclose financial statements already from 1996 onwards, and (3) German private limited-liability firms that voluntarily disclosed financial statements to the public before the enforcement change.

Our main data source is the Mannheim Enterprise Panel (MEP), which includes credit rating data from Creditreform, the largest CRA in Germany. This proprietary database covers the universe of firms operating in Germany. The MEP includes all credit ratings issued by the CRA and the underlying information that were used to construct these ratings. It includes publicly and privately disclosed financial information, as well as the discretionary personal assessments of the credit analysts. The latter enables us to isolate changes in the subjective opinion of the credit analysts from changes in firm fundamentals. In addition, because we have access to all fundamentals that are considered by analysts to construct credit ratings, we can control for

differences in firm characteristics between treated and control firms that might have an impact on their rating.

To further strengthen identification, we focus on firms that disclose all requested information to the CRA, irrespective of whether that information was also publicly available. We thus specifically focus on firms where financial statement information exogenously switch from being privately available to analysts to being publicly available. We compare these firms with a control group where financial statement information is either always privately disclosed to the CRA or, alternatively, always publicly available. Following this approach rules out biases from changes in available firm-specific information to credit analysts (see e.g., Breuer, Hombach, and Müller, 2021).

Based on a panel of approximately 260,000 private firms observed over the period 2002 to 2012, we find that firms receive, on average, more conservative ratings in response to disclosing their financial statements to the public. Specifically, we find that approximately one out of every five firms receive a one-notch rating downgrade on the S&P rating scale after disclosure. Consistent with the reputational concerns' hypothesis, these changes in credit ratings are entirely driven by changes in the discretionary assessments of the credit analysts, and not by changes in fundamentals or the business environment. Once we control for changes in the discretionary assessment of credit analysts, the adjusted credit ratings would predict an improvement in firms' creditworthiness. The observed improvements are just not large enough to offset the negative effect that is driven by the analysts' increased concern about alleged misclassifications. Consistently, we show that rating accuracy declines following the provision of these more conservative ratings. Default warnings increase while firms are actually less likely to default and more likely to pay off their debt obligations. The latter results indicate that the observed average decrease in ratings is unwarranted.

Detailed analyses of the determinants of credit ratings provide additional support for the idea that reputational concerns about alleged rating failures drive the decline in rating accuracy. First, we show that positive information that the CRA privately possesses is less likely to positively

influence a credit analyst's opinion, while negative publicly available information is more likely to lead to a more conservative opinion. Second, we show that it is particularly credit analysts who already provided incorrect credit assessments in the past who provide overly conservative ratings after disclosure regulation - presumably because of stronger fears of losing their job when making additional rating mistakes.

Finally, we examine the consequences of this increase in conservatism on the sensitivity between credit ratings and debt provision. Besides confirming that debt provision is in general strongly correlated with firms' credit ratings, we show that the sensitivity between ratings and total debt provision decreases by about 50% after regulation-induced credit rating downgrades. When differentiating between debt provision by banks and trade credit provision by firms, our results show that the change in sensitivity is mainly driven by changes in sensitivity to bank debt provision. This suggests that professional credit providers understand that the observed rating changes are unwarranted, and as a consequence are less likely to rely on them. For trade credit providers, we find the change in the sensitivity between debt provision and credit ratings to be only a fourth as large as compared to banks. We suspect that many trade credit providers, typically small firms, lack sufficient resources to accurately assess credit risks on their own, and are therefore unable to assess if rating downgrades are warranted or not. As a consequence, trade credit providers are more likely to act upon disclosure-induced rating changes. Consistent with this idea, we show that affected firms receive approximately 50,000 euro less in trade credit, which translates to a 5.5% decrease in total amount of debt, while bank debt attraction does not decrease due to the more conservative ratings. Given that trade credit is one of the most important sources of external finance for non-financial corporations (Berger and Udell, 1998; Bundesbank, 2012), disclosure regulation and its associated effect on credit ratings seem to have an economically meaningful impact on firms' financing opportunities.

Our study contributes to the broader debate on how to improve the information environment and resolve market frictions through public information disclosure (e.g., Angeletos and Pavan, 2007; Goldstein and Leitner, 2018; Goldstein and Yang, 2019; Breuer, Hombach,

Müller, 2018; Breuer, Hombach, Müller, 2021). The conventional wisdom that public information disclosure unambiguously improves efficiency has been repeatedly challenged by this literature. One of the main arguments brought forward is that public information may crowd out different types of private information. Our study extends this literature by investigating how mandatory financial statement disclosures influence corporate credit ratings, and how it can trigger reputational concerns of informed experts. We provide novel evidence that credit rating analysts are more likely to rely on public information and less on private information in their credit assessments when firms disclose financial statements to the public.

Our results also inform the growing theoretical as well as empirical credit rating literature (see Jeon and Lovo, 2013, for an overview). Several theoretical papers have studied biases in credit ratings, highlighting reputational concerns as a key driving force (e.g., Mariano, 2012, and Bouvard and Levy, 2018). While these studies do not explicitly show that reputational concerns are triggered by increased corporate financial transparency, it is often some type of asymmetry between private and public information that causes biases in credit ratings.

Empirical studies show that credit ratings have generally become more conservative over time and that the market only partially eliminates the impact of conservatism on debt provision (e.g., Jiang, Stanford, and Xie, 2012; Baghai, Servaes, and Tamayo, 2014). Significant factors that seem to have contributed to rating conservatism include the unexpected collapse of WorldCom (Alp, 2013), increased regulatory scrutiny after the Dodd-Frank Act (Dimitrov, Palia, and Tang, 2015), and increased competition from an investor-paid CRA (Xia, 2014). The mechanisms that drive the long-term trend are still not well understood, though. Our study contributes to this line of research by providing evidence of a new mechanism that seems to have contributed to the provision of more conservative ratings over time.

II. Data and Identification Strategy

II.A. Data

To empirically assess if credit analysts provide more conservative ratings when firms publicly disclose information, we draw on the Mannheim Enterprise Panel (MEP) hosted by the Leibniz Centre for European Economic Research (ZEW). The database contains credit ratings for all firms operating in Germany. Important for our study, it also includes the underlying data that is used by credit analysts to construct these credit ratings.

The data originally stem from Creditreform, the largest CRA in Germany.[5] Creditreform regularly screens the official German company register, ensuring full coverage of the corporate landscape.[6] From 2000 onwards, the database contains firm level data for approximately 3 million German firms on a yearly basis. It contains data on all public companies, as well as information on almost all limited- and unlimited-liability private companies operating in Germany.[7]

The core business of Creditreform is selling credit ratings to banks and suppliers that want to determine the amount of (trade) credit they offer. For example, banks buy these credit ratings to approve or reject loan applications, determine the loan conditions, or to supplement their own creditworthiness assessments. Suppliers of firms buy ratings to determine the amount of trade credit they offer to their clients. Creditreform thus employs an investor-paid business model, similar to the business model of Credit Safe, Dun and Bradstreet, Equifax, and Experian that operate in other parts of the world.[8]

Creditreform has 130 business offices in Germany, which employ together more than 4,000 employees. The 130 offices each have a local regional monopoly. Each office has the

[5] As in most other countries of the world, the credit rating business in Germany is dominated by very few companies that create credit reports (European Commission, 2012). For more details about the MEP, and for a comparison with publicly available databases such as Orbis, Amadeus and Dafne, see the Online Appendix.

[6] Comparisons with the company register of the Federal Statistical Office of Germany confirm that the MEP is representative of the country's corporate landscape (see Bersch, Gottschalk, Müller, and Niefert, 2014).

[7] Public firms comprise less than 0.01% of the sample, and approximately 25% of the sample are private limited-liability firms. 5% of total firms in the database are unlimited-liability firms with the legal form OHG and KG. The remaining share of firms are other types of unlimited-liability firms, such as BGB-Gesellschaft, Einzelfirma, eG, eV, Gewerbebetrieb, and Freie Berufe.

[8] The three largest CRAs in the US that construct credit ratings for private firms are Dun and Bradstreet (D&B), Experian, and Equifax. They had a combined revenue of over 10 billion dollars in 2017. In contrast, the revenues of Moody's, S&P and Fitch was 12 billion dollars in 2017. According to a survey done in late 2012 by DG Internal Market (European Commission, 2012), these CRAs indicate that they face only limited competition from the big three international rating agencies (Moody's, Fitch, S&P), as they operate in different market segments under different modalities. The big three CRAs serve large multinationals, while the others serve SME's and large private companies.

exclusive right to construct ratings for firms that operate in their respective region. Creditreform has in total approximately 125,000 clients and sold more than 15 million reports in 2010 (Creditreform, 2010). Their market share is around 70%, which remained stable over recent decades (Creditreform, 2007, 2010). When one of the clients of Creditreform requests a credit rating for a company, an analyst collects the necessary information to construct a credit report. The most important element in the credit report is the credit rating, which reflects how likely it is that a given firm would default within the next year. All ratings sold to clients are available in our database.[9]

The MEP also includes all the underlying data that is used to construct the ratings, i.e. (i) payment behavior, (ii) order prospects, (iii) general business development and growth, (iv) financial statement information, (v) age, (vi) sales, (vii) employees, (viii) productivity, (ix) equity, (x) legal form, (xi) industry and regional information (Creditreform, 2020a). Information is obtained from public (e.g., corporate websites, publicly available financial statements, court cases) as well as private sources (e.g., management reports or financial statements disclosed through private channels). Non-public information is obtained by interviewing managers and is enriched with data received from clients and suppliers (e.g., data on firm's payment behavior).

To determine the associated probability of default, Creditreform uses a credit risk model that includes all elements listed above as well indicators of missing information. Analysts independently examine all available information to provide an individual assessment of given firm's creditworthiness. All elements are weighted and combined to determine the final credit rating. A company's payment behavior and the discretionary assessment of the credit analyst receive the largest weights of approximately 25% each (Creditreform, 2020a). Each of the other risk factors receive a weight of approximately 5%. The Online Appendix provides an example of a fictitious

[9] Credit ratings are available for about half of all firm-year observations in the database. More specifically, we observe credit ratings in 74% of firm-year observations for limited-liability firms, and in 61% of the cases for unlimited-liability firms with the legal form OHG and KG. For all other unlimited-liability firms that are not used in this study (e.g., one-man companies, BGB-Gesellschaf) we observe ratings in 42% of the cases.

company. The model is overall very similar to rating methodologies used by other CRAs, where analysts have considerable influence over the final credit rating.[10]

II.B. Institutional Setting

To empirically examine the impact of financial statement disclosure on credit ratings, we draw on a quasi-natural experiment that originates from EU directive 2003/58/EC. It required all EU member states to set up an electronic register of limited-liability firms by January 1, 2007. The purpose of these national registers was to make all annual financial statements electronically available to the public. Before 2007, the EU had already required private firms to disclose annual financial statements to the public. However, the ensuing regulations were not enforced in Germany. Before 2007, only approximately 5% of German firms that were obliged to publish annual financial statements actually disclosed their financial statements to the public (Ballwieser and Hager, 1991; Bundesanzeiger, 2011; Theile and Nitsche, 2006).[11]

When Germany reformed its enforcement to comply with EU law through the Electronic Registers for Commerce, Companies and Associations Bill (EHUG), it led to a massive increase in available financial statements via a web-based platform.[12] If a firm does not file its financial statements within one year after the end of the fiscal year, the Federal Office of Justice (FOJ) launches an administrative procedure that results in a fine between €2,500 and €25,000. Firms are subject to fines every six weeks until their financial statement is available in the electronic register.[13] This robust change in enforcement practice proved to be highly effective. Publication rates increased from approximately 5% to well over 90% two years after the law change

[10] For example, the methodology reports of Dun and Bradstreet show that similar financial information is used, and reveal that analyst can manually override the credit ratings predicted by their statistical model (Dun and Bradstreet, 2020). Similarly, the rating methodology of S&P explicitly state that analysts exercise analytical judgment in the analysis and determination of their credit ratings. The analysts may even determine that it is suitable to follow a completely different approach than the one described in the official guidance documents (S&P, 2020). This is also in line with prior research showing that 27 to 30% of the contemporaneous variation in the ratings of S&P, Moody's, and Fitch (Fracassi, Petry, and Tate, 2016).

[11] For example, Ballwieser and Hager (1991) gathered financial statements for a sample of firms at 21 local courts in 1987. Only 11.9% of firms filed their financial statements. Others found publication rates of between 10.0% and 16.2% for the fiscal years 1996 to 2004 (Theile and Nitsche, 2006). Furthermore, it was common practice for firms to register in judicial districts far away from their creditors, preferably on commercial registers that were known for lax registration practices (Sandrock, 2017).

[12] The platform is similar to the SEC's EDGAR website in the US. Enforcement has been strict since then. Prior to the electronic platform, courts were responsible for making the financial statements of private firms available upon request. However, they have been repeatedly described as antiquated due to their limited scope for obtaining access (Sandrock, 2017).

[13] Paying the fine does not replace the requirement to disclose, and fines can be imposed on the company as well as on its legal representatives.

(Bundesanzeiger, 2011). As of today, 1.1 million financial statements are readily accessible through the website 'www.bundesanzeiger.de', and more than 35 million annual accounts are retrieved from the website on a yearly basis.[14]

It is important to note that the enforcement change did not significantly increase compliance costs for firms because book and tax reporting are strongly aligned in Germany. Firms typically already had financial statements readily available and disclose them through private channels to stakeholders upon request, including to CRAs.[15] The main change that occurred for analysts is that information exogenously changed from private to public availability. It is an open question, however, whether the disclosure reform affected the CRA business model and the demand for credit ratings. Descriptive evidence from the website of Creditreform shows that prices of the credit reports stayed fairly stable, ranging between 58 euro in 2005 and 64.90 euro in 2012, irrespective of whether firms publicly disclosed financial statements or not.[16] Examining our database reveals that the number of available credit ratings stayed fairly constant over time as well. The number of firms for which a credit rating was requested by banks and suppliers steadily increased from 1.3 million firms in 2002 to 1.5 million firms in 2012, largely resembling the growth of companies over the same time period. There is thus no structural break in the number of issued credit ratings before and after 2007. This might not be surprising given that credit reports are still today considered a valuable resource by many banks and companies although even more and easier to access public information is available.[17] The annual reports of Creditreform do reveal, however, that there was a slight decline in the number of clients of Creditreform (128,000 in the period

[14] 80% of the requests refer to the annual accounts of private firms that qualify as small- and medium-sized enterprises (SME). A user survey from 2011 revealed that firms use the platform as the principal source of gathering financial information on their clients and potential business partners (Bundesanzeiger, 2011). Of key interest are figures such as EBIT, balance sheet information, liabilities, and solvency ratios.

[15] For example, in our database we see that in the years 2002 to 2007 that the CRA obtained financial information for approximately 1 million firms on a yearly basis through private channels.

[16] We examined archived webpages from www.Creditreform.de and www.firmenwissen.de using the way-back-machine (www.archive.org). There is no price discrimination between reports from limited- and unlimited-liability firms.

[17] Next to the credit rating, credit reports contain detailed private information about the company (e.g., payment behavior, order outlook, etc.). Such type of private information is not immediately observable in a private firm's financial statement. In addition, the Basel II agreements require banks to make use of ratings to assess credit risk. One of the approaches that banks can use is the standardized approach, which requires them to use ratings from external CRAs to make credit risk assessments. Alternatively, they can use their own rating system (Internal-Rating Based approach). This approach needs to be approved by the bank's supervisors, which require them to make use of all relevant internal and external data that is available. In practice, this means that credit reports from external rating agencies is still often bought to feed in their own credit models (e.g., information about firms' payment behavior).

2002-2006 to 125,000 in 2008-2012). This decline suggests that, for at least some clients, publicly available financial statements seem to be a suitable alternative to assess firms' creditworthiness. In the economic relevance section, we discuss this topic in more detail, and empirically assess the sensitivity between credit ratings and debt provision to shed light on which types of credit providers are less likely to use credit ratings when financial statements become publicly available.

II.C. Identification Strategy

To identify the causal impact of financial information disclosure on credit ratings we rely on a Difference-in-Differences (DiD) research design. Our 'treated' group consists of German *limited-liability* firms with the legal form *GmbH* and *GmbH Co.KG* that did not disclose financial statements to the public prior to the law change, but were required, and effectively did so, from 2007 onwards (approximately 95% of all limited-liability firms operating in Germany). We compare this set of 'treated' firms with three different sets of 'control' firms: (1) German *unlimited-liability* firms; (2) Austrian *limited-liability* firms; (3) and German *limited-liability* firms that already voluntarily disclosed their financial statements to the public prior to the enforcement change.

Following prior research, our most preferred control group are *unlimited-liability* firms (see e.g., Breuer et al., 2021, and Breuer, Leuz and Vanhaverbeke, 2022). Unlimited-liability firms serve as a natural control group because they were neither required before nor after the regulatory change to make financial statements publicly available. We explicitly focus on unlimited liability firms with the legal form OHG and KG firms because these firms have similar distributions of sales, employees, and productivity, and they operate in the same industries and regions as their limited-liability counterparts.[18] Firms in both groups regularly collaborate with various suppliers and banks, giving them similar incentives to provide information to business partners and CRAs. Despite the difference in their legal status, owners of limited-liability firms often need to provide personal collateral to obtain loans, increasing the comparability of both groups of firms (Ang, Lin, and Tyler, 1995; Cerqueiro and Penas, 2017). Importantly, in our empirical design, we compare limited

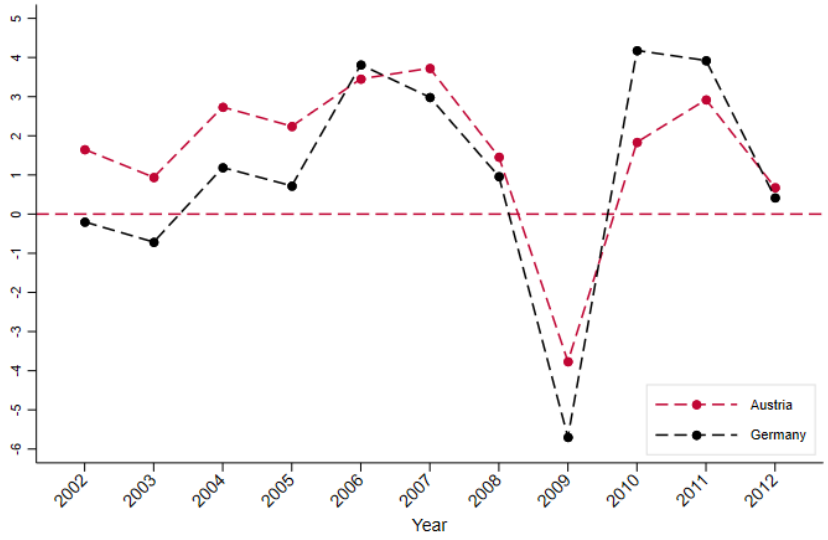
[18] Other types of unlimited-liability firms (e.g., sole proprietorships) are less comparable with the treated firms' characteristics and are removed from the analysis.

and unlimited liability firms that operate in the same region and industry. As explained in the institutional setting section, each of the 130 credit rating offices of the CRA has the exclusive right to sell ratings about firms that operate in their respective region, and employ their own analysts. By incorporating county-year and industry-year fixed effects in our analyses, we essentially compare treated and control firms that received a rating by the same analyst.

Next to using unlimited-liability firms as a control group, we make use of two alternative control groups to assess the robustness of our results. Our first alternative control group are *limited-liability* firms that operate in the neighboring country Austria. Specifically, we use all Austrian firms that have the same legal form as their German counterparts (*GmbH* and *GmbH Co.KG)*. The law change that affected the German firms did not affect their Austria counterparts. Austria has effectively enforced public financial statement disclosure already since 1996 (Eierle, 2008).[19] In addition, Creditreform is also the market leader in Austria (Creditreform, 2007) and used the same methodology to construct ratings for Austrian firms as for German firms (Creditreform, 2017a). Regional differences between Austria and Germany are arguably negligible since both countries are long-term members of the EU, which implies free movement of capital, labor, and goods between both member states. Together with Germany, Austria forms a common market as evidenced by the parallel trend in GDP growth (Figure 1).

[19] According to a study on filing practices, only 12% of SMEs in Austria did not deliver their financial statements to the commercial register in 2002 (Eierle 2008), compared to more than 90% of non-compliance in Germany in that time period (Bundesanzeiger, 2011). Austria established an effective enforcement mechanism in 1996. From that point onwards, the Austrian commercial register actively monitors compliance, and imposes fines of up to 3.600 euro if an enterprise does not comply with the legal filing requirements.

Figure 1: GDP Growth over Time between Germany and Austria



This figure shows the GDP Growth rate (Annual %) of Austria and Germany. Data is retrieved from the World Bank.

The third control group consists of German *limited-liability* firms that voluntarily disclosed their financial statements to the public before the enforcement change (~5% of all limited-liability firms in Germany). Hence, similar to the control group of Austrian firms, this group of firms also have limited liability and disclosed financial statements to the public over the entire sampling period. These two alternative control groups thus allow us to assess if the results using our main control group of unlimited liability firms are simply driven by differences in legal form. We summarize the similarity and difference between treated and control firms in Table 1.

Table 1

OVERVIEW TREATED AND CONTROL GROUPS				
	Treatment Effect	Firm Characteristics		
	Disclosure of Financial Statements	Credit analyst	Firm size	Legal form
Treated group				
German Limited	No public disclosure before 2007, Public disclosure after 2007	German regional offices	Small and large firms	Limited
Control groups				
German Unlimited	No public disclosure before 2007 No public disclosure after 2007	German regional offices	Small and large firms	Unlimited
Austrian Limited	Public disclosure before 2007 Public disclosure after 2007	Austrian regional offices	Small and large firms	Limited
German Limited (voluntary disclosure)	Public disclosure before 2007 Public disclosure after 2007	German regional offices	On average larger firms	Limited

Notes: This table summarizes the main similarities and differences between our treated and control groups.

Under the assumption that the treated and control groups are comparable in terms of macroeconomic influences and market-wide shocks that are concurrent but unrelated to the regulatory change, we can identify the causal impact of mandatory financial statement disclosure on credit ratings using DiD estimations. We examine the plausibility of these assumptions in section III.B.

II.D. Sample Construction

We focus on credit ratings of firms that were released five years before and five years after the law change in 2007. This results in a panel dataset covering the period 2002 to 2012. From 2013 onward a large fraction of limited-liability firms was allowed to disclose less information to the public. In the robustness section III.F, we discuss this deregulation reform in more detail and use it as an alternative setting to reexamine our hypotheses.

Our baseline sample consists of treated and control firms as outlined above. To minimize potentially confounding selection effects, we further restrict the sample to firms that we can

observe before and after the law change and did not change their legal form over time.[20] In addition, we keep only firm-year observations that have non-missing information on the variables used by the CRA to construct a rating. Hence, we keep only firms that disclose all the requested information to the CRA (either through private or public channels). This approach allows us to rule out that changes in credit ratings are driven by changes in information provision (see e.g. Breuer, Hombach, and Muller, 2021).[21] In addition, it rules out that our analyses are confound by the GmbH Law reform that occurred in 2008 (MoMiG), which brought a new legal form (Unternehmergesellschaft (UG)) to the German corporate landscape (see e.g. Bracht, Mahieu and Vanhaverbeke, 2022).[22] This new type of limited liability company has, unlike our treated firms, no minimum capital requirements. Since we focus on companies that we observe before *and* after 2007, these newly founded firms do not appear in our sample.

Hence, the main variation that we exploit is that financial statement information exogenously switches from private availability to public availability in 2007 for the treated firms. For the firms in the control group, the same set of information is either always available through private channels or, alternatively, always available through public channels.

To maximize comparability, we further exclude the largest 1% of firms from our analyses.[23] Lastly, we also remove the few firms that do not follow the mandate. Hence, we remove German and Austrian limited-liability firms that did not disclose to the public when they were required to do so. Similarly, we remove unlimited-liability firms that voluntary disclosed financial statement to

[20] In our database, we find that less than 0.3% of all firms switch legal forms (Table Online Appendix A3). They do not alter the results if they remain in the sample. Since we keep firms that we observe at least once before and after the law change, this implies that we also remove firms that defaulted from the sample. Results are robust if we would not impose this restriction. When we test the accuracy of the ratings, we reinclude defaulting firms in our sample.

[21] We also examined if there are changes in the availability of private information over time (i.e., data which is not available for many small private firms in their financial statements). In Online Appendix A4, we show the percentage of non-missing observations for sales, employees, and payment behavior data. The descriptive statistics show that there is only a minor change in available private information for analysts for treated and non-treated firms. Most noteworthy is a decrease in the availability of sales data for limited liability firms, however, this seems to decrease in a similar fashion for unlimited liability firms. Data received from suppliers and banks about firm's payment behavior of debt seem to increase. And employee data seem to stay relatively constant over time. Overall, these descriptive statistics suggest that there is some change in the availability of private information for some firms, however, for the vast majority of firms the information is still available.

[22] The German industry code classification was re-classified in 2008. Since we use a setup where we balance the sample across the pre and post period, we can use the industry codes that are available in the post periods and impute those values in the pre-period.

[23] Specifically, we remove firms with more than 5,000 employees and sales of more than €130,000,000. Unlimited-liability firms that surpass these thresholds are required to disclose financial information to the public following the classification instituted by German Corporate Law. Large unlimited-liability firms represent only a small fraction of the population. Results are nonetheless robust to keeping those large firms in the sample.

the public.[24] The final sample comprises 1,854,434 firm-year observations on 205,947 firms that were affected by the law change ('treated firms') and 55,104 firms that were not affected.[25] A detailed selection table is provided in Online Appendix Table A1 and a breakdown by year in Table A2.

III. Results

III.A Descriptive Statistics

Table 2 presents descriptive statistics for affected and non-affected firms. A table with all variable definitions is presented in the Appendix. The average treated firm is 21 years old, which is about the same for Austrian limited-liability firms and German limited-liability firms that voluntary disclosed to the public (respectively 22 and 24 years old), and about half the age of the average German unlimited-liability firm (38 years old). The size of treated firms and unlimited-liability firms is comparable, with around 22 vs. 24 employees on average. Austrian limited-liability and German limited-liability firms that voluntarily disclosed are about twice as large (42 and 43 employees, respectively).

[24] We identify these firms by comparing the availability of financial statement data in the MEP database with the historical records of the Orbis Database. The Orbis database only includes information about financial statements that are publicly available.
[25] More specifically, 4,152 unlimited-liability firms, 8,672 Austrian limited-liability firms, and 42,280 German limited-liability firms that voluntarily disclosed financial statements to the public.

Table 2

DESCRIPTIVE STATISTICS

	Treated Group				Control Groups											
	Limited (Germany) N: 1,438,019				Unlimited (Germany) N:30,449				Limited (Austria) N: 46,547				Limited (Germany) Voluntary Disclosure N: 339,419			
Variables	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Credit Rating Index																
Credit Rating	10.52	2.47	1	21	9.13	2.50	1	21	11.20	3.02	1	21	9.78	2.57	1	21
Speculative Grade	0.45	0.50	0	1	0.25	0.43	0	1	0.53	0.50	0	1	0.35	0.48	0	1
Information to construct Credit Ratings:																
Credit Analyst Opinion	2.41	0.61	1	5	2.31	0.55	1	5	2.56	0.70	1	5	2.31	0.61	1	5
Log(Sales +1)	7.43	1.47	0.00	11.78	7.27	1.49	0.00	11.78	8.34	1.56	0.51	11.77	7.90	1.51	0.00	11.78
Log(Age)	2.66	0.97	0	6.80	3.15	1.12	0	5.92	2.78	0.93	0	6.70	2.86	0.86	0	6.53
Log(Equity +1)	10.70	1.18	0.69	19.36	6.11	5.19	0	18.41	11.13	1.38	2.40	17.25	11.21	1.48	0.69	18.39
Log(Productivity +1)	5.30	1.36	0.00	11.74	5.14	1.03	0.00	10.46	5.81	1.59	0.29	11.02	5.13	1.14	0.00	11.75
Log(Employees +1)	2.34	1.15	0.69	8.37	2.33	1.16	0.69	8.04	2.71	1.42	0.69	7.76	2.91	1.27	0.69	8.16
Payment Behavior	2.05	0.48	1	5	2.02	0.52	1	5	2.29	0.59	1	5	2.03	0.54	1	5
Order Situation	2.24	1.29	0	6	2.42	1.18	0	5	1.56	1.56	0	6	2.32	1.19	0	6
Business Development	2.40	1.22	0	6	2.55	1.10	0	5	1.72	1.60	0	6	2.49	1.09	0	6

Notes: This table presents the descriptive statistics of the subsamples of treated and control firms. Treated firms are limited-liability firms operating in Germany with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements after 2007. We have three control groups: (1) German unlimited-liability firms with the legal forms OHG or KG that were neither required before nor after 2007 to disclose financial statements; (2) limited-liability firms operating in Austria that were required to disclose already from 1996 onwards; (3) German limited-liability firms that already voluntary disclosed before 2007. The credit rating index range from 1 (AAA) to 21 (C). Variable definitions are provided in Online Appendix.

Labor productivity, measured by total sales per employee, is comparable across all samples. Similarly, treated and control firms show a comparable payment behavior to suppliers, a similar number of orders from clients, and equivalent business development prospects. In addition, credit analysts' opinion about the firms' creditworthiness is on average the same for treated and control group firms.[26]

To compare the credit ratings across groups, we follow prior literature and assign a numerical value to each rating on a notch basis as follows: AAA=1, AA+=2, AA=3, AA−=4, A+=5, A=6, A−=7, BBB+=8, BBB=9, BBB−=10, BB+=11, BB=12, BB−=13, B+=14, B=15, B−=16, CCC+=17, CCC=18, CCC−=19, CC=20, C=21. The credit rating index thus ranges from 1 to 21.[27] Our descriptive statistics show that firms in our sample have on average an investment grade (i.e., BBB- or better). However, slight differences between ratings exists between the four groups. Unlimited-liability firms and limited-liability firms that voluntarily disclosed have on average a one notch better rating (BBB) compared to the treated firms (BBB-), while Austrian Limited-liability have a one notch worse ratings (BB+).

III.B Impact of Disclosure Regulation on Credit Ratings

Impact on Credit Ratings

To examine the impact of financial statement disclosure on credit ratings systematically, we run Difference-in-Differences (DiD) regressions. Following Jiang, Stanford, and Xie (2012), Baghai, Servaes, and Tamayo (2014), and Xia (2014) we adopt a firm fixed-effects OLS regression model[28] with these specifications:

[26] These categorial variables ranges from 1 (best classification) to 6 (worst classification). Each of these categories has a distinct meaning. For example, Category 2 of the payment behavior variable means that a company pays within the agreed goal, and category 4 means that there are targets oversts of a minimm o. See Appendixfor a detailed variable definition list. Note that the maximum for payment behavior and credit analyst opinion is 5 in our sample. Category 6 is exclusively given to firms that already defaulted.

[27] The original ratings from Creditreform have a range from 100 (best credit score) to 500 (worst credit score), and a separate credit rating category of 600 is provided to companies that defaulted. In the credit report that is accompanied with the credit rating, the ratings are translated to the more well-known S&P credit rating index, which ranges from AAA (i.e., prime rating) to D (i.e., in default). We use the S&P index to be able to compare our results with prior literature.

[28] Results are robust to estimating ordered logit models as in Dimitrov et al. (2015), see Online Appendix Table A5.

$$Credit\ Rating\ Index_{it} = \beta_1 \cdot Treated_i \times Post_t + f_i + \alpha_{ct} + \delta_{st} + \varepsilon_{it} \quad (1)$$

$$Speculative\ Grade_{it} = \beta_1 \cdot Treated_i \times Post_t + f_i + \alpha_{ct} + \delta_{st} + \varepsilon_{it} \quad (2)$$

We estimate both specifications using three different samples. In each sample, we compare the credit ratings of the treated group to the credit ratings of one of our three control groups described in section II.C. $Credit\ Rating\ Index_{it}$ is the credit rating of firm i in year t. It ranges from 1 to 21 (i.e., AAA to C ratings). $Speculative\ Grade_{it}$ is a dummy variable that equals one when firms receive a non-investment rating (i.e., BB+ or worse) and is zero otherwise. $Treated_i$ is a dummy indicating whether the firm started to publicly disclose financial statements after 2007, and zero if the firm does not change its disclosure strategy. $Post_t$ is a dummy that equals one from 2008 onwards, when the first financial statements became publicly available. Both specifications include firm fixed-effects (f_i), which control for unobserved time invariant heterogeneity across firms (e.g., different legal form). We also include county-year fixed effects (α_{ct}) and industry-year fixed effects (δ_{st}) to control for macroeconomic differences across years, counties, and industries. Standard errors are cluster at the county level.[29]

Under the assumption that treated and control firms follow similar trends absent disclosure regulation, β_1 captures the causal impact of financial statement disclosure on credit ratings in our models. We expect to find a positive β_1 coefficient, meaning that public disclosure of financial statements leads on average to more conservative ratings.

Table 3 displays the results. Columns 1 to 3 show the estimated change in the likelihood to receive a speculative grade. The estimated change in the credit rating index are displayed in columns

[29] We report more conservative standard errors in comparison to standard clustering at the firm-level (Bertrand, Duflo, and Mullainathan, 2004). Clustering at the county level is the most natural choice in our specification. Creditreform has 130 business offices in Germany, which employ together more than 4,000 employees. The 130 offices each have a local regional monopoly. They each have the exclusive right to construct ratings for firms that operate in their respective region (i.e., a set of counties, in Germany called Kreis). We cluster at the county level instead of the credit rating office level because Creditreform did not disclose information on regional offices in Austria.

4 to 6. The results suggest that firms are on average 3% less likely to receive an investment grade, which is resembled by a significant decline in the average credit rating. The average marginal effect across the three different control groups suggests that one out of every five firms receive a one notch downgrade when required to disclose financial statements to the public. This indicates an economically meaningful effect. For example, it is about twice the size of the competition effect identified by Xia (2014), who finds a one-notch rating downgrade in S&P ratings for approximately one out of twelve firms in response to new competition from an investor-paid CRA. When we follow the approach of Dimitrov et al. (2015) and estimate an ordered logit model to calculate proportional odds ratios between ratings, we find that firms have a 1.23 times greater chance to receive a non-investment grade in response to publishing their financial statements (details presented in Online Appendix Table A5). The estimated marginal effect of the regulatory change we document is thus similar in size to the impact of the passage of the Dodd-Frank act in the U.S., which increased the odds that a corporate bond is rated a non-investment grade by 1.19 times (Dimitrov et al., 2015).

Table 3

REPORTING REGULATION AND CREDIT RATINGS

Outcome	Speculative Grade			Credit Rating Index		
Control Group	Unlimited (Germany)	Limited (Austria)	Limited (Germany)	Unlimited (Germany)	Limited (Austria)	Limited (Germany)
Column	(1)	(2)	(3)	(4)	(5)	(6)
Treated x Post	0.041***	0.033**	0.034***	0.229***	0.103*	0.327***
	(0.009)	(0.013)	(0.005)	(0.034)	(0.059)	(0.018)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-County FE	Yes	No	Yes	Yes	No	Yes
Observations	1,468,247	1,484,391	1,777,360	1,468,247	1,484,391	1,777,360
Clusters (County)	443	543	444	443	543	444
R-squared	0.616	0.585	0.609	0.696	0.677	0.694

Notes: This table presents OLS regressions on firms' credit ratings. Treated firms are limited-liability firms operating in Germany with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements after 2007. We have three control groups: (1) German unlimited-liability firms with the legal forms OHG or KG that were neither required before nor after 2007 to disclose financial statements; (2) limited-liability firms operating in Austria that were required to disclose already from 1996 onwards; (3) German limited-liability firms that already voluntary disclosed before 2007. *Post* is a dummy variable equal to 1 for all firms for the years after 2007, i.e. the period when financial statements of treated firms became publicly available. The credit rating index range from 1 (AAA) to 21 (C). Speculative grade is equal to 1 for all firms with a non-investment grade (i.e., BB+ or worse). A positive (negative) coefficient indicates that the credit rating gets worse (better). Variable definitions are provided in Online Appendix. Heteroscedasticity-robust standard errors are clustered at the county level and presented in parentheses. ***, ** and * indicate a significance level of 1%, 5%, and 10%, respectively.

To put the results in perspective, we further estimate what the impact would be on the recommended amount of (trade) credit that credit providers should offer according to the CRA. To do so, we use data included in the credit report that is accompanied by the credit rating. In this report the CRA indicates the maximum amount of trade credit a supplier/bank should offer given the firms' creditworthiness. Using this data, we find that the CRA suggests a reduction in *recommended* credit volume between 18% and 33% for the affected firms (see Appendix Table A6). In the economic relevance section III.E, we will examine in more detail how creditors react to the increase in overly conservative ratings.

Change in Assessment of the Credit Analysts or Change in Fundamentals?

The previous results are consistent with the idea that credit analysts provide more conservative ratings after disclosure regulation. However, an alternative explanation for the change in credit ratings is that disclosure regulation (or concurrent events around the law change) has real negative economic consequences for firms, which in turn leads to a real change in firms' creditworthiness. In that case we may wrongly assign the estimated change in credit ratings to reputational concerns of the credit analysts. For example, Breuer, Leuz and Vanhaverbeke (2022) show that disclosure regulation can have a negative impact on firms' incentive to innovate, which indirectly might lead to lower credit ratings for firms. Similarly, Germany introduced a corporate tax code reform (UntStRefG) in 2008, which led to a reduction in limited liability, as well as unlimited liability firms' tax rate. If tax rates have reduced more drastically for unlimited liability, this might indirectly have an impact on the ratings they receive.[30]

An implication of such alternative explanation is that the observed change in credit ratings is grounded in changes in firm characteristics, for example, a negative change in firms' payment behavior

[30] We do want to note, however, that the reform was more favorable for limited liability companies. Hence, the more favorable tax rates for limited liability companies, if anything, would work against our findings. As we will show later, it is also inconsistent with the finding that the main driver in the change in credit ratings is driven by a change in credit analysts' opinions, and not by changes in firm fundamentals.

or business development. The reputational concerns hypothesis, however, would predict the opposite, namely that changes in credit ratings are driven by changes in the discretionary opinion of the credit analyst. To assess if our results are driven by changes in firm characteristics or more conservative assessment by the credit analyst's opinion, we estimate the following three specifications:

$$Credit\ Analyst\ Opinion_{it} = \beta_1 \cdot Treated_i \times Post_t + f_i + \alpha_{ct} + \delta_{st} + \varepsilon_{it} \quad (3)$$

$$Credit\ Rating_{it} = \beta_1 \cdot Treated_i \times Post_t + \beta_2 \cdot Credit\ Analyst\ Opinion_{it} + \beta_3 \cdot Credit\ Analyst\ Opinion_{it} \times Post_t + f_i + \alpha_{ct} + \delta_{st} + \varepsilon_{it} \quad (4)$$

$$Credit\ Rating_{it} = \beta_1 \cdot Treated_i \times Post_t + \beta_2 \cdot Other\ Credit\ Rating\ inputs_{it} + \beta_3 \cdot Other\ Credit\ Rating\ inputs_{it} \times Post_t + f_i + \alpha_{ct} + \delta_{st} + \varepsilon_{it} \quad (5)$$

Specification (3) examines the impact of disclosure regulation on the personal judgement of the analysts $(Credit\ Analyst\ Opinion_{it})$. If reputational concerns drive the credit rating downgrades, we expect to find that credit analysts provide more conservative opinions after disclosure regulation. The personal judgment of the analysts is one of the main elements that determine the final credit rating and is supposed to take into account all private and public information that is available to the analyst. It has an impact of 25% on a firm's final credit rating (Creditreform, 2020a).[31]

Specification (4) tests whether changes in credit analysts' opinion determine the change in the final credit rating. If the personal judgment of the analyst drives our results, we expect to find that the increase in credit rating downgrades document in Table 3 will be muted once we control for the personal judgement of the analysts. Specification (5) tests if any other element used in the credit rating model of Creditreform changes the impact we documented in Table 3.[32] In these models, we take the log plus one for all the continuous control variables (e.g., employees, sales, productivity and age), and

[31] Such a large influence of the credit analyst's opinion is consistent with prior studies that find that credit analysts account for 27 to 30% of the within variation in credit ratings (Fracassi, Petry, and Tate, 2016).

[32] In this test, we thus control for all other available credit information inputs that are used according to Creditreform, namely: Sales, Employees, Age, Productivity, Equity, Payment Behavior, Order situation, and business development. Because of the inclusion of firm fixed effects, we also control for other aspects, such as legal form, industry, and regional differences. In addition, we also interact these controls with the post time dummy to take into account that our controls might have a differential impact on credit ratings after the regulatory reform. Our results are also unaltered if we include all accounting items that are available in the financial statements as additional controls.

include dummy variables for each value of the different categorial variables that the CRA uses (e.g., payment behavior, growth prospects, order situation).

Table 4 summarizes the results. Irrespective of which control group we use, Panel A shows that credit analysts provide a more conservative opinion in response to increased corporate financial transparency. In Panel B we control for these changes in the opinion of the analysts when estimating the impact of disclosure regulation on credit ratings. As the coefficient of our DiD estimator considerably declines, it seems that the increase in credit ratings that we documented in Table 3 is almost entirely driven by the change in the personal assessments of the credit analysts. Moreover, the sign of the coefficients even switches from positive to negative in five out of six specifications. These results suggest that the creditworthiness of firms actually improve due to disclosure regulation if we take the subjective opinion of the analysts out of the credit rating model.

The latter result is further confirmed in Table 4, Panel C when we control for all the other credit information inputs that are used by Creditreform to construct the ratings. In these models, we see that the coefficients become slightly more positive compared to our base line results presented in Table 3. Hence, once we take into account potential positive consequences of disclosure regulations that are reflected in changes in firm characteristics, the impact of disclosure regulation on credit rating conservatism is even more pronounced.

Taken together, these results suggest that the overly conservative ratings are driven by the credit analysts, and not by changes in firm fundamentals. These results are in line with prior literature showing that disclosure regulation leads to capital market benefits, but those improvements are not reflected in an improvement in credit ratings. The observed benefits of disclosure regulation documented in prior literature do not seem to be large enough to offset the negative effect that might be driven by analysts' increased concern about alleged misclassifications.

Table 4

REPORTING REGULATION AND CREDIT ANALYST OPINION

Panel A: Impact on Credit Analyst Opinion

Outcome	Credit Analyst Opinion		
Control Group	Unlimited (Germany)	Limited (Austria)	Limited (Germany)
Column	(1)	(2)	(3)
Treated x Post	0.098***	0.079***	0.101***
	(0.011)	(0.015)	(0.006)
Firm FE	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes
Year-County FE	Yes	No	Yes
Observations	1,468,247	1,484,391	1,777,360
Clusters (County)	443	543	444
R-squared	0.620	0.590	0.614

Panel B: Impact on Credit Ratings - Controlling for Credit Analyst Opinion

Outcome	Speculative Grade			Credit Rating Index		
Control Group	Unlimited (Germany)	Limited (Austria)	Limited (Germany)	Unlimited (Germany)	Limited (Austria)	Limited (Germany)
Column	(1)	(2)	(3)	(4)	(5)	(6)
Treated x Post	-0.017***	-0.026***	-0.017***	-0.076***	-0.148***	0.025***
	(0.005)	(0.006)	(0.002)	(0.018)	(0.027)	(0.009)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-County FE	Yes	No	Yes	Yes	No	Yes
Credit Analyst Opinion FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,468,247	1,484,391	1,777,360	1,468,247	1,484,391	1,777,360
Clusters (County)	443	543	444	443	543	444
R-squared	0.829	0.823	0.829	0.908	0.905	0.908

Panel C: Impact on Credit Ratings - Controlling for All Other Credit Information Inputs						
Outcome	Speculative Grade			Credit Rating Index		
Control Group	Unlimited (Germany)	Limited (Austria)	Limited (Germany)	Unlimited (Germany)	Limited (Austria)	Limited (Germany)
Column	(1)	(2)	(3)	(4)	(5)	(6)
Treated x Post	0.066***	0.043***	0.028***	0.382***	0.314***	0.206***
	(0.012)	(0.010)	(0.004)	(0.041)	(0.051)	(0.014)
Log (Sales +1)	-0.038***	-0.051***	-0.034***	-0.374***	-0.432***	-0.320***
	(0.011)	(0.011)	(0.009)	(0.031)	(0.036)	(0.029)
Log (Age)	-0.171***	-0.157***	-0.169***	-0.540***	-0.487***	-0.546***
	(0.004)	(0.004)	(0.004)	(0.022)	(0.023)	(0.021)
Log (Equity +1)	-0.014***	-0.012***	-0.013***	-0.142***	-0.134***	-0.150***
	(0.002)	(0.002)	(0.002)	(0.007)	(0.008)	(0.007)
Log (Productivity +1)	0.049***	0.060***	0.044***	0.414***	0.467***	0.352***
	(0.011)	(0.012)	(0.010)	(0.032)	(0.039)	(0.031)
Log(Employees +1)	0.024*	0.037***	0.018	0.286***	0.347***	0.214***
	(0.013)	(0.014)	(0.011)	(0.036)	(0.042)	(0.033)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-County FE	Yes	No	Yes	Yes	No	Yes
Credit Analyst Opinion FE	No	No	No	No	No	No
Payment Behavior FE	Yes	Yes	Yes	Yes	Yes	Yes
Order Situation FE	Yes	Yes	Yes	Yes	Yes	Yes
Business Development FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls x Post	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,468,247	1,484,391	1,777,360	1,468,247	1,484,391	1,777,360
Clusters (County)	443	543	444	443	543	444
R-squared	0.676	0.650	0.672	0.838	0.826	0.839

Notes: Panel A presents OLS regressions of the credit analysts' opinion. Panel B and Panel C present OLS regressions of firms' credit ratings. Treated firms are limited-liability firms operating in Germany with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements after 2007. We have three control groups: (1) German unlimited-liability firms with the legal forms OHG or KG that were neither required before nor after 2007 to disclose financial statements; (2) limited-liability firms operating in Austria that were required to disclose already from 1996 onwards; (3) German limited-liability firms that already voluntary disclosed before 2007. *Post* is a dummy variable equal to 1 for all firms for the years after 2007, i.e. the period when financial statements of treated firms became publicly available. The credit analyst opinion ranges from 1 (best possible opinion) to 5 (worst opinion). The credit rating index range from 1 (AAA) to 21 (C). Speculative grade is equal to 1 for all firms with a non-investment grade (i.e., BB+ or worse). A positive (negative) coefficient indicates that the credit rating or analyst opinion gets worse (better). Variable definitions are provided in Online Appendix. Heteroscedasticity-robust standard errors are clustered at the county level and are presented in parentheses. ***, ** and * indicate a significance level of 1%, 5%, and 10%, respectively.

Assess the validity of the results: Matching, Effects over Time, and Common trend

To further increase confidence in the identification, we test our models based on a matched sample of affected firms that are comparable to the control group firms with regard to all our control variables, including industry and regional differences. This exercise addresses concerns that affected firms might be clustered in regions or industries where disclosure regulation had particularly pronounced effects. To further enhance comparability, we employ Mahalanobis nearest-neighbor matching, where we only consider treated firms that are most comparable to a given control group

firm.[33] Re-estimating our baseline models on the matched sample reveals no significant qualitative differences (see Online Appendix A7).

If our results are driven by a change in reputational concerns for analysts, we would also expect that this effect persist over time and stays constant over our sample period.[34] To examine the impact over time, we re-estimate our DiD model, but add coefficients β_t separately for each year before and after the regulatory change. Figures 2 to 5 illustrate the coefficients of the dynamic DiD models where we compare our main control group limited-liability firms with unlimited-liability firms. In Online Appendix A.F1 to A.F6, we present similar graphs using the matched sample and for our two alternative control groups. In all models, we find economically insignificant differences between the treated and non-treated firms before 2007, providing support for the common trend assumption. After the reform, the estimated impact stays fairly constant over time.

Our main findings can thus be summarized as follows: Firms receive a significantly worse credit rating once they start to disclose to the public (Figure 1). A similar increase is observed when we examine the impact on the credit analysts' opinions, one of the main inputs that influences the final credit rating (Figure 2). Once we control for the change in credit analysts' opinions in our credit rating model, we find that credit ratings would actually have improved (Figure 3). In other words, firms receive on average more conservative ratings, which seem to be entirely driven by subjective changes in analysts' personal assessments. Figure 4 further confirms our main findings. If we control for all other information used to construct the final rating, this does not affect the change in credit ratings we observe in Figure 1. Taken together, these results suggest that the change in credit ratings is not driven by changes in firm fundamentals but by changes in the subjective opinion of the analysts.

[33] We take the average of each of these matching criteria in the period 2002 to 2007, and find the closest neighbor based on these averages. More specifically, for each untreated firm, we keep only the closest treated firm in terms of sales, employees, age, equity and productivity, payment behavior, order situation and business development, all measured before the law change.

[34] In contrast, a short-term effect (i.e., the ratings reverse back to original levels after a few years), would be consistent with a short-term resources' constraints explanation. For example, the CRA might have instructed analysts to be more conservative until they were able to incorporate all the newly available data for treated firms. Such a channel is unlikely to play a role because the CRA already had confidential data for a large set of firms. In our database, we see that in the years 2002 to 2007 the CRA obtained financial information for approximately 1 million firms on a yearly basis, while in 2008 to 2012, it receives financial information from approximately 1.5 million firms each year.

Figure 2: Average Difference in Credit Ratings between Treated and Control Group Over Time

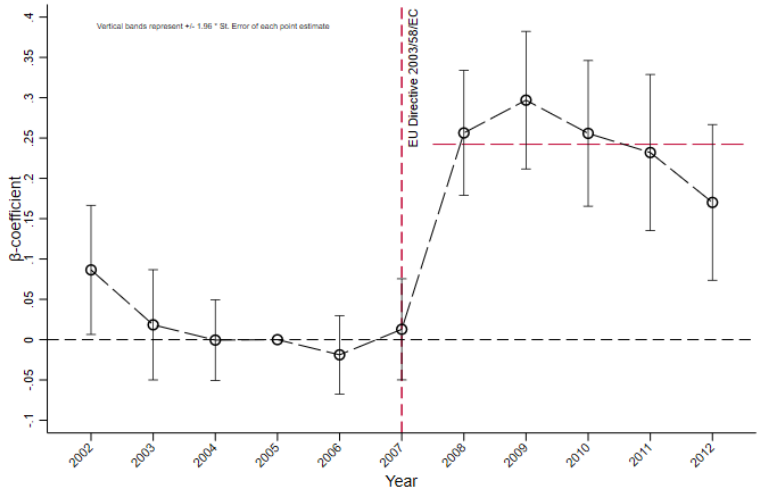


Figure 3: Average Difference in Analyst Opinion between Treated and Control Group Over Time

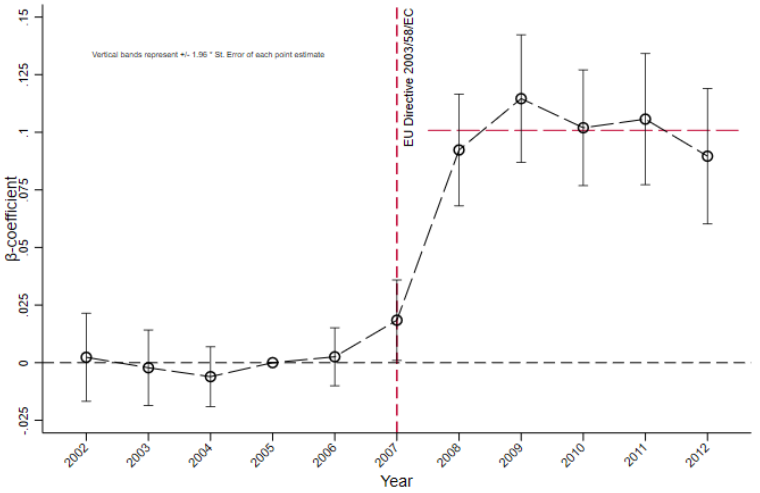


Figure 4: Average Difference in Credit Ratings between Treated and Control Group Over Time Controling for Credit Analyst Opinion

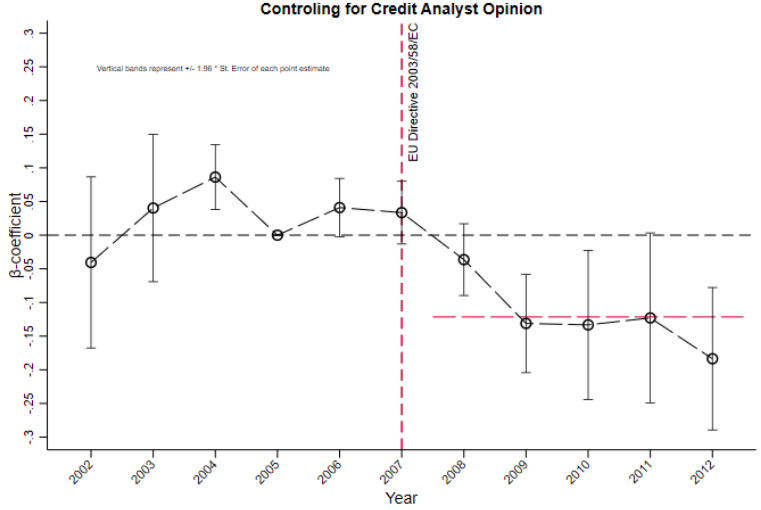
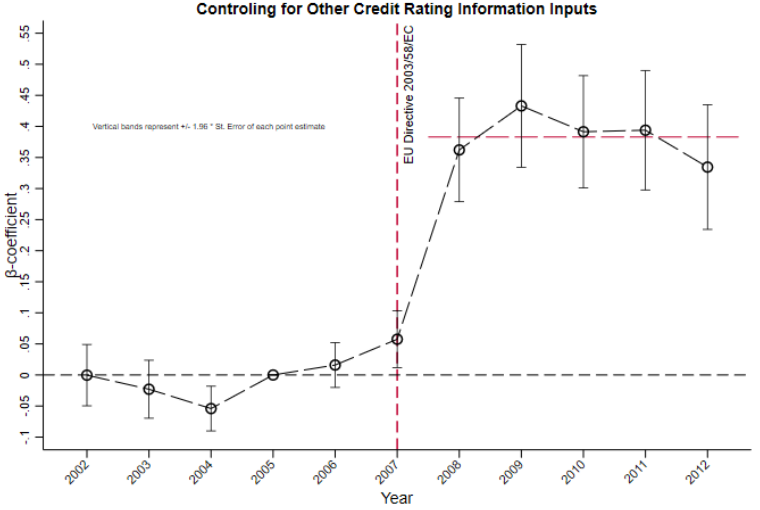


Figure 5: Average Difference in Credit Ratings between Treated and Control Group Over Time Controling for Other Credit Rating Information Inputs



III.C. Accuracy of Credit Ratings

An additional consequence of the reputational concerns hypothesis is that the accuracy of ratings declines. Such a finding would rule out that the observed rating downgrades and decreases in analysts' opinions would be justified.[35]

To empirically test the accuracy of ratings, we follow the approach of Cheng and Neamtiu (2009) and Dimitrov et al. (2015), and examine how the likelihoods of type-one and type-two errors change after financial statements become publicly available. If credit analysts were to become better at predicting defaults, we expect that they are less likely to make credit rating mistakes. We follow prior literature and define type-one errors as when an analyst provides an investment rating (i.e., credit rating of BBB- or better), but the firm still defaults next year. Type-two errors occur when a firm receives a speculative rating (i.e., credit rating of BB+ or worse) but does not default in the next year.[36] If the reputational concern hypothesis hold, we expect that type-two errors would increase because of the increase in conservatism.

As an alternative test, we follow the approach of Baghai et al. (2014) and examine the impact on default. Baghai et al. (2014) show that the increase in credit rating conservatism that occurred in the US over the period 1985 to 2009 is inconsistent with the decline in defaults in this period. If we would find a decrease in defaults in our setting, it would further strengthen the case that credit analysts suggest overly conservative ratings, which are not justified relative to the default risk of the firm. In contrast, an increase in defaults would suggest that the more conservative ratings of analysts might

[35] For example, Bernard (2016) and Breuer (2021) show that disclosure regulation fosters competition among firms. It might decrease firms' profitability and might thus lead to worse credit ratings. Such a channel would imply justified downgrades, rather than erroneous default warnings. We do note, however, that such a channel would be inconsistent with our previous findings, which show that the increase in credit ratings is driven by changes in analyst opinions, and not by changes in firm fundamentals.

[36] Results are robust for alternative definitions of type-one and type-two errors. In Online Appendix A8, we define type-one errors as firms that default but received a strong upper-medium investment rating (i.e., credit rating of A- or better). Type-two errors are defined as firms that receive a highly speculative rating (i.e., credit rating of B+ or worse) but do not default in the next year. Results are in line with our main results. Once we control for the credit analyst opinion when examining type-two errors, we see that the economic magnitude of the effect reduces on average by a factor of three.

still be justified because they would point to correctly updated believes about the true creditworthiness of the firm.

Table 5

REPORTING REGULATION AND TYPE 1 AND TYPE 2 ERRORS

Panel A: Impact on Erroneous Default Warnings (Type 2 Errors)

Outcome	Type 2 Error					
Control Group	Unlimited (Germany)		Limited (Austria)		Limited (Germany)	
Column	(1)	(2)	(3)	(4)	(5)	(6)
Treated x Post	0.0496***	-0.0107**	0.0597***	-0.0079	0.0245***	-0.0079***
	(0.011)	(0.005)	(0.009)	(0.006)	(0.004)	(0.002)
Log (Sales +1)	-0.0394***	-0.0234**	-0.0499***	-0.0234**	-0.0364***	-0.0248***
	(0.012)	(0.009)	(0.012)	(0.009)	(0.010)	(0.009)
Log (Age)	-0.3010***	-0.2785***	-0.2923***	-0.2764***	-0.2879***	-0.2659***
	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)
Log (Equity +1)	-0.0136***	-0.0227***	-0.0124***	-0.0241***	-0.0136***	-0.0242***
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
Log (Productivity +1)	0.0509***	0.0340***	0.0590***	0.0341***	0.0469***	0.0350***
	(0.012)	(0.010)	(0.013)	(0.010)	(0.011)	(0.009)
Log(Employees +1)	0.0327**	0.0308***	0.0439***	0.0314***	0.0279**	0.0316***
	(0.014)	(0.011)	(0.015)	(0.011)	(0.012)	(0.010)
Credit Analyst Opinion FE	No	Yes	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-County FE	Yes	Yes	No	No	Yes	Yes
Payment Behavior FE	Yes	Yes	Yes	Yes	Yes	Yes
Order Situation FE	Yes	Yes	Yes	Yes	Yes	Yes
Business Development FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls x Post	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,767,631	1,767,631	1,786,837	1,786,837	2,093,841	2,093,841
Clusters (County)	444	444	546	546	444	444
R-squared	0.633	0.692	0.609	0.693	0.633	0.694

Notes: Panel A presents OLS regressions of Type 2 errors. Treated firms are limited-liability firms operating in Germany with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements after 2007. We have three control groups: (1) German unlimited-liability firms with the legal forms OHG or KG that were neither required before nor after 2007 to disclose financial statements; (2) limited-liability firms operating in Austria that were required to disclose already from 1996 onwards; (3) German limited-liability firms that already voluntary disclosed before 2007. *Post* is a dummy variable equal to 1 for all firms for the years after 2007, i.e. the period when financial statements of treated firms became publicly available. Type 2 errors are equal to 1 when an analyst provides a speculative rating (i.e., credit rating of BB+ or worse) but the firm does not default in the next year, 0 otherwise. Variable definitions are provided in Online Appendix. Heteroscedasticity-robust standard errors are clustered at the county level and are presented in parentheses. ***, ** and * indicate a significance level of 1%, 5%, and 10%, respectively.

Table 5 shows the results on credit rating mistakes. Columns 1, 3 and 5 show that type-two errors are 9% more likely to occur for treated firms after the law change (an average absolute marginal change of 4% across the three models).[37] Table 5 also reveals that the increase in type-two errors is

[37] Probit models or LPMs without the inclusion of FE reveal comparable results (untabulated). Our results are also robust over various definitions of type-one and type-two errors. When we define type-two errors as more extreme credit errors (i.e., a highly speculative rating (i.e., B+ or worse) but the firms do not default in the next year), the results become more pronounced with a relative increase in type-2 errors of 35%. Results are presented in Online Appendix A8.

entirely driven by the more conservative opinions of credit analysts. Specifically, we find that the economic magnitude of the effect reduces drastically once we control for the analysts' opinions in our models. Moreover, the sign even flips in all models. In contrast, financial statement disclosure does not seem to have an economically meaning impact on type-one errors. The coefficients of these models are close to zero (see Online Appendix Table A8). Taken together, these accuracy tests suggest that the predictive power of the credit rating decreases in response to financial statement disclosures. Hence, financial statement disclosure regulation may allow CRAs to do a better credit risk assessment based on fundamentals, but the quality effect seems to be fully offset by the reputational concerns effect.

Table 6

REPORTING REGULATION AND DEFAULT

Outcome	Default		Payment Behavior		Order Situation	
Control Group	Unlimited (Germany)		Unlimited (Germany)		Unlimited (Germany)	
Column	(1)	(2)	(3)	(4)	(5)	(6)
Treated x Post	-0.026***	-0.007**	-0.004	-0.015*	-0.049***	-0.064***
	(0.003)	(0.003)	(0.007)	(0.008)	(0.016)	(0.015)
Log (Sales +1)		0.008*		-0.030***		0.184***
		(0.004)		(0.009)		(0.030)
Log (Age)		0.158***		-0.040***		0.073***
		(0.004)		(0.005)		(0.017)
Log (Equity +1)		0.001		0.003		0.003
		(0.001)		(0.002)		(0.003)
Log (Productivity +1)		-0.011**		0.028***		-0.195***
		(0.004)		(0.009)		(0.029)
Log(Employees +1)		-0.019***		0.006		-0.190***
		(0.005)		(0.010)		(0.029)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-County FE	No	No	No	No	No	No
Payment Behavior FE	No	Yes	No	No	No	Yes
Order Situation FE	No	Yes	No	Yes	No	No
Business Development FE	No	Yes	No	Yes	No	Yes
Controls x Post	No	Yes	No	Yes	No	Yes
Observations	1,767,631	1,767,631	1,468,247	1,468,247	1,468,247	1,468,247
Clusters (County)	444	444	0.589	0.598	0.723	0.819
R-squared	0.342	0.376	443	443	443	443

Notes: This table presents OLS regressions on default, payment behavior and order situation. Treated firms are limited-liability firms operating in Germany with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements after 2007. The control group are German unlimited-liability firms with the legal forms OHG or KG that were neither required before nor after 2007 to disclose financial statements. *Post* is a dummy variable equal to 1 for all firms for the years after 2007, i.e. the period when financial statements of treated firms became publicly available. Default is equal to 1 if the firm defaults in the next year when the rating was assigned, 0 otherwise. Payment behavior and order situation are variables ranging from 1 (lowest credit risk) to 6 (highest credit risk). Variable definitions are provided in Online Appendix. Heteroscedasticity-robust standard errors are clustered at the county level and are presented in parentheses. ***, ** and * indicate a significance level of 1%, 5%, and 10%, respectively.

The results in Table 6 further support that the disclosure-induced credit rating downgrades are unwarranted. For brevity we focus on the main control group (i.e., German unlimited-liability firms). Results in the Online Appendix Table A9 present the results for the other two control groups. We find that firms that became required to disclose financial statements are less likely to default (column 1 and 2). In column 3 and 4, we examine the impact on the payment behavior of companies, and column 5 and 6 shows if there is an improvement or decline in firms' orders. Both variables are categorial variables, where a lower value means either a better payment behavior or a better order outlook. For both these measures we find a negative coefficient, indicating that their payment behavior to suppliers improve, and that they expect an increase in orders. Results using the alternative control groups are largely in line.[38]

Our accuracy tests support the notion that the increase in rating downgrades is not justified relative to firms' creditworthiness, i.e. that ratings become more conservative. Moreover, our findings suggest that firms on average seem to benefit from disclosure regulation, consistent with prior literature that documents various capital market benefits of improved disclosure regulation (see e.g., Leuz and Wysocki, 2016, for an overview). These benefits, however, do not manifest themselves in better ratings because the negative impact of reputational concerns on credit ratings outweigh the positive effects.

III.D. Underlying mechanism

Crowding out of private information

In this section, we examine the mechanism behind the finding that analysts provide more conservative ratings. As previously highlighted, theory predicts that public disclosure of information

[38] Results across all specifications show in general a negative significant coefficient. We do find, however, that the likelihood of default increases when comparing the treated firms with the 3rd control group, German limited liability firms that voluntary disclose information before the reform. We expect that this result is driven because of the rare occurrences of default in this control group. Treated firms are 3 times more likely to default. There is fairly little variation for the control group to properly estimate the likelihood of default and payment behavior using this control group.

can have adverse effects because it crowds out the effective usage of private information because informed professionals care about their reputation with uninformed decision makers (e.g., Morris, 2001; Prat, 2005; Ottaviani and Sørensen, 2006). Credit analysts may be reluctant to use their private information, because rating failures based on private information are more likely to be attributed to alleged misclassifications, than rating failures based on public information (e.g., Mariano, 2012). Given that credit analysts are penalized more heavily for overly optimistic ratings than for overly pessimistic ratings (Bolton, Freixas, and Shapiro, 2012; Xia, 2014, Dimitrov et al., 2015), we expect to find that analyst will less likely use private information that positively deviates from public information in their assessments.

To test this prediction, we draw on information about firms' payment behavior that analysts privately receive from firms' suppliers and banks. We construct a dummy variable that is equal to one for all firms that pay on time, and zero where the payment behavior variable indicates a target overshoot. Using this variable, we assess how likely an analyst provides either a positive or negative opinion given that she observes a positive or negative private signal on payment behavior. We also assess if a negative public information is more likely to lead to a negative personal assessment. We measure a negative public signal with a second dummy variable that equals one when revenues decrease compared to the prior year and is zero otherwise.[39]

[39] We focus on revenue growth in our main analyses because this is an economically meaningful data point used by investors and creditors to assess a firms' creditworthiness. As a robustness check we also use a decline in number of employees and decline in productivity to measure a negative public signal. Results using these alternative measures are consistent with our main results, and presented in Online appendix A11.

Table 7

PUBLIC VS PRIVATE INFORMATION AND CREDIT ANALYST OPINION

Panel A: Treated Firms - German Limited

	Relation between Positive Private Information and Credit Analyst Opinion		Relation between Negative Public Information and Credit Analyst Opinion	
Period (2003-2007)	Received Good Private Signal	Received Bad Private Signal	Received Good Public Signal	Received Bad Public Signal
Analyst Provides Bad Opinion	31.33%	97.71%	29.30%	35.20%
Analysts Provides Good Opinion	68.67%	2.29%	70.70%	64.80%
	100%	100%	100%	100%
Period (2008-2012)				
Analyst Provides Bad Opinion	44.18%	97.30%	40.78%	47.01%
Analysts Provides Good Opinion	52.82%	2.70%	59.22%	52.99%
	100%	100%	100%	100%

Panel B: Control Firms - German Unlimited

	Relation between Positive Private Information and Credit Analyst Opinion		Relation between Negative Public Information and Credit Analyst Opinion	
Period (2003-2007)	Received Good Private Signal	Received Bad Private Signal	Received Good Public Signal	Received Bad Public Signal
Analyst Provides Bad Opinion	26.41%	96.77%	24.60%	30.61%
Analysts Provides Good Opinion	73.59%	3.23%	75.40%	69.39%
	100%	100%	100%	100%
Period (2008-2012)				
Analyst Provides Bad Opinion	34.12%	93.75%	31.27%	37.50%
Analysts Provides Good Opinion	65.88%	6.25%	68.73%	62.50%
	100%	100%	100%	100%

Notes: This table presents descriptive statistics on the likelihood that a firm receive a positive credit opinion from an analyst give that the analyst receives either a positive or negative signal. Treated firms are limited-liability firms operating in Germany with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements after 2007. A private signal is based on payment behavior information that is privately collected by the CRA. We define a positive private signal when the analysts observe that the firm pays its debt obligations on time, and a negative private signal is defined as firms that have significant target overshoot. We define a negative public as a signal that the analysts observe when a firm has a decrease in revenues in t compared to t-1, and a positive signal when revenues increase or stay constant. Variable definitions are provided in Online Appendix.

Table 7 shows that in the pre-disclosure period treated firms have a 69% chance to get a favorable analyst opinion when analysts receive a positive private signal about its payment behavior. After disclosure regulation, this percentage decreases to 53%. Descriptively, we also find that negative information that is available in financial statements is more likely to lead to a negative opinion for firms after financial statements become publicly available for our treated firms. For our control groups, we find that the average in the post period is more comparable to the average in the pre period. The changes in percentages are 2 to 4 times larger for the treated firms, compared to the control firms (see Table 7, Panel B, and Online Appendix A10).

Table 8

USE OF POSITIVE PRIVATE INFORMATION AND NEGATIVE PUBLIC INFORMATION

Outcome	Good Credit Opinion when Positive Private Information Received			Bad Credit Opinion when Negative Public Information Received		
Control Group	Unlimited (Germany)	Limited (Austria)	Limited (Germany)	Unlimited (Germany)	Limited (Austria)	Limited (Germany)
Column	(1)	(2)	(3)	(4)	(5)	(6)
Treated x Post	-0.082***	-0.108***	-0.044***	0.070***	0.018**	0.029***
	(0.014)	(0.017)	(0.005)	(0.008)	(0.009)	(0.003)
Log (Sales +1)	0.037***	0.054***	0.028***	-0.069***	-0.081***	-0.060***
	(0.009)	(0.011)	(0.008)	(0.014)	(0.013)	(0.012)
Log (Age)	0.040***	0.024***	0.038***	0.146***	0.153***	0.140***
	(0.007)	(0.007)	(0.007)	(0.009)	(0.008)	(0.008)
Log (Equity +1)	-0.012***	-0.016***	-0.014***	0.008***	0.010***	0.009***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Log (Productivity +1)	-0.038***	-0.051***	-0.028***	0.011	0.022	0.001
	(0.010)	(0.012)	(0.009)	(0.014)	(0.014)	(0.013)
Log(Employees +1)	-0.016	-0.033***	-0.006	0.003	0.017	-0.005
	(0.011)	(0.013)	(0.010)	(0.016)	(0.015)	(0.014)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-County FE	Yes	No	Yes	Yes	No	Yes
Payment Behavior FE	Yes	Yes	Yes	Yes	Yes	Yes
Order Situation FE	Yes	Yes	Yes	Yes	Yes	Yes
Business Development FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls x Post	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,468,247	1,484,391	1,777,360	1,468,247	1,484,391	1,777,360
Clusters (County)	443	543	444	443	543	444
R-squared	0.654	0.612	0.642	0.470	0.441	0.458

Notes: This table presents OLS regressions. Treated firms are limited-liability firms operating in Germany with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements after 2007. We have three control groups: (1) German unlimited-liability firms with the legal forms OHG or KG that were neither required before nor after 2007 to disclose financial statements; (2) limited-liability firms operating in Austria that were required to disclose already from 1996 onwards; (3) German limited-liability firms that already voluntary disclosed before 2007. *Post* is a dummy variable equal to 1 for all firms for the years after 2007, i.e. the period when financial statements of treated firms became publicly available. The variable 'Good Credit Opinion when Positive Private Information Received' is equal to 1 when analysts provide a positive opinion when they receive a positive private signal, 0 otherwise. The variable 'Bad Credit Opinion when Negative Public Information Received' is a dummy variable that is equal to 1 when an analyst provides a negative opinion when they receive a negative public signal, 0 otherwise. Variable definitions are provided in Online Appendix. Heteroscedasticity-robust standard errors are clustered at the county level and are presented in parentheses. ***, ** and * indicate a significance level of 1%, 5%, and 10%, respectively.

Table 8 examines the impact of private vs public information on analysts' opinions in a DiD design. Our outcome variable is equal to one when analysts provide a positive opinion when they receive a positive private signal and zero otherwise. As an alternative outcome we use a dummy variable that equals one when an analyst provides a negative opinion when they receive a negative public signal and zero otherwise. Using these outcome variables, we find that analysts are on average 7.8% less likely to provide a positive opinion about a company when they observe a positive private

signal, and analysts are 3.9% more likely to provide a bad opinion when they observe a negative public signal. These results are consistent with the idea that analysts are less likely using private information that positively deviates from public information in their assessments because they are concerned of alleged rating failures. It is in line with the predictions of herding models and more recent theories predicting that public information may crowd out effective usage of private information (e.g., Morris and Shin, 2002; Angeletos and Pavan, 2007; James and Lawler, 2011; Goldstein and Yang, 2019).

Career concerns

Next, we examine if credit analysts that provided wrong credit ratings in the past are more likely to provide more conservative opinions after the disclosure mandate. We expect that especially this group of analysts may face pressure to provide more conservative ratings because they might fear losing their job if an additional client complains about a wrong rating.

Our database does not include credit analysts' identifiers, however, we are able to proxy for prior analyst errors by calculating errors at the industry-office level. Creditreform has 130 distinct credit rating offices in Germany, which each have the exclusive right to construct and sell ratings for firms that operate within their region. Each of these offices in Germany thus have a local monopoly. The more than 4,000 credit analysts that work in one of these 130 credit rating offices are specialized in certain industries. We can thus proxy for rating mistakes by counting all the rating mistakes that occurred within each credit rating office – industry (NACE 4) cluster. Given that each office has only a few analysts that are specialized in each industry, our measure should closely reflect the number of mistakes that are made by an individual analyst.

In our DiD model, we interact this measure with our Treated and Post variables, resulting in the following specifications:

$$\begin{aligned} Credit\ Analyst\ Opinion_{it} = {} & \beta_1 \cdot Treated_i \times Post_t \times \text{Past Errors}_i \\ & + \beta_2 \cdot Treated_i \times Post_t + \beta_3 \cdot Past_t \times \text{Past Errors}_i \\ & + f_i + \alpha_{ct} + \delta_{st} + \varepsilon_{it} \end{aligned} \tag{6}$$

In equation 6, Past Errors is measured as the sum of all the errors that were made prior to 2007 within an office-industry cluster, scaled by all ratings provided within that office-industry cluster in that period.[40] An error is defined as a company that received an investment grade (i.e., a BBB- or better) but defaulted within the next year. For Austrian firms, the Mannheim Enterprise Panel does not include information on the credit rating office that is appointed to a firm. For this control group, we use the state where the firm is operating in as a proxy for the regional offices, and thus calculate errors at the state-industry level.

Table 9

REPORTING REGULATION AND CREDIT ANALYST OPINION
(CREDIT ANALYST SENSITIVITY ANALYSES)

Outcome	Credit Expert Opinion		
Control Group	Unlimited (Germany)	Limited (Austria)	Limited (Germany)
Column	(1)	(2)	(3)
Treated x Post x Past Errors (continuous)	3.554***	2.373**	0.735**
	(0.601)	(0.988)	(0.350)
Treated x Post	0.081***	0.067***	0.098***
	(0.011)	(0.015)	(0.006)
Post x Past Errors	-3.008***	1.122	-0.069
	(0.578)	(0.896)	(0.326)
Firm FE	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes
Year-County FE	No	Yes	Yes
Observations	1,468,247	1,484,391	1,777,360
Clusters (County)	443	543	444
R-squared	0.620	0.591	0.614

Notes: This table presents OLS regressions on credit analysts' opinions. Treated firms are limited firms operating in Germany with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements after 2007. We have three control groups: (1) German unlimited-liability firms with the legal forms OHG or KG that were neither required before nor after 2007 to disclose financial statements; (2) limited-liability firms operating in Austria that were required to disclose already from 1996 onwards; (3) German limited-liability firms that already voluntary disclosed before 2007. *Post* is a dummy variable equal to 1 for all firms for the years after 2007, i.e. the period when financial statements of treated firms became publicly available. The credit analyst opinion ranges from 1 (best possible opinion) to 5 (worst opinion). A positive (negative) coefficient indicates that the credit analyst opinion gets worse (better). Variable definitions are provided in Online Appendix. Heteroscedasticity-robust standard errors are clustered at the county level and are presented in parentheses. ***, ** and * indicate a significance level of 1%, 5%, and 10%, respectively.

Table 9 presents the results. Similar to our main results, we find that credit analysts give more conservative opinions after disclosure regulation. However, the effect is significantly stronger for analysts that made prior rating mistakes in the past. It is consistent with prior literature that shows

[40] Note that this variable captures a concept that stays constant over time in our sample. In our estimations, the main effect and its interaction with treated firms thus drop out of the model because we include firm-fixed effects.

that security analysts' jobs are more likely to be terminated for inaccurate earnings forecast, giving them incentives to follow the public consensus (Hong, Kubik, and Solomon, 2000). Overall, our results on the mechanisms behind our main effect presented in Table 7, 8 and 9 are all consistent with the idea that disclosure regulation increases reputational concerns, which lead to more conservative opinions.

III.E. Economic relevance

Credit Ratings and Access to Debt Sensitivity

Lower credit ratings typically decrease firms' ability to attract external capital (e.g., Hand, Holthausen, and Leftwich, 1992; Kliger and Sarig, 2000). However, prior studies also suggest that debt yields are shaped by other factors than ratings (e.g., Campbell and Taksler, 2003), and market participants view rating conservatism as an additional factor to take into account when pricing debt (Baghai et al., 2014). If credit providers realize that the increase in downgrades are unwarranted, they might change their reliance on credit ratings once firms become required to disclose financial information. As a consequence, debt providers might become more reluctant to rely exclusively on credit ratings when making lending decision, which would (partially) mitigate the impact of more conservative ratings on firms' access to credit.

We try to shed light on this issue empirically by examining the sensitivity between firm's total amount of debt and their credit ratings. Since banks and suppliers buy credit reports to determine the amount of (trade) credit they provide, we would expect that credit ratings should be highly correlated with firms' ability to access debt. In addition, we would expect that the sensitivity decreases over time if credit providers recognize that credit analysts are more likely to provide less accurate ratings.

To assess the sensitivity between debt and credit ratings we estimate the following DiD design model:

$$
\begin{aligned}
Log(Debt)_{it} = \; & \beta_1 \cdot Treated_i \times Post_t \times \text{Log(Credit Rating Index)}_{it} \\
& + \beta_2 \cdot Treated_i \times Post_t + \beta_3 \cdot Past_t \times \text{Log(Credit Rating Index)}_{it} \\
& + \beta_4 \cdot Treated_i \times \text{Log(Credit Rating Index)}_{it} + f_i + \alpha_{ct} + \delta_{st} + \varepsilon_{it}
\end{aligned} \tag{7}
$$

where Log(Debt) is the total amount of debt on a firm's balance sheet in year *t*.[41] We take the log of the Credit Rating Index so that the coefficients can be interpreted as elasticities. The remaining variables are defined as in our previous equations.

Table 10 presents the results of our estimations for the three control groups. To ease interpretation, we use the coefficients presented in Table 10 and calculate the sensitivity between debt and credit ratings for the treated and control groups, both in the pre and post period. The results are summarized in Table 11. Our results reveal that the sensitivity between credit ratings and debt is negative in all cases. Hence, worse credit ratings consistently lead to less debt for treated and control firms, in both the pre- and post-period. More importantly, we find that the sensitivity of debt provision to credit rating decreases by approximately 50% for treated firms once they are required to disclose financial statements to the public. For the unlimited liability control group, we find no significant decrease in sensitivity over time, and for the other two control groups the decrease in sensitivity is only a fraction of the decrease found for treated firms. These results are consistent with the idea that debt providers are less (more) likely to rely on credit ratings (financial statements information) to determine the amount of credit they provide. It suggests that credit providers understand that disclosure induced changes in credit ratings are not warranted.

[41] Missing observations on debt data can either mean that firms did not report this information, or it can mean that firms did not have debt. We take a conservative approach, and only focus on observations with non-missing values on our debt variables (i.e., we do not impute zeros when debt data is missing). In Online Appendix A13, we present robustness tests to examine if such a change in sample composition would impact our main results. Using the subsamples with non-missing debt data, we find very similar effects as when using the full sample.

Table 10

CHANGE IN SENSITIVITY OF DEBT PROVISION TO CREDIT RATINGS

Outcome	Log(Debt)		
Control Group	Unlimited (Germany)	Limited (Austria)	Limited (Germany)
Column	(1)	(2)	(3)
Treated x Post x Log(Credit Rating Index)	0.738***	0.396***	0.372***
	(0.073)	(0.061)	(0.034)
Log(Credit Rating Index)	-0.581***	-0.669***	-0.619***
	(0.091)	(0.082)	(0.059)
Treated x Log(Credit Rating Index)	-0.383***	-0.231***	-0.196***
	(0.077)	(0.058)	(0.032)
Post x Log(Credit Rating Index)	0.018	0.271***	0.209***
	(0.078)	(0.094)	(0.059)
Treated x Post	-0.644***	-0.289**	-0.261***
	(0.154)	(0.134)	(0.072)
Log (Sales +1)	0.008	0.016	0.026
	(0.046)	(0.047)	(0.037)
Log (Age)	0.530***	0.535***	0.609***
	(0.020)	(0.023)	(0.022)
Log (Equity +1)	0.071***	0.081***	0.085***
	(0.008)	(0.008)	(0.007)
Log (Productivity +1)	0.199***	0.177***	0.182***
	(0.049)	(0.050)	(0.040)
Log(Employees +1)	0.462***	0.454***	0.435***
	(0.056)	(0.057)	(0.045)
Firm FE	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes
Year-County FE	Yes	No	Yes
Credit Analyst Opinion FE	Yes	Yes	Yes
Payment Behavior FE	Yes	Yes	Yes
Order Situation FE	Yes	Yes	Yes
Business Development FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Controls x Post	Yes	Yes	Yes
Observations	892,408	914,563	1,139,775
Clusters (County)	443	542	444
R-squared	0.837	0.833	0.839

Notes: This table presents OLS regressions. Treated firms are limited-liability firms operating in Germany with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements after 2007. We have three control groups: (1) German unlimited-liability firms with the legal forms OHG or KG that were neither required before nor after 2007 to disclose financial statements; (2) limited-liability firms operating in Austria that were required to disclose already from 1996 onwards; (3) German limited-liability firms that already voluntary disclosed before 2007. *Post* is a dummy variable equal to 1 for all firms for the years after 2007, i.e. the period when financial statements of treated firms became publicly available. The variable 'Log(Debt) is the log of total amount of debt on a firm's balance sheet in year t. Variable definitions are provided in Online Appendix. Heteroscedasticity-robust standard errors are clustered at the county level and are presented in parentheses. ***, ** and * indicate a significance level of 1%, 5%, and 10%, respectively.

Table 11

CHANGE IN SENSITIVITY– AVERAGE MARGINAL EFFECTS ACROSS GROUPS				
Panel A: Treated Firms vs. Unlimited (Germany)				
Group	Sensitivity Credit rating on Debt	Group	Sensitivity Credit rating on Debt	Difference between Pre and Post Period
Control Pre:	-0.581***	Control Post:	-0.563***	0.018
	(0.091)		(0.079)	(0.078)
Treated Pre:	-0.964***	Treated post:	-0.208***	0.756***
	(0.061)		(0.034)	(0.069)
		Difference-in-Differences in Sensitivity:		0.738***
				(.073)
Panel B: Treated Firms vs. Limited (Austria)				
Group	Sensitivity Credit rating on Debt	Group	Sensitivity Credit rating on Debt	Difference between Pre and Post Period
Control Pre:	-0.669***	Control Post:	-0.398***	0.271***
	(0.082)		(0.055)	(0.094)
Treated Pre:	-0.899***	Treated post:	-0.233***	0.666***
	(0.067)		(0.045)	(0.086)
		Difference-in-Differences in Sensitivity:		0.396***
				(0.061)
Panel C: Treated Firms vs. Limited (Germany)				
Group	Sensitivity Credit rating on Debt	Group	Sensitivity Credit rating on Debt	Difference between Pre and Post Period
Control Pre:	-0.619***	Control Post:	-0.410***	0.209****
	(0.059)		(0.033)	(0.059)
Treated Pre:	-0.815***	Treated post:	-0.234***	0.582***
	(0.053)		(0.031)	(0.063)
		Difference-in-Differences in Sensitivity:		0.372***
				(0.034)

Notes: This table presents descriptive statistics of the sensitivity between treated and control groups in the pre and post period. Sensitivities are obtained from the coefficients estimated in Table 10. Treated firms are limited-liability firms operating in Germany with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements after 2007. We have three control groups: (1) German unlimited-liability firms with the legal forms OHG or KG that were neither required before nor after 2007 to disclose financial statements; (2) limited-liability firms operating in Austria that were required to disclose already from 1996 onwards; (3) German limited-liability firms that already voluntary disclosed before 2007. *Post* is a dummy variable equal to 1 for all firms for the years after 2007, i.e. the period when financial statements of treated firms became publicly available. Variable definitions are provided in Online Appendix. Heteroscedasticity-robust standard errors are clustered at the county level and are presented in parentheses. ***, ** and * indicate a significance level of 1%, 5%, and 10%, respectively.

Sophisticated vs Unsophisticated Credit Providers

While showing clear changes in the sensitivity between credit ratings and the total amount of debt, the previous finding might mask important differences between banks and trade credit providers. This is because trade credit providers – generally small private firms – have less resources available to do independent credit assessments and are thus more likely to rely solely on credit ratings to make

credit decisions. In contrast, banks have more resources to consider other sources of information in their credit risk assessment then solely the credit rating. Hence, we would expect that banks are less likely to be influenced by unwarranted disclosure-induced rating changes as compared to less-sophisticated users such as trade credit providers.

We empirically test our conjecture by re-estimating specification (7) separately with a) only bank debt and b) only with trade credit volume as dependent variables. Due to missing data on bank debt and trade credit for Austrian firms, we are only able to estimate the effect when using the German unlimited and German limited liability control groups.[42]

Table 12 presents the results. We find an economically meaningful change in the bank debt to credit rating sensitivity of on average 71%, while the trade credit volume to credit rating sensitivity appears to decline at a much smaller magnitude of 20% on average. These numbers support the idea that more sophisticated users of credit ratings (i.e., banks) are less likely to rely on credit ratings after disclosure regulation, while less sophisticated users (i.e., trade credit suppliers) still largely rely on credit ratings to determine the amount of trade credit they provide. The drop in the sensitivity between bank debt and ratings is also consistent with prior literature which suggests that banks are more likely to use financial statements to make loan approval decisions once financial statements are publicly available (e.g., Breuer et al. 2018).

The persistently strong sensitivity of trade credit volume to credit ratings further implies that a change to more conservative ratings would also lead to a decrease in the average amount of trade credit volume. Table 12 provides consistent evidence. While we do find a positive relationship with respect to the amount of bank debt firms receive[43], we do find that firms receive, on average, an approximately 24% lower amount of trade credit in response to disclosure induced reductions in credit

[42] The vast majority of Austrian firms are not required to disclose this detailed level of debt data to the public. In our database, as well as in other databases such Orbis, such information is available for less than 1% of Austrian firms.

[43] The positive significant effect of disclosure regulation on bank debt is consistent with Deno, Loy and Homburg (2020). They document that there is a strong increase in access to bank debt following the EHUG law change for treated firms. Financial disclosure regulation seems to decrease banks information acquisition costs and decrease overall uncertainty about firms and the market as a whole.

ratings (Table 12, coefficients on the variable 'Treated x Post' of -0.272 and -0.294). In absolute terms, our estimations translate to a decrease in trade credit volume of approximately 50,000 euro for the average firm, or put differently, a 5.5% decrease in total amount of debt.

Table 12

CHANGE IN SENSITIVITY OF DEBT PROVISION TO CREDIT RATINGS
TRADE CREDIT VS. BANK DEBT

Control Group	Unlimited (Germany)		Limited (Germany)	
Outcome	Log(Trade Credit)	Log(Bank Debt)	Log(Trade Credit)	Log(Bank Debt)
Column	(1)	(2)	(3)	(4)
Treated x Post x Log(Credit Rating Index)	0.228***	1.096***	0.177***	0.316*
	(0.058)	(0.347)	(0.028)	(0.180)
Log(Credit Rating Index)	-0.249***	-1.268***	-0.355***	-0.439**
	(0.075)	(0.384)	(0.045)	(0.215)
Treated x Log(Credit Rating Index)	-0.222***	0.493	-0.089***	-0.314*
	(0.065)	(0.344)	(0.028)	(0.171)
Post x Log(Credit Rating Index)	-0.090	-0.552	-0.077	-0.037
	(0.066)	(0.401)	(0.047)	(0.277)
Treated x Post	-0.272**	1.627**	-0.294***	1.840***
	(0.124)	(0.793)	(0.061)	(0.411)
Log (Sales +1)	0.027	-1.519***	0.095*	-1.672***
	(0.068)	(0.203)	(0.058)	(0.157)
Log (Age)	0.328***	0.764***	0.348***	1.044***
	(0.018)	(0.063)	(0.018)	(0.061)
Log (Equity +1)	0.027***	0.348***	0.029***	0.392***
	(0.009)	(0.038)	(0.007)	(0.034)
Log (Productivity +1)	0.293***	1.647***	0.252***	1.871***
	(0.068)	(0.204)	(0.056)	(0.159)
Log(Employees +1)	0.550***	2.194***	0.494***	2.451***
	(0.080)	(0.237)	(0.064)	(0.188)
Firm FE	Yes	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes	Yes
Year-County FE	Yes	Yes	Yes	Yes
Credit Analyst Opinion FE	Yes	Yes	Yes	Yes
Payment Behavior FE	Yes	Yes	Yes	Yes
Order Situation FE	Yes	Yes	Yes	Yes
Business Development FE	Yes	Yes	Yes	Yes
Controls x Post	Yes	Yes	Yes	Yes
Observations	262,489	304,045	378,531	431,283
Clusters (County)	442	442	443	443
R-squared	0.871	0.765	0.872	0.757

Notes: This table presents OLS regressions. Treated firms are limited-liability firms operating in Germany with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements after 2007. We have two control groups with available bank and trade credit data: (1) German unlimited-liability firms with the legal forms OHG or KG that were neither required before nor after 2007 to disclose financial statements; (2) German limited-liability firms that already voluntary disclosed before 2007. *Post* is a dummy variable equal to 1 for all firms for the years after 2007, i.e. the period when financial statements of treated firms became publicly available. The variable 'Log(Trade Credit) is the log of total amount of Trade Credit on a firm's balance sheet in year t. The variable 'Log(Bank Debt) is the log of total amount of Bank Debt on a firm's balance sheet in year t. Variable definitions are provided in Online Appendix. Heteroscedasticity-robust standard errors are clustered at the county level and are presented in parentheses. ***, ** and * indicate a significance level of 1%, 5%, and 10%, respectively.

In addition, the coefficients in our models on (real) amount of trade credit are slightly lower compared to the models where we examined the impact on the CRA's recommended amount of trade credit (i.e., an average coefficient of 0.283 compared to 0.320; see Table 12 and Online Appendix A6). This further suggests that trade credit providers still largely rely on ratings, and only partially take into account that ratings have become more conservative. Taken together, these results point to economically meaningful implications of disclosure induced changes in credit ratings. They seem to be particularly relevant for firms that rely on trade credit which is one of the most important sources of debt for private firms (Berger and Udell, 1998; Bundesbank, 2012).

III.F. Robustness tests

Alternative quasi-natural experiment: MicroBilg

To address remaining concerns with respect to the specific timing of the EU disclosure directive, we re-run our main analysis using an alternative quasi-natural experiment. As highlighted in the institutional setting section, Germany changed its disclosure regulation again for a large share of firms at the end of 2012. From that point onwards, approximately half of all limited-liability firms were allowed to disclose less information to the public (e.g., fewer notes and less detailed balance sheet information). In addition, firms were allowed to restrict the access of their financial statements to the public (see Gassen and Muhn, 2018). Firms have to meet two out of the following three criteria to be eligible: total assets less than or equal to €350,000, total revenues less than or equal to €700,000, and an average number of up to 10 employees. This change had a significant impact on the number of available financial statements. According to Gassen and Muhn (2018), approximately 70% of eligible firms have restricted public access to their financial statements by 2018. We use this law change to reexamine our main analysis. If the reputational concerns hypothesis holds, we would expect to find that credit ratings and the discretionary opinion of analysts improve in response to the new disclosure regulation.

Resembling the previously used DiD design, we compare firms that were eligible to reduce their disclosures from 2013 onwards with firms that were obliged to disclose financial statements over the entire sampling period. Since firms can switch from eligible to non-eligible over time, we define our eligible firms as firms that meet the standards in 2010. Non-eligible firms are those that barely surpass the thresholds.[44] Using this setup, we investigate how disclosure *deregulation* impacts credit ratings, speculative grades, and the credit expert opinion over time.

Online Appendix Table A14 shows the results. Firms that were eligible to reduce the amount of publicly disclosed financial information are less likely to receive a speculative grade, receive on average a less conservative credit rating, and the credit analyst provide a less conservative opinion. Moreover, once we control for the credit expert opinion, we again see that the relationship between disclosure and credit ratings becomes less pronounced, indicating that the change in ratings is driven by the analyst's opinion instead of changes in fundamentals.[45]

Falsification tests

To test the sensitivity of our research design we run two falsification tests. In a first test, we compare Austrian limited-liability firms with a set of Austrian unlimited-liability firms. In this setting, we are comparing firms that were always required to disclose over the period 2002 to 2012 with firms that were never required to do so. An insignificant effect that is close to zero would alleviate concerns that some of our results are driven by differences in legal forms. A concern might be that these groups were differently affected by the financial crisis, which occurred almost concurrent with the law change. If our results are driven by the financial crisis, we would also expect to find such a change in credit ratings when we compare Austrian limited-liability with Austrian unlimited-liability firms because the financial crisis had a similar impact in Germany and Austria as illustrated by Figure 1.

[44] Specifically, we compare eligible firms to firms that are above the micro thresholds, but below the thresholds that define medium-sized companies (total assets < 4,480,000; turnover < 9,680,000; employees < 50). We thus compare micro firms with small firms, as defined in 2010.

[45] In this setting, however, the effect on credit ratings is not completely mitigated by controlling for the credit expert opinion. This is potentially driven by the limited capital market benefits that these small private firms have from disclosing financial statement information.

In an alternative falsification test, we compare two of our control groups and see if we observe any change in credit rating between these two control groups. Specifically, we compare German limited-liability firms that voluntary disclose against German unlimited-liability firms that never disclosed financial statements. Since no changes in disclosure strategies occurred for both groups, we would not expect any change in credit ratings in this setting. For both tests, we do not find any significant change in credit ratings or analysts' opinions (see Online Appendix Table A15). We do acknowledge however that the sample sizes of our falsification tests are a lot lower compared to our main tests, which reduces the power of our tests. Given that the coefficients are on average much smaller compared to our main tests, we believe that these falsification tests still provide some support that our main findings are driven by a change in public disclosure regulation.

IV. Summary and Conclusion

This study demonstrated how the introduction of a mandatory disclosure regime in Germany influenced firms' credit ratings. Consistent with idea that credit analysts become increasingly concerned about alleged rating failures, credit ratings decrease, and the decrease appears to be entirely driven by changes in the discretionary assessment of the credit analysts, and not by changes in firm fundamentals. Analysts reduce the likelihood of being accused of rating failure by giving positive private information a lower and negative public information a higher weight in their risk assessments. Since these changes are not justified by changes in fundamentals (e.g., firms' payment behavior), rating accuracy declines as evidenced by an increase in erroneous default warnings.

Professional credit providers seem to understand that the analyst-induced downgrades are not warranted. The sensitivity between credit ratings and bank debt provision declines sharply. Unsophisticated lenders, however, reduce the provision of trade credit in response to the analyst-induced rating downgrades, pointing to an economically relevant impact of disclosure regulation.

These results call for a cautionary review of the conventional wisdom that additional disclosure of financial information unambiguously improves the information environment. It seems important to carefully consider not only the benefits of increased corporate financial transparency but also its unintended side effects (e.g., on credit ratings and unsophisticated lenders).

Given that our analysis is bound to the German institutional environment and one CRA, more research is needed to assess the relevance of our findings in other settings. Since other CRAs (e.g., D&B, Experian, Credit Safe) follow a very similar business model, though, it seems reasonable to suspect similar mechanisms may apply. Irrespective of the institutional environment, analysts have decisive power over credit ratings and there is no reason to believe they would not be concerned about alleged rating failures. It is also reasonable to expect that disclosure regulation amplify reputational concerns of issuer-paid rating agencies (e.g., Fitch, S&P, Moody's). For example, An, Cordell and Nichols (2019) provide evidence of herding behavior between Moody's, S&P and Fitch in the CMBS market. Similarly, Xia (2014) shows that S&P ratings provide more conservative ratings once they face competition from an investor-paid rating agency. Although these papers do not focus on financial statement disclosure regulation, their results are consistent with the idea that public disclosure of information about firms' creditworthiness amplifies analysts' reputation concerns. When analysts put a higher (lower) weight on public (private) information than optimal, it would unambiguously have a negative impact on the accuracy of ratings. However, it is important to bear in mind that unlike investor-paid CRAs, issuer-paid rating agencies have incentives to cater to their clients, and might issue more optimistic ratings than optimal (see e.g., Cheng and Neamtiu, 2009). In such a setting, an increase in conservatism might lead to a reduction in the number of missed defaults. It is unclear if the benefits that are associated with such a reduction in missed defaults would outweigh the costs associated with an increase in erroneous default warnings. Future research may shed further light on the interplay between credit rating business models, financial statement disclosure, reputational concerns, access to private information, and capital market benefits.

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Variable Appendix

VARIALBE DESCRIPTION	
Treatment and Main Outcomes:	**Description**
Treated	Treated is equal to 1 for German limited-liability firms that start to disclose financial statements from 2007 onwards, 0 for firms in the control group. The control group consists of either (1) German unlimited-liability firms that were never required to disclosed financial statements information to the public , (2) Austrian limited-liability companies that were already enforced to disclose financial statements from 1996 onwards, or (3) German limited-liability firms that always disclosed (voluntarily) financial statement to the public.
Post	Post is equal to one after 2007, 0 otherwise.
Credit Rating Index	Credit Rating index is the credit rating of Creditreform. The original rating ranges from 100 to 500. A rating of 600 is given to firms that defaulted. We translate the rating of Creditreform to the S&P index using the correspondence table of Creditreform. Following the prior literature, a numerical value is assigned to each rating on a notch basis as follows: AAA=1, AA+=2, AA=3, AA−=4, A+=5, A=6, A−=7, BBB+=8, BBB=9, BBB−=10, BB+=11, BB=12, BB−=13, B+=14, B=15, B−=16, CCC+=17, CCC=18, CCC−=19, CC=20, C=21. The credit rating index ranges from 1 to 21. Defaulting firms are equal to 22.
Speculative Grade	Speculative grade is equal to 1, if a firm receives a speculative grade (i.e., credit rating of BB+ or worse), 0 otherwise.
Credit Rating Inputs:	
Log (Sales + 1)	The log of sales of the firm within a year, plus 1.
Log (Age)	The log of the age of the company.
Log (Equity + 1)	The log of the total equity of the firm within a year, plus 1.
Log (Productivity + 1)	The log of the productivity of the firm within a year (measured as sales divided by employees), plus 1.
Log(Employees + 1)	The log of the number of employees within a year, plus 1.
Payment Behavior	Information from suppliers about firm's payment behavior. The payment behavior information is classified in 6 main categories. Ranging from 1, the most positive rating, to 6 which is given to firms in default. Specifically, Category 1 means that firms pay on time and utilize cash discounts; Category 2 means that firms payback within the agreed targets; Category 3 means that firms mostly pays within agreed targets, occasionally exceeding the target; Category 4 means that firms exceeded payment targets for up to 30 days; Category 5 means that firms have significant overruns of at least more than 30 days; Category 6 means that firms is in bankruptcy proceedings.
Credit Analyst Opinion	The opinion of the analysts about the creditworthiness of the firm. An analyst can classify firms in 6 main categories. Ranging from 1, the most positive rating, to 6 which is given to firms in default. Specifically, category 1 means that business relationships and credit provision are highly recommended; category 2 means that business relationship and credit provision are permitted; Category 3 means that Business relationship are acceptable, and credit provisions are allowed, but with limits; Category 4 means that a business relationship is acceptable, but any form of credit requires collateral; Category 5 means that any form of business relationships and credit are not advised. Category 6 means that the firm is in default, any form of business relationship and loans are rejected.

Order Situation	Information about customer orders. Firms' order situation is classified in 6 main categories. Ranging from 1, the most positive rating, to 6 the worst rating. Specifically, Category 1 means that the firm has a very good order book (growing); category 2 means that the firm has a good order book (growing); 3 means that the situation is satisfactory (stable); 4 means that the orders are declining; 5 means that the orders are declining sharply; Category 6 is giving to firms with the worst order situation (e.g., no orders incoming, close to bankruptcy). A category 0, exist in case the information is missing.
Business Development	Information about the general business development of the company. The business development of the company is classified in 6 main categories. Ranging from 1, the most positive rating, to 6 the worst rating. Specifically, Category 1 means that the business is expanding (growing); Category 2 means that there is a positive business development (growing); Category 3 means that the business development of the company is stable; Category 4 means that the business development of the company is stagnating; Category 5 means that the business development in is decline; Category 6 means that there is a sharp decline in the business development of the company. A category 0, exist in case the information is missing.
Industry	The industry of the company that the firm is operating in. Certain industries have a higher risk of default compared to others, and thus receive a higher rating. In our setting, this is captured by our firm-fixed effects and year-industry fixed effects.
County	The county of the company that the firm is operating in (i.e., Kreis-level). Certain counties have a higher risk of default compared to others, and thus receive a higher rating. In our setting, this is captured by our firm-fixed effects and year-county fixed effects
Additional Variables	
Type 1 Errors	Type 1 Errors are equal to 1 if the company received an investment grade (a credit rating BBB- or better), but default within the next year, 0 otherwise.
Type 2 Errors	Type 2 Errors are equal to 1 if the company received a speculative grade (a credit rating BB+ or worse), but do not default within the next year, 0 otherwise.
$Default_{t+1}$	Default (t+1) is equal to 1 if the company defaults the next year, 0 otherwise.
Log(Debt)	The variable Log(Debt) is the log of total debt of a company. Retrieved from firms' financial statements.
Log (Trade Credit)	The variable Log(Trade Credit) is the log of trade credit of a company. Retrieved from firms' financial statements.
Log (Recommended Trade Credit)	Recommended Trade Credit is retrieved from the credit report that is accompanied with the credit rating. It indicates how much trade credit a supplier/bank should utmost offer given the firms' creditworthiness.
Log (Bank Debt)	The variable Log(Bank Debt) is the log of bank debt of a company. Retrieved from firms' financial statements.
Past errors	The variable past errors is the number of Type 1 Errors made in the period 2002 to 2006 within each 'industry - credit rating office' cluster, weighted by the number of credit ratings constructed within each 'industry - credit rating office' cluster.
Positive Credit Analyst Opinion	Positive credit analyst opinion is equal to 1 for an opinion which permits credit provisions (i.e., a score of 1 or 2 on the Credit Analyst opinion variable), 0 otherwise.
Positive Payment Behavior	Positive payment behavior is equal to 1 for all firms that pay within targets (i.e., a score of 1,2 or 3 on the payment behavior variable), 0 otherwise.
Negative Financial statement information	Negative financial information is equal to 1 if firms experience a drop in turnover from t to t-1, 0 otherwise.

Online Appendix

(For online publication only)

Table of Contents

Credit Rating Model

The following description is provided in the information brochure of Creditreform:

The Creditreform Solvency Index is the central pillar of Creditreform's Commercial Report and other information formats for evaluating a business's solvency. Its accurate forecasts of the probability of default (PD) provide for quick and direct assessment of a customer's solvency – and consequently also the customer's credit worthiness.

The Solvency Index's excellent forecasting accuracy is also attributed to Creditreform's extensive database which has increased significantly over the past few years – not only in terms of 10 million accounts now published, but also regarding industry KPIs and in the payment-experience field. The Debitorenregister Deutschland debtors' register, alone, for example, gives Creditreform access to over 100 million payment experiences.

The calculation of the Creditreform Solvency Index involves a wide range of information relevant to a company's solvency. The individual KPIs in the Commercial Report are collated into an overall score value represented as a three-digit figure.

The following attributes are used in calculating the creditreform Credit Rating Index: Credit opinion, payment behaviour, financial report data, industry risk, company development, turnover, legal form, company's age, regional risk, order-book situation, capital, management experience, number of employees, sales per employee, relationship of capital:sales

Due to their relevance for calculating solvency scores, a wide range of exclusive Creditreform information sources is tapped for this. These sources include, in particular: External payment experiences, Financial statement data, Industry risk

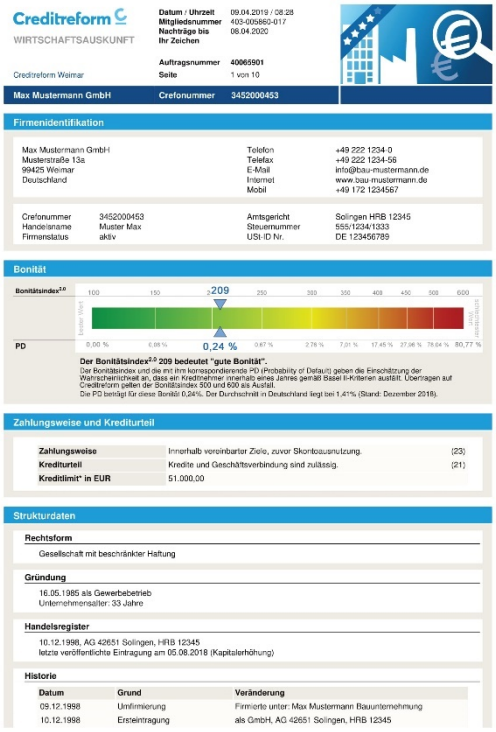
Creditreform's model to determine a Credit Rating								
			Classification					
Example Company	Risk factors	Weight %	1	2	3	4	5	6
Legal form: GmbH (limited company) **Industry:** Electronics – Wholesale **Age:** 12 years **Business development:** Constant (class 3) **Order situation:** Satisfactory (class 3) **Payment behavior:** Within agreed goals (class 2) **Credit Analyst Opinion:** Credit provision and business relationships are permitted (class 2)	Payment behavior	25		50				
	Credit Analyst Opinion	25		50				
	Business development	5			15			
	Order situation	5			15			
	Legal form	4		8				
	Industry	6		12				
	Age	4		8				
	Sales	5			15			
	Employees	4			12			
	Productivity	2		4				
	Equity	5		10				
	Financial statement Rating	10		20				
	Total	**100**		**162**	**57**			
	Credit Rating	**219**						

Statistical valuation models returning accurately calculated forecasts, plus rigorously implemented quality controls, guarantee the meaningfulness of these checks. In this way, the Creditreform Solvency Index allows prospective forecasts to be made for reliably distinguishing between good and profitable, and bad, loss-making, business.

The Creditreform Solvency Index can assume a value ranging from 100 to 500 or 600 – corresponding to a spectrum from excellent solvency to suspension of payment). A solvency index is not calculated for newly formed companies or in the event of uncertain circumstances.

Retrieved from:
https://www.creditreform.at/fileadmin/user_upload/Oesterreich/Downloads/Wirtschaftsinformation/Broschuere_Bonitaetsindex_2.pdf
and
https://www.creditreform.co.uk/wp-content/uploads/2016/12/Solvency_Index.pdf

Example of a Credit Rating Report of Creditreform (fictitious example)



Creditreform
WIRTSCHAFTSAUSKUNFT

Datum / Uhrzeit 09.04.2019 / 08:28
Mitgliedsnummer 403-005860-017
Nachträge bis 08.04.2020
Ihr Zeichen
Auftragsnummer 40065901
Creditreform Weimar
Seite 1 von 10

Max Mustermann GmbH | Crefonummer 3452000453

Firmenidentifikation

Max Mustermann GmbH
Musterstraße 13a
99425 Weimar
Deutschland

Telefon +49 222 1234-0
Telefax +49 222 1234-56
E-Mail info@bau-mustermann.de
Internet www.bau-mustermann.de
Mobil +49 172 1234567

Crefonummer 3452000453
Handelsname Muster Max
Firmenstatus aktiv

Amtsgericht Solingen HRB 12345
Steuernummer 555/1234/1333
USt-ID Nr. DE 123456789

Bonität

Bonitätsindex$^{2.0}$ 209

PD 0,24 %

Der Bonitätsindex$^{2.0}$ 209 bedeutet "gute Bonität".
Der Bonitätsindex und die mit ihm korrespondierende PD (Probability of Default) geben die Einschätzung der Wahrscheinlichkeit an, dass ein Kreditnehmer innerhalb eines Jahres gemäß Basel II-Kriterien ausfällt. Übertragen auf Creditreform gelten der Bonitätsindex 500 und 600 als Ausfall.
Die PD beträgt für diese Bonität 0,24%. Der Durchschnitt in Deutschland liegt bei 1,41% (Stand: Dezember 2018).

Zahlungsweise und Krediturteil

Zahlungsweise	Innerhalb vereinbarter Ziele, zuvor Skontoausnutzung.	(23)
Krediturteil	Kredite und Geschäftsverbindung sind zulässig.	(21)
Kreditlimit* in EUR	51.000,00	

Strukturdaten

Rechtsform
Gesellschaft mit beschränkter Haftung

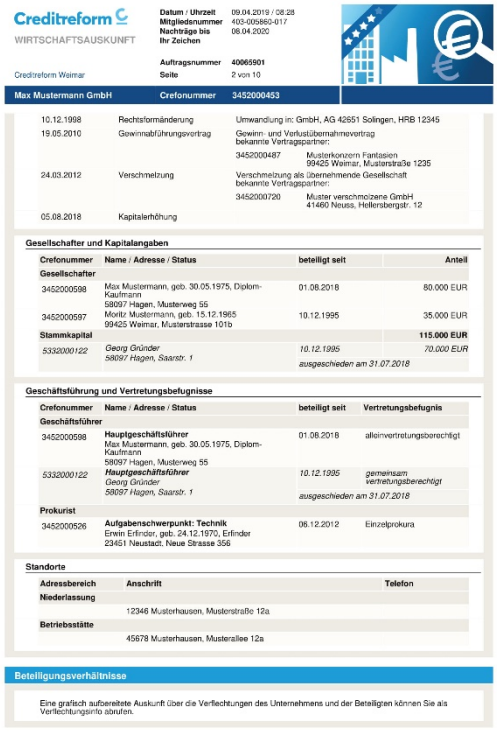
Gründung
16.05.1985 als Gewerbebetrieb
Unternehmensalter: 33 Jahre

Handelsregister
10.12.1998, AG 42651 Solingen, HRB 12345
letzte veröffentlichte Eintragung am 05.08.2018 (Kapitalerhöhung)

Historie

Datum	Grund	Veränderung
09.12.1998	Umfirmierung	Firmierte unter: Max Mustermann Bauunternehmung
10.12.1998	Ersteintragung	als GmbH, AG 42651 Solingen, HRB 12345

Diese Auskunft ist nur für den Empfänger bestimmt. Für den Inhalt wird jede Haftung für einfache Fahrlässigkeit abgelehnt. Was die Auskunft zur Kenntnis nimmt, unterwirft sich diesen Bedingungen. Der Empfänger darf die übermittelten Daten nur für den Zweck verarbeiten oder nutzen, zu dessen Erteilung sie ihm übermittelt worden sind. Eine Nutzung für andere Zwecke ist nur unter der Voraussetzung Art. 6 Abs. 11 V.m. Abs. 4 EU-DSGVO zulässig.
* Das Kreditlimit beruht auf der Einschätzung von Creditreform und beziehnet den von uns empfohlenen Verpflegswert für die Einrichtung einer Kreditlinie zum angefragten Debitor.



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Creditreform Weimar
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Max Mustermann GmbH | Crefonummer 3452000453

10.12.1998	Rechtsformänderung	Umwandlung in: GmbH, AG 42651 Solingen, HRB 12345
19.05.2010	Gewinnabführungsvertrag	Gewinn- und Verlustübernahmevertrag bekannte Vertragspartner: 3452000487 Musterkonzern Fantasien 99425 Weimar, Musterstraße 1235
24.03.2012	Verschmelzung	Verschmelzung als übernehmende Gesellschaft bekannte Vertragspartner: 3452000720 Muster verschmolzene GmbH 41460 Neuss, Hellersbergstr. 12
05.08.2018	Kapitalerhöhung	

Gesellschafter und Kapitalangaben

Crefonummer	Name / Adresse / Status	beteiligt seit	Anteil
Gesellschafter			
3452000598	Max Mustermann, geb. 30.05.1975, Diplom-Kaufmann 58097 Hagen, Musterweg 55	01.08.2018	80.000 EUR
3452000597	Moritz Mustermann, geb. 15.12.1965 99425 Weimar, Musterstrasse 101b	10.12.1995	35.000 EUR
Stammkapital			**115.000 EUR**
5332000122	*Georg Gründer* *58097 Hagen, Saarstr. 1*	*10.12.1995* *ausgeschieden am 31.07.2018*	*70.000 EUR*

Geschäftsführung und Vertretungsbefugnisse

Crefonummer	Name / Adresse / Status	beteiligt seit	Vertretungsbefugnis
Geschäftsführer			
3452000598	**Hauptgeschäftsführer** Max Mustermann, geb. 30.05.1975, Diplom-Kaufmann 58097 Hagen, Musterweg 55	01.08.2018	alleinvertretungsberechtigt
5332000122	***Hauptgeschäftsführer*** *Georg Gründer* *58097 Hagen, Saarstr. 1*	*10.12.1995* *ausgeschieden am 31.07.2018*	*gemeinsam vertretungsberechtigt*
Prokurist			
3452000526	**Aufgabenschwerpunkt: Technik** Erwin Erfinder, geb. 24.12.1970, Erfinder 23451 Neustact, Neue Strasse 356	06.12.2012	Einzelprokura

Standorte

Adressbereich	Anschrift	Telefon
Niederlassung		
	12346 Musterhausen, Musterstraße 12a	
Betriebsstätte		
	45678 Musterhausen, Musterallee 12a	

Beteiligungsverhältnisse

Eine grafisch aufbereitete Auskunft über die Verflechtungen des Unternehmens und der Beteiligten können Sie als Verflechtungsinfo abrufen.

Diese Auskunft ist nur für den Empfänger bestimmt. Für den Inhalt wird jede Haftung für einfache Fahrlässigkeit abgelehnt. Was die Auskunft zur Kenntnis nimmt, unterwirft sich diesen Bedingungen. Der Empfänger darf die übermittelten Daten nur für den Zweck verarbeiten oder nutzen, zu dessen Erteilung sie ihm übermittelt worden sind. Eine Nutzung für andere Zwecke ist nur unter der Voraussetzung Art. 6 Abs. 11 V.m. Abs. 4 EU-DSGVO zulässig.
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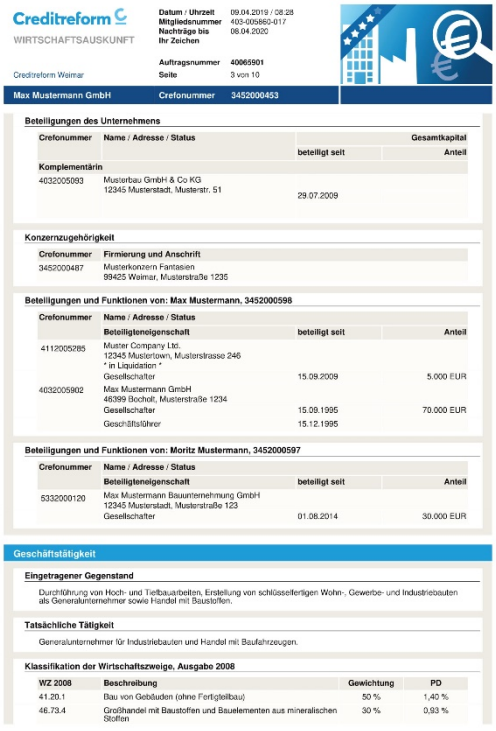

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Max Mustermann GmbH | Crefonummer 3452000453

Beteiligungen des Unternehmens

Crefonummer	Name / Adresse / Status	beteiligt seit	Gesamtkapital Anteil
Komplementärin			
4032005093	Musterbau GmbH & Co KG 12345 Musterstadt, Musterstr. 51	29.07.2009	

Konzernzugehörigkeit

Crefonummer	Firmierung und Anschrift
3452000487	Musterkonzern Fantasien 99425 Weimar, Musterstraße 1235

Beteiligungen und Funktionen von: Max Mustermann, 3452000598

Crefonummer	Name / Adresse / Status Beteiligteneigenschaft	beteiligt seit	Anteil
4112005285	Muster Company Ltd. 12345 Mustertown, Musterstrasse 246 * in Liquidation * Gesellschafter	15.09.2009	5.000 EUR
4032005902	Max Mustermann GmbH 46399 Bocholt, Musterstraße 1234 Gesellschafter	15.09.1995	70.000 EUR
	Geschäftsführer	15.12.1995	

Beteiligungen und Funktionen von: Moritz Mustermann, 3452000597

Crefonummer	Name / Adresse / Status Beteiligteneigenschaft	beteiligt seit	Anteil
5332000120	Max Mustermann Bauunternehmung GmbH 12345 Musterstadt, Musterstraße 123 Gesellschafter	01.08.2014	30.000 EUR

Geschäftstätigkeit

Eingetragener Gegenstand
Durchführung von Hoch- und Tiefbauarbeiten, Erstellung von schlüsselfertigen Wohn-, Gewerbe- und Industriebauten als Generalunternehmer sowie Handel mit Baustoffen.

Tatsächliche Tätigkeit
Generalunternehmer für Industriebauten und Handel mit Baufahrzeugen.

Klassifikation der Wirtschaftszweige, Ausgabe 2008

WZ 2008	Beschreibung	Gewichtung	PD
41.20.1	Bau von Gebäuden (ohne Fertigteilbau)	50 %	1,40 %
46.73.4	Großhandel mit Baustoffen und Bauelementen aus mineralischen Stoffen	30 %	0,93 %

Diese Auskunft ist nur für den Empfänger bestimmt. Für den Inhalt wird jede Haftung für einfache Fahrlässigkeit abgelehnt. Was die Auskunft zur Kenntnis nimmt, unterwirft sich diesen Bedingungen. Der Empfänger darf die übermittelten Daten nur für den Zweck verarbeiten oder nutzen, zu dessen Erteilung sie ihm übermittelt worden sind. Eine Nutzung für andere Zwecke ist nur unter der Voraussetzung Art. 6 Abs. 11 V.m. Abs. 4 EU-DSGVO zulässig.
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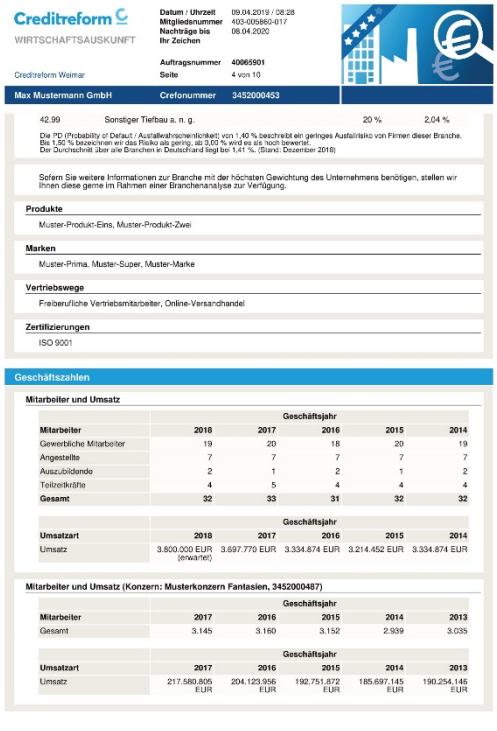

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Max Mustermann GmbH | Crefonummer 3452000453

42.99	Sonstiger Tiefbau a. n. g.	20 %	2,04 %

Die PD (Probability of Default / Ausfallwahrscheinlichkeit) von 1,40 % beschreibt ein geringes Ausfallrisiko von Firmen dieser Branche. Bis 1,50 % bezeichnen wir das Risiko als gering, ab 3,00 % wird es als hoch bewertet.
Der Durchschnitt über alle Branchen in Deutschland liegt bei 1,41 %. (Stand: Dezember 2018)

Sofern Sie weitere Informationen zur Branche mit der höchsten Gewichtung des Unternehmens benötigen, stellen wir Ihnen diese gerne im Rahmen einer Branchenanalyse zur Verfügung.

Produkte
Muster-Produkt-Eins, Muster-Produkt-Zwei

Marken
Muster-Prima, Muster-Super, Muster-Marke

Vertriebswege
Freiberufliche Vertriebsmitarbeiter, Online-Versandhandel

Zertifizierungen
ISO 9001

Geschäftszahlen

Mitarbeiter und Umsatz

	Geschäftsjahr				
Mitarbeiter	**2018**	**2017**	**2016**	**2015**	**2014**
Gewerbliche Mitarbeiter	19	20	18	20	19
Angestellte	7	7	7	7	7
Auszubildende	2	1	2	1	2
Teilzeitkräfte	4	5	4	4	4
Gesamt	**32**	**33**	**31**	**32**	**32**

	Geschäftsjahr				
Umsatzart	**2018**	**2017**	**2016**	**2015**	**2014**
Umsatz	3.800.000 EUR (erwartet)	3.697.770 EUR	3.334.874 EUR	3.214.452 EUR	3.334.874 EUR

Mitarbeiter und Umsatz (Konzern: Musterkonzern Fantasien, 3452000487)

	Geschäftsjahr				
Mitarbeiter	**2017**	**2016**	**2015**	**2014**	**2013**
Gesamt	3.145	3.160	3.152	2.939	3.035

	Geschäftsjahr				
Umsatzart	**2017**	**2016**	**2015**	**2014**	**2013**
Umsatz	217.580.805 EUR	204.123.956 EUR	192.751.872 EUR	185.697.145 EUR	190.254.146 EUR

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* Das Kreditlimit beruht auf der Einschätzung von Creditreform und beziehnet den von uns empfohlenen Verpflegswert für die Einrichtung einer Kreditlinie zum angefragten Debitor.

Import / Export

	Import	Export
Quote	30 %	5 %
Länder	Frankreich, Österreich	China, Indien

Immobilien

Immobilienart	Anschrift	Verkehrswert	Belastung
Betriebsanwesen			
	12345 Musterstadt, Musterstr. 123	180.000 EUR	
Unbebautes Grundstück			
	23456 Musterdorf, Musterweg 20	200.000 EUR	

Eine Überprüfung der Angaben zum Immobilieneigentum durch Grundbucheinsicht ist uns leider nicht möglich.

Unternehmensbilanz

Hinweis

Bitte beachten Sie, dass die dargestellte Bilanz von der veröffentlichten Bilanz abweicht, da diese zu Bewertungszwecken in eine Strukturbilanz (Analysebilanz) überführt wurde. Hintergrund dafür ist, dass die vom Gesetz eingeräumten Wahlrechte bzw. die vom Unternehmen genutzten, gesetzeskonformen, bilanzpolitischen Gestaltungsmaßnahmen aus analytischer Sicht nicht den tatsächlichen Erfolg der Periode im betriebswirtschaftlichen Sinne wiedergeben und somit nicht ausreichend genau das tatsächliche Bild der Vermögens-, Finanz- und Ertragslage des Unternehmens abbilden. Aus diesem Grund werden einzelne Bilanzpositionen aufgespaltet, umgegliedert oder umgruppiert.

Bilanz

Bilanzkategorie	**mittel**	**mittel**
Rechnungslegung	**HGB**	**HGB**
Berichtszeitraum	**01.01.2017 - 31.12.2017**	**01.01.2016 - 31.12.2016**
strukturierte Aktiva	**in EUR**	**in EUR**
bereinigte Bilanzsumme Aktiva	***12.727.978,16***	***12.657.634,86***
Summe Anlagevermögen	**12.293.889,76**	**11.617.592,18**
bereinigtes immaterielles Vermögen	*8.756,78*	*4.719,91*
Konzessionen, Schutzrechte, Lizenzen	8.756,78	4.719,91
Sachanlagevermögen	*12.285.132,98*	*11.612.872,27*
Grundstücke, Bauten	12.213.777,45	11.469.402,76
Betriebs- und Geschäftsausstattung, Anlagen	59.859,95	67.069,54
Anzahlungen und Anlagen im Bau	11.495,58	76.399,97
Summe Umlaufvermögen	**434.088,40**	**1.040.042,68**
monetäres (kurzfristiges) Umlaufvermögen	*419.786,48*	*1.019.624,78*
Forderungen aus Lieferungen und Leistungen RLZ bis 1 Jahr	17.317,90	11.847,09
flüssige Mittel	402.468,58	1.007.777,69
mittelfristiges Umlaufvermögen	*14.301,92*	*20.417,90*
sonstige Forderungen und Vermögensgegenstände RLZ über 1 Jahr	14.301,92	20.417,90
strukturierte Passiva	**in EUR**	**in EUR**
bereinigte Bilanzsumme Passiva	***12.727.978,16***	***12.657.634,86***

bereinigtes Eigenkapital	**4.715.420,95**	**4.072.111,02**
Nennkapital, Kapitalkonto I	*1.614.176,97*	*1.398.826,46*
+ Gewinnrücklagen / Rücklagen bei Personengesellschaften	*3.038.565,48*	*2.696.733,89*
+ Bilanzgewinn / Bilanzverlust	*62.678,50*	*-23.449,33*
Summe Fremdkapital	**8.012.557,21**	**8.585.523,84**
mittelfristiges Fremdkapital	*6.376.585,84*	*7.037.737,30*
Verbindlichkeiten gegenüber Kreditinstituten RLZ 1 bis 5 Jahre	6.376.585,84	7.037.737,30
kurzfristiges Fremdkapital	*1.635.971,37*	*1.547.786,54*
Steuerrückstellungen und sonstige Rückstellungen	19.090,00	18.600,00
erhaltene Anzahlungen RLZ bis 1 Jahr	162.184,24	110.746,62
Verbindlichkeiten aus Lieferungen und Leistungen RLZ bis 1 Jahr	125.392,57	291.629,12
sonstige Verbindlichkeiten inkl. Steuerverbindlichkeiten RLZ bis 1 Jahr	1.329.304,56	1.126.810,80
Bilanzgewinn-/Verlust aus Bilanz	***62.678,50***	***-23.449,33***

Gewinn- und Verlustrechnung

Berechnungsart: Gesamtkostenverfahren

Rechnungslegung	**HGB**	**HGB**
Berichtszeitraum	**01.01.2017 - 31.12.2017**	**01.01.2016 - 31.12.2016**
	in EUR	**in EUR**
Umsatzerlöse	**3.697.769,96**	**3.334.874,17**
Gesamtleistung	***3.697.769,96***	***3.334.874,17***
Aufwand für Roh-, Hilfs- und Betriebsstoffe	2.075.657,53	1.796.202,41
Rohertrag	***1.622.112,43***	***1.538.671,76***
sonstige betriebliche Erträge	93.462,19	55.698,75
Löhne und Gehälter	592.047,89	521.018,10
Abschreibungen inkl. Firmenabschreibung	550.800,65	630.043,87
sonstige betriebliche Aufwendungen	113.944,17	94.217,43
Betriebsergebnis	***458.781,91***	***349.091,11***
sonstige Zinsen und ähnliche Erträge	8.631,64	10.347,99
Zinsen und ähnliche Aufwendungen	***301.811,01***	***296.644,26***
Finanzergebnis	***-293.179,37***	***-286.296,27***
Ergebnis der gewöhnlichen Geschäftstätigkeit	165.602,54	62.794,84
Gesamtergebnis	***165.602,54***	***62.794,84***
sonstige Steuern	102.924,04	86.244,17
Jahresüberschuss / -fehlbetrag	***62.678,50***	***-23.449,33***
Jahresüberschuss / -fehlbetrag nach Gewinn- / Verlustabführung	***62.678,50***	***-23.449,33***

Jahresabschlusskennzahlen

Berichtszeitraum	**01.01.2017 - 31.12.2017**	**01.01.2016 - 31.12.2016**
Vermögensstruktur		
Anlagenintensität (%)	**96,58**	**91,78**

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Kapitalumschlag	**0,29**	**0,26**
Quote der flüssigen Mittel (%)	**3,16**	**7,96**
Kapitalstruktur		
Eigenkapitalquote (%)	**37,04**	**32,17**
Verschuldungsgrad	**1,69**	**2,10**
Lieferantenziel (Tage)	**22,05**	**59,26**
Kurzfristige Kapitalbindung (%)	**39,33**	**42,53**
Rentabilität		
Gesamtkapitalrentabilität (%)	**2,86**	**2,15**
Umsatzrentabilität (%)	**4,24**	**1,57**
Erfolgsquote (%)	**0,49**	**-0,18**
Liquidität		
Liquidität I. Grades (%) erweitert	**5,02**	**11,73**

Konzernbilanz

Hinweis

Bitte beachten Sie, dass die dargestellte Bilanz von der veröffentlichten Bilanz abweicht, da diese zu Bewertungszwecken in eine Strukturbilanz (Analysebilanz) überführt wurde. Hintergrund dafür ist, dass die vom Gesetz eingeräumten Wahlrechte bzw. die vom Unternehmen genutzten, gesetzeskonformen, bilanzpolitischen Gestaltungsmaßnahmen aus analytischer Sicht nicht den tatsächlichen Erfolg der Periode im betriebswirtschaftlichen Sinne wiedergeben und somit nicht ausreichend genau das tatsächliche Bild der Vermögens-, Finanz- und Ertragslage des Unternehmens abbilden. Aus diesem Grund werden einzelne Bilanzpositionen aufgespaltet, umgegliedert oder umgruppiert.

Bilanz (Konzern: Musterkonzern Fantasien, 3452000487)

Bilanzkategorie	**groß**	**groß**
Rechnungslegung	**HGB**	**HGB**
Berichtszeitraum	**01.01.2017 - 31.12.2017**	**01.01.2016 - 31.12.2016**
strukturierte Aktiva	**in EUR**	**in EUR**
bereinigte Bilanzsumme Aktiva	***128.223.823,39***	***114.593.814,62***
Summe Anlagevermögen	**51.359.844,66**	**51.699.490,65**
bereinigtes immaterielles Vermögen	*7.422.251,71*	*9.741.001,40*
Konzessionen, Schutzrechte, Lizenzen	765.229,28	877.993,13
Anzahlungen auf immaterielles Vermögen	41.947,43	3.452.393,87
sonstige immaterielle Vermögensgegenstände	6.615.075,00	5.410.614,40
Sachanlagevermögen	*43.937.592,95*	*41.958.489,25*
Grundstücke, Bauten	30.154.458,86	27.542.745,40
Maschinen, technische Anlagen	7.445.789,31	6.878.709,60
Betriebs- und Geschäftsausstattung, Anlagen	5.799.681,94	5.776.745,89
Anzahlungen und Anlagen im Bau	537.662,84	1.760.288,36
Summe Umlaufvermögen	**76.863.978,73**	**62.894.323,97**
Vorräte	*50.249.587,28*	*42.839.542,07*
Roh-, Hilfs- und Betriebsstoffe	27.054.711,36	24.225.913,86
fertige und unfertige Erzeugnisse und Handelswaren	23.194.875,92	18.613.628,21
monetäres (kurzfristiges) Umlaufvermögen	*26.614.391,45*	*20.054.781,90*

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Forderungen aus Lieferungen und Leistungen RLZ bis 1 Jahr	18.546.317,98	16.032.047,23
flüssige Mittel	6.409.520,16	2.970.694,23
aktive Rechnungsabgrenzung (ohne Disagio)	1.658.553,31	1.052.040,44
strukturierte Passiva	**in EUR**	**in EUR**
bereinigte Bilanzsumme Passiva	***128.223.823,39***	***114.593.814,62***
bereinigtes Eigenkapital	**53.748.388,32**	**45.081.116,62**
Nennkapital, Kapitalkonto I	*15.000.000,00*	*15.000.000,00*
+ Kapitalrücklage	*5.963.985,00*	*5.963.985,00*
+ Gewinnrücklagen / Rücklagen bei Personengesellschaften	*998.090,88*	*1.083.620,35*
- aktivierter Geschäfts- oder Firmenwert	*7.907.681,48*	*8.915.688,60*
+ 1/2 Sonderposten mit Rücklagenanteil	*772.894,09*	*864.717,50*
+ Gewinnvortrag / Verlustvortrag	*31.084.482,37*	*24.876.119,64*
+ Jahresüberschuss / Jahresfehlbetrag	*7.836.617,46*	*6.208.362,73*
Summe Fremdkapital	**74.475.435,07**	**69.512.698,00**
langfristiges Fremdkapital	*910.043,08*	*907.399,38*
Pensionsrückstellungen und ähnliche längerfristige Rückstellungen	910.043,08	907.399,38
mittelfristiges Fremdkapital	*772.894,09*	*864.717,50*
1/2 Sonderposten mit Rücklagenanteil	772.894,09	864.717,50
kurzfristiges Fremdkapital	*72.792.497,90*	*67.740.581,12*
Steuerrückstellungen und sonstige Rückstellungen	4.796.712,36	7.343.877,58
Verbindlichkeiten gegen Gesellschafter RLZ bis 1 Jahr	250.000,00	250.000,00
Verbindlichkeiten gegenüber Kreditinstituten RLZ bis 1 Jahr	40.857.194,43	33.381.303,36
Verbindlichkeiten aus Lieferungen und Leistungen RLZ bis 1 Jahr	14.402.469,00	16.158.569,80
sonstige Verbindlichkeiten inkl. Steuerverbindlichkeiten RLZ bis 1 Jahr	11.822.570,04	9.865.684,45
passive Rechnungsabgrenzung	663.552,07	741.145,93
Bilanzgewinn-/Verlust aus Bilanz	***38.921.099,83***	***31.084.482,37***

Zusatzinformationen

Banken

Bankname Ort	BLZ SWIFT
Deutsche Bank AG 42651 Solingen	34270094 DEUTDEDW342
Commerzbank AG 42651 Solingen	34240050 COBADEFFXXX

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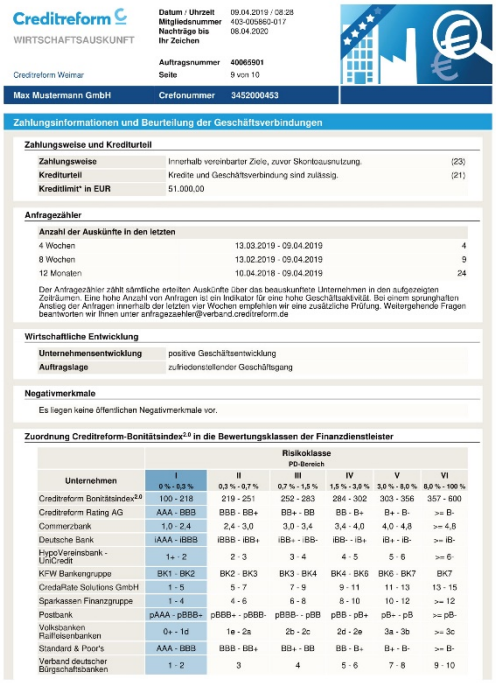

Creditreform
WIRTSCHAFTSAUSKUNFT

Datum / Uhrzeit 09.04.2019 / 08:28
Mitgliedsnummer 403-005860-017
Nachträge bis 08.04.2020
Ihr Zeichen

Auftragsnummer 40065901
Creditreform Weimar Seite 9 von 10
Max Mustermann GmbH Crefonummer 3452000453

Zahlungsinformationen und Beurteilung der Geschäftsverbindungen

Zahlungsweise und Krediturteil

Zahlungsweise	Innerhalb vereinbarter Ziele, zuvor Skontoausnutzung.	(23)
Krediturteil	Kredite und Geschäftsverbindung sind zulässig.	(21)
Kreditlimit* in EUR	51.000,00	

Anfragezähler

Anzahl der Auskünfte in den letzten		
4 Wochen	13.03.2019 - 09.04.2019	4
8 Wochen	13.02.2019 - 09.04.2019	9
12 Monaten	10.04.2018 - 09.04.2019	24

Der Anfragezähler zählt sämtliche erteilten Auskünfte über das beauskunftete Unternehmen in den aufgezeigten Zeiträumen. Eine hohe Anzahl von Anfragen ist ein Indikator für eine hohe Geschäftsaktivität. Bei einem sprunghaften Anstieg der Anfragen innerhalb der letzten vier Wochen empfehlen wir eine zusätzliche Prüfung. Weitergehende Fragen beantworten wir Ihnen unter anfragezaehler@verband.creditreform.de

Wirtschaftliche Entwicklung

Unternehmensentwicklung	positive Geschäftsentwicklung
Auftragslage	zufriedenstellender Geschäftsgang

Negativmerkmale

Es liegen keine öffentlichen Negativmerkmale vor.

Zuordnung Creditreform-Bonitätsindex$^{2.0}$ in die Bewertungsklassen der Finanzdienstleister

	Risikoklasse PD-Bereich					
Unternehmen	I 0 % - 0,3 %	II 0,3 % - 0,7 %	III 0,7 % - 1,5 %	IV 1,5 % - 3,0 %	V 3,0 % - 8,0 %	VI 8,0 % - 100 %
Creditreform Bonitätsindex$^{2.0}$	100 - 218	219 - 251	252 - 283	284 - 302	303 - 356	357 - 600
Creditreform Rating AG	AAA - BBB	BBB - BB+	BB+ - BB	BB - B+	B+ - B-	>= B-
Commerzbank	1,0 - 2,4	2,4 - 3,0	3,0 - 3,4	3,4 - 4,0	4,0 - 4,8	>= 4,8
Deutsche Bank	AAA - BBB	BBB - BB+	BB+ - BB-	BB- - B+	B+ - B-	>= B-
HypoVereinsbank - UniCredit	1+ - 2	2 - 3	3 - 4	4 - 5	5 - 6	>= 6
KFW Bankengruppe	BK1 - BK2	BK2 - BK3	BK3 - BK4	BK4 - BK6	BK6 - BK7	BK7
CreditRate Solutions GmbH	1 - 5	5 - 7	7 - 9	9 - 11	11 - 13	13 - 15
Sparkassen Finanzgruppe	1 - 4	4 - 6	6 - 8	8 - 10	10 - 12	>= 12
Postbank	pAAA - pBBB+	pBBB+ - pBBB-	pBBB- - pBB	pBB - pB+	pB+ - pB	>= pB-
Volksbanken Raiffeisenbanken	0+ - 1d	1e - 2a	2b - 2c	2d - 2e	3a - 3b	>= 3c
Standard & Poor's	AAA - BBB	BBB - BB+	BB+ - BB	BB - B+	B+ - B-	>= B-
Verband deutscher Bürgschaftsbanken	1 - 2	3	4	5 - 6	7 - 8	9 - 10

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Weitere Informationen zu den Risikoklassen finden Sie unter www.creditreform.de/ratingmap

Die PD (Probability of Default) gibt die Wahrscheinlichkeit an, dass ein Kreditnehmer innerhalb eines Jahres gemäß Basel II-Kriterien ausfällt. Überfragen auf Creditreform gelten der Bonitätsindex 500 und 600 als Ausfall. Angabe des PD-Bereichs von (inkl.) bis (exkl.)

Die Bewertung des angefragten Unternehmens liegt im blau unterlegten Bereich.

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Retrieved from:
https://www.creditreform.de/fileadmin/user_upload/central_files/docs/produkte/muster/Muster-Creditreform-Wirtschaftsauskunft.pdf

Database - Mannheim Enterprise Panel

The following description is based on information retrieved from the corporate website of ZEW and Bersch et al. (2014).

The Mannheim Enterprise panel (MEP) is a proprietary panel dataset available at ZEW – Leibniz Centre for European Economic Research (ZEW) in Germany. The MEP is a joint project between ZEW and Creditreform, the largest Credit agency operating in Germany. The database is a collection of all firm-level data collected by Creditreform. Each 6 months, ZEW receives an update of all the data collected by Creditreform. ZEW process the data and brings the data into a panel structure.

The first wave of available data was received in 1992 and contains data about the entire population of Eastern Germany, as well as all start-ups in Western Germany. From 2000 onwards, ZEW received data that covers the full population of German companies. Around that period, the MEP also contains data from firms operating in 26 other countries.

Creditreform registers new businesses in its database through three channels: (1) They make use of records from official registers such as the Handelsregister, (2) reports on firms in various media, and (3) research by the credit analysts of Creditreform in response to requests of clients. Through this procedure, the MEP covers all firms with a "significant economic activity". Firms with minor economic activities – such as freelancers, unlimited-liability microenterprises, businesses in the agricultural sector – are underrepresented in the MEP. Comparison with aggregated statistics from the German Statistical Business Register of the Federal Statistical Office shows that the MEP contains data about 91% of all firms in 2012.

The MEP dataset is the most comprehensive dataset on the German economy that can be used for research. When we compare the Orbis, Amadeus and Dafne database to the MEP, we observe that the products of Bureau van Dijk (BvD) only contain data for about 28% of German firms that are available in the MEP. It is important to note that the data that is available about German companies in the products of BvD originate from Creditreform. However, Creditreform only sells data to BvD that was retrieved from publicly available data sources. Hence, the vast majority of data that is available in Orbis comes from sources such as the Bundesanzeiger website (the official publication platform in Germany). Firms that are not required to disclose such information on this platform are thus not observable in the datasets of BvD (e.g., unlimited liability firms). The MEP contains the same data as is available in the products of BvD, but in addition it contains financial information for a large fraction of firms that voluntarily disclose financial statements to Creditreform. This information is not sold to BvD. For example, in the period 2002 to 2005, when firms were not yet enforced to disclose financial statement information to public, we observe voluntarily disclosed financial information for approximately 1 million firms on a yearly basis in the MEP. In Orbis, we only observe data for approximately 50,000 companies in that period.

Next to accounting data, the MEP also includes data about firms' credit ratings, as well as all other underlying data that is used to construct these ratings (e.g., payment behavior information received from suppliers).

The MEP does not have the typical biases that exist in Orbis and Amadeus. For example, ZEW does not remove any information about companies in their database. Unlike the Orbis and Amadeus database, firms are thus not removed when they go bankrupt or stop disclosing information for 5 years in a row. For more information, see the webpage of ZEW about the Mannheim Enterprise Panel (2020), and the paper of Bersch et al (2014) for more technical details.

References:

ZEW. (2020) The Mannheim Enterprise Panel. ZEW Webpage (2020). Retrieved from: https://www.zew.de/PJ92-1

Bersch, J., Gottschalk, S., Müller, B., & Niefert, M. (2014). The Mannheim Enterprise Panel (MUP) and Firm Statistics for Germany. *ZEW-Centre for European Economic Research Discussion Paper*, (14-104).

Online Appendix Figures

Matched Sample of Treated and German Unlimited Liability Firms

Figure A1: Average Difference in Credit Ratings between Treated and Control Group Over Time
Control Group: German Unlimited Liability Firms

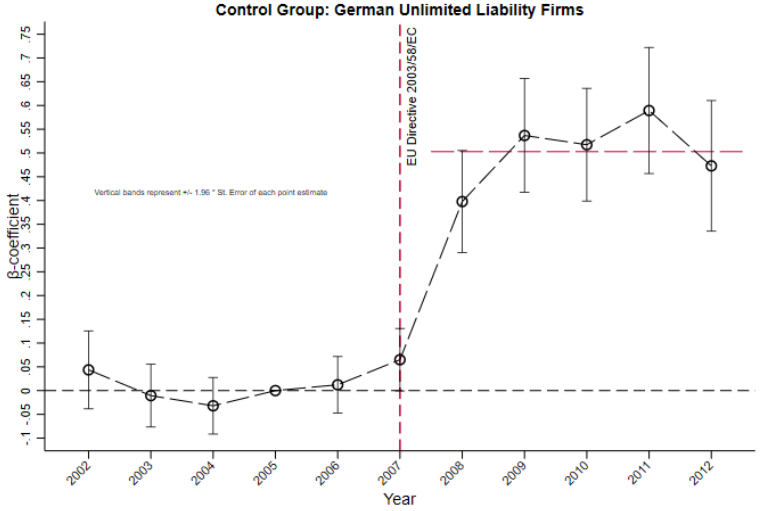
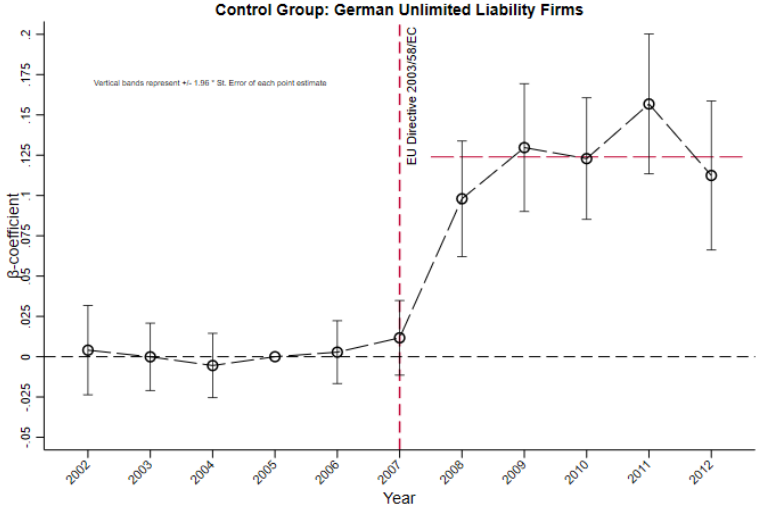


Figure A2: Average Difference in Analyst Opinion between Treated and Control Group Over Time
Control Group: German Unlimited Liability Firms



Matched Sample of Treated and Austrian Limited Liability Firms

Figure A3: Average Difference in Credit Ratings between Treated and Control Group Over Time
Control Group: Austrian Limited Liability Firms

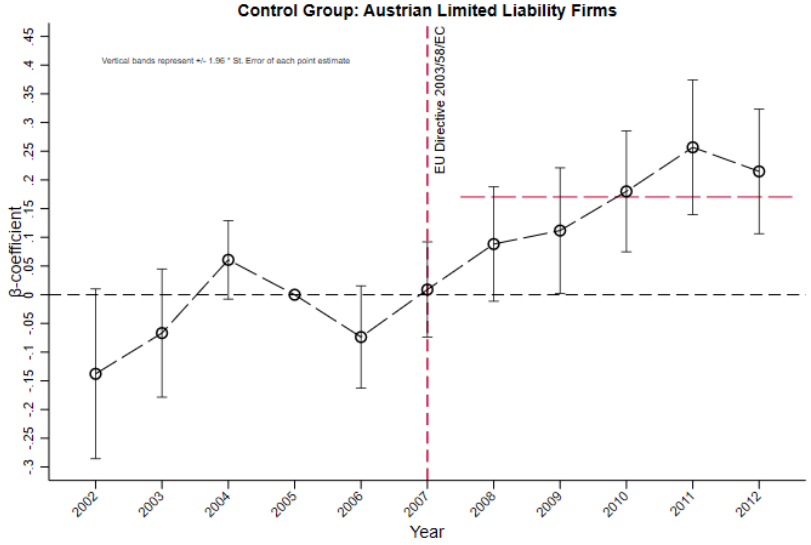
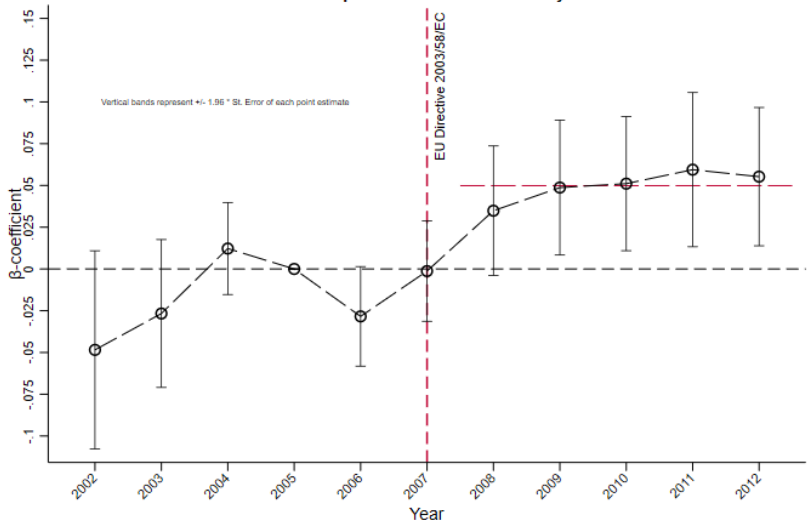


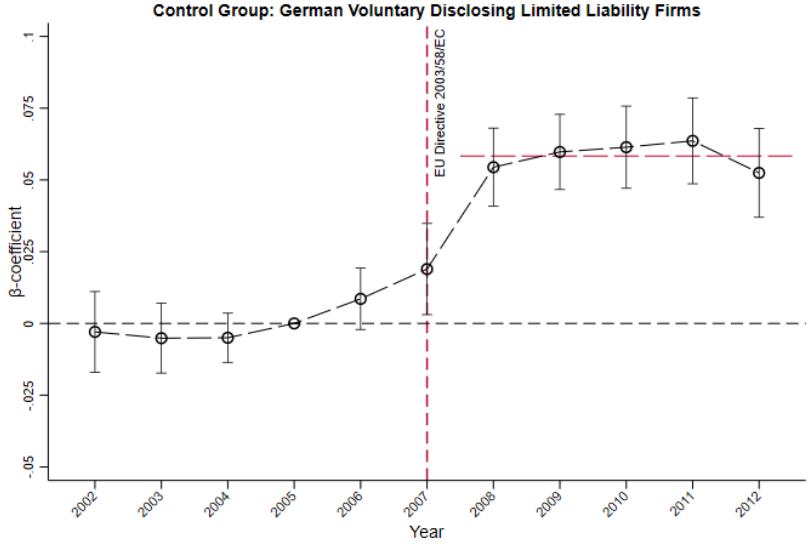
Figure A4: Average Difference in Analyst Opinion between Treated and Control Group Over Time
Control Group: Austrian Limited Liability Firms



Matched Sample of Treated and German Limited Liability Firms

Figure A5: Average Difference in Credit Ratings between Treated and Control Group Over Time
Control Group: German Voluntary Disclosing Limited Liability Firms

Figure A6: Average Difference in Analyst Opinion between Treated and Control Group Over Time
Control Group: German Voluntary Disclosing Limited Liability Firms



Online Appendix Tables

Table A1

SAMPLE SELECTION				
	Treated Group	Control Groups		
Sample selection criteria:	Limited (Germany)	Unlimited (Germany)	Limited (Austria)	Limited (Germany) Voluntary Disclosure
Firm-year observations in MEP in period 2002-2012	8,597,690	398,557	1,150,308	676,136
Remove observations with missing credit ratings	-2,412,649	-160,498	-534,219	-82,949
Remove observations with missing information on credit information (e.g., payment behavior, employees, sales, etc.)	-2,270,884	-87,809	-330,962	-142,909
Remove observations with characteristics above the thresholds that require *unlimited* companies to disclose	-72,000	-3,021	-11,143	-30,251
Remove firms that we only observe before or after the mandate	-1,244,448	-52,110	-115,710	-80,608
Remove OHG/KG that voluntary disclosed before or after the mandate (according to Orbis Database)	0	-4,407	0	0
Remove limited-liability firms that did not disclose to the public after the mandate (according to Orbis Database)	-689,558	0	0	0
Remove Austrian GMBH that did not disclose in the pre and post period (according to Orbis Database)	0	0	-111,727	0
Remove firms where the CRA does not observe (voluntary disclosed) financial statements before and/or after the mandate.	-470,132	-60,263	0	0
Final Samples	1,438,019	30,449	46,547	339,419

Notes: We start with the sample of the MEP (wave 56) containing 81 million firm year observation across 23 European Countries. We retain all limited-liability (GmbH and GmbH Co.KG) and unlimited-liability firms (OHG and KG) in the MEP database for Germany, and all limited-liability firms (GmbH and GmbH Co.KG) for Austria that do no switch legal form over our sample period (36,236 firm year observations drop out due to removing switching firms - 0.3% of the sample). From this sample we keep all firm-year observations where the CRA provides a credit rating. Next, we keep all observations where the CRA has all credit information available that is used in their credit rating model. The largest group that drops out is due to missing observations on either sales or employee data. Information is rarely missing on other variables such as payment behavior. Next, we remove firm-year observations in our sample that have more than 65 million euro in total assets, 130 million euro in sales or more than 5,000 employees. We remove these firms from our sample because unlimited-liability firms in Germany that score above these thresholds are required to disclose financial statement information to the public. Next, we remove firms that we do not observe before or after the law change to keep the sample balanced over the two period. We thereby also remove firms that default in our sample period, because we need to observe firms in both periods. As a last step, we remove unlimited-liability firms that voluntary disclosed before and/or after the mandate and limited-liability firms that did not disclose to the public when they are required to do so. To identify these firms, we make use of historical records of the Orbis database, which include only data of publicly available financial statements. By comparing if firms have financial statement data available in the Orbis database or not, we can verify if they disclose or not to the public. Finally, we also remove firms where the CRA did not receive a full set of financial statement information (through private channels) for our treated and control firms. This leaves us with a final sample of 1,854,434 firm-year observations across 4 distinct groups. Note that minor differences in the number of observations exist when one would compare these totals with the total number of observations in our main analyses. This is because we removed singletons due to the inclusion of year-industry and year-region fixed effects. Specifically, 217 treated and 4 control firm-year observations drop out in the Limited-liability (Germany) vs Unlimited-liability (Germany) sample, 169 treated and 6 control firm-year observations drop out in the Limited-liability (Germany) vs Limited-liability (Austria) sample, and 54 treated and 24 control drop out in the limited-liability (Germany) vs Limited-liability (Germany) sample.

Table A2

SAMPLE BREAKDOWN BY YEAR				
	Treated Group	Control Groups		
Year	Limited (Germany)	Unlimited (Germany)	Limited (Austria)	Limited (Germany) Voluntary Disclosure
2002	117,360	2,508	3,839	30,064
2003	119,179	2,588	4,192	31,423
2004	131,644	2,734	4,380	33,071
2005	144,058	2,955	4,077	33,178
2006	149,189	3,045	5,027	32,641
2007	132,691	2,802	3,797	30,740
2008	133,349	2,944	4,585	30,678
2009	127,579	2,717	4,475	28,871
2010	127,710	2,772	4,414	29,355
2011	127,557	2,736	3,841	29,525
2012	127,703	2,648	3,920	29,873
Final Samples	1,438,019	30,449	46,547	339,419

Notes: This table presents the sample breakdown by year across treated and control groups. The final sample compromises 1,854,434 firm-year observations across 4 distinct groups. Treated firms are limited-liability firms operating in Germany with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements after 2007. We have three control groups: (1) German unlimited-liability firms with the legal forms OHG or KG that were neither required before nor after 2007 to disclose financial statements; (2) limited-liability firms operating in Austria that were required to disclose already from 1996 onwards; (3) German limited-liability firms that already voluntary disclosed before 2007. Note that minor differences in the number of observations exist when one would compare the totals with the number of observations in our main analyses. Singletons were removed due to the inclusion of year-industry and year-region fixed effects. Specifically, 217 treated and 4 control firm-year observations drop out in the Limited-liability (Germany) vs Unlimited-liability (Germany) comparison, 169 treated and 6 control firm-year observations drop out in the Limited-liability (Germany) vs Limited-liability (Austria) comparison, and 54 treated and 24 control drop out in the limited-liability (Germany) vs Limited-liability (Germany) comparison.

Table A3

SWITCHING LEGAL FORMS AROUND THE MANDATE	
Years	Switching from Limited to Unlimited-liability Firms
2003	0.017%
2004	0.035%
2005	0.056%
2006	0.052%
2007	0.058%
2008	0.064%
2009	0.058%
2010	0.069%
2011	0.060%
2012	0.068%

Notes: This table presents descriptive statistics on the percentage of limited-liability firms that switch to unlimited-liability firms in the database during our time period of interest.

Table A4

DESCRIPTIVE STATISTICS – PRIVATE INFORMATION AVAILABILITY OVER TIME

Panel A: All firms (including firms with missing credit ratings)

Period	Limited Liability Firms (Legal Form: GmbH / GmbH Co. KG)				Unlimited Liability Firms (Legal Form: OHG /KG)			
Non-missing:	Credit Rating	Employees	Sales	Payment Behavior	Credit Rating	Employees	Sales	Payment Behavior
2002-2006	70.45%	58.38%	60.16%	78.29%	61.49%	50.83%	53.07%	68.54%
2008-2012	77.21%	58.36%	54.69%	87.19%	62.09%	49.75%	47.66%	68.52%

Panel B: Firms with credit ratings

Period	Limited Liability Firms (Legal Form: GmbH / GmbH Co. KG)			Unlimited Liability Firms (Legal Form: OHG /KG)		
Non-missing:	Employees	Sales	Payment Behavior	Employees	Sales	Payment Behavior
2002-2006	80.16%	76.45%	99.76%	79.44%	75.50%	99.82%
2008-2012	71.70%	64.25%	99.99%	77.25%	68.95%	99.90%

Notes: This Table presents descriptive statistics regarding availability of private information data collected by the CRA.

Table A5

REPORTING REGULATION AND CREDIT RATINGS (ORDERED LOGIT MODEL)

Outcome	Credit Rating Index		
Control Group	Unlimited (Germany)	Limited (Austria)	Limited (Germany)
Column	(1)	(2)	(3)
Treated x Post	0.083**	0.093**	0.444***
	(0.036)	(0.043)	(0.028)
Treated	1.096***	-0.434***	0.398***
	(0.040)	(0.097)	(0.049)
Year-Industry FE	Yes	Yes	Yes
Year-County FE	Yes	No	Yes
Observations	1,468,247	1,484,391	1,777,360
Clusters (County)	443	543	444
R-squared	0.616	0.585	0.609

Notes: This table presents Ordered logit regressions following the approach of Dimitrov et al. (2015). Treated firms are limited-liability firms operating in Germany with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements after 2007. We have three control groups: (1) German unlimited-liability firms with the legal forms OHG or KG that were neither required before nor after 2007 to disclose financial statements; (2) limited-liability firms operating in Austria that were required to disclose already from 1996 onwards; (3) German limited-liability firms that already voluntary disclosed before 2007. *Post* is a dummy variable equal to 1 for all firms for the years after 2007, i.e. the period when financial statements of treated firms became publicly available. The credit rating index range from 1 (AAA) to 21 (C). A positive (negative) coefficient indicates that the credit rating gets worse (better). Variable definitions are provided in Online Appendix. Heteroscedasticity-robust standard errors are clustered at the county level and are presented in parentheses. ***, ** and * indicate a significance level of 1%, 5%, and 10%, respectively.

Table A6

REPORTING REGULATION AND RECOMMENDED TRADE CREDIT

Outcome	Log (Recommended Trade Credit)		
Control Group	Unlimited (Germany)	Limited (Austria)	Limited (Germany)
Column	(1)	(2)	(3)
Treated x Post	-0.398***	-0.199***	-0.242***
	(0.026)	(0.062)	(0.017)
Log (Sales +1)	0.132***	0.127***	0.067**
	(0.036)	(0.036)	(0.032)
Log (Age)	0.203***	0.190***	0.206***
	(0.011)	(0.012)	(0.011)
Log (Equity +1)	0.070***	0.067***	0.079***
	(0.009)	(0.009)	(0.008)
Log (Productivity +1)	-0.127***	-0.124***	-0.056*
	(0.036)	(0.036)	(0.032)
Log(Employees +1)	0.074*	0.095**	0.159***
	(0.044)	(0.045)	(0.039)
Firm FE	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes
Year-County FE	Yes	No	Yes
Payment Behavior FE	Yes	Yes	Yes
Order Situation FE	Yes	Yes	Yes
Business Development FE	Yes	Yes	Yes
Controls x Post	Yes	Yes	Yes
Observations	1,468,247	1,484,391	1,777,360
Clusters (County)	443	543	444
R-squared	0.672	0.675	0.674

Notes: This table presents OLS regressions of recommended amount of trade Credit. Treated firms are limited-liability firms operating in Germany with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements after 2007. We have three control groups: (1) German unlimited-liability firms with the legal forms OHG or KG that were neither required before nor after 2007 to disclose financial statements; (2) limited-liability firms operating in Austria that were required to disclose already from 1996 onwards; (3) German limited-liability firms that already voluntary disclosed before 2007. *Post* is a dummy variable equal to 1 for all firms for the years after 2007, i.e. the period when financial statements of treated firms became publicly available. Variable definitions are provided in Online Appendix. Heteroscedasticity-robust standard errors are clustered at the county level and are presented in parentheses. ***, ** and * indicate a significance level of 1%, 5%, and 10%, respectively.

Table A7

REPORTING REGULATION AND CREDIT RATINGS
(MATCHED SAMPLE)

Outcome	Credit Expert Opinion			Credit Rating Index		
Control Group	Unlimited (Germany)	Limited (Austria)	Limited (Germany)	Unlimited (Germany)	Limited (Austria)	Limited (Germany)
Column	(1)	(2)	(3)	(4)	(5)	(6)
Treated x Post	0.121***	0.065***	0.056***	0.486***	0.201***	0.177***
	(0.016)	(0.016)	(0.005)	(0.048)	(0.042)	(0.015)
Log (Sales +1)	0.046	-0.083**	-0.008	-0.187	-0.208	-0.255***
	(0.034)	(0.039)	(0.012)	(0.117)	(0.134)	(0.040)
Log (Age)	-0.058***	0.001	-0.029***	-0.646***	-0.282***	-0.613***
	(0.014)	(0.012)	(0.009)	(0.040)	(0.042)	(0.025)
Log (Equity +1)	-0.000	0.010	0.009***	-0.112***	-0.125***	-0.189***
	(0.007)	(0.007)	(0.003)	(0.024)	(0.024)	(0.009)
Log (Productivity +1)	-0.042	0.078*	0.005	0.235*	0.249*	0.262***
	(0.036)	(0.040)	(0.013)	(0.124)	(0.134)	(0.042)
Log(Employees +1)	-0.080*	0.064	-0.021	0.085	0.065	0.123***
	(0.043)	(0.047)	(0.014)	(0.146)	(0.158)	(0.047)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-County FE	Yes	No	Yes	Yes	No	Yes
Payment Behavior FE	Yes	Yes	Yes	Yes	Yes	Yes
Order Situation FE	Yes	Yes	Yes	Yes	Yes	Yes
Business Development FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls x Post	Yes	Yes	Yes	Yes	Yes	Yes
Observations	58,727	94,672	668,106	58,727	94,672	668,106
Clusters (County)	427	539	443	427	539	443
R-squared	0.762	0.711	0.649	0.890	0.871	0.842

Notes: This table presents OLS regressions on firms' credit ratings and credit expert opinions. Treated firms are limited-liability firms operating in Germany with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements after 2007. We have three control groups: (1) German unlimited-liability firms with the legal forms OHG or KG that were neither required before nor after 2007 to disclose financial statements; (2) limited-liability firms operating in Austria that were required to disclose already from 1996 onwards; (3) German limited-liability firms that already voluntary disclosed before 2007. *Post* is a dummy variable equal to 1 for all firms for the years after 2007, i.e. the period when financial statements of treated firms became publicly available. We employ a Mahalanobis nearest-neighbor matching, where we only consider treated firms that are most comparable to a given control group firm. Specifically, for each untreated firm, we keep only the closest treated firm in terms of sales, employees, age, equity and productivity, payment behavior, order situation and business development, all measured before the law change. The credit rating index range from 1 (AAA) to 21 (C). The credit analyst opinion ranges from 1 (best possible opinion) to 5 (worst opinion). A positive (negative) coefficient indicates that the credit rating/opinion gets worse (better). Variable definitions are provided in Online Appendix. Heteroscedasticity-robust standard errors are clustered at the county level and are presented in parentheses. ***, ** and * indicate a significance level of 1%, 5%, and 10%, respectively.

Table A8

REPORTING REGULATION AND TYPE 1 AND TYPE 2 ERRORS

Panel A: Type 2 Errors defined as firms that do not default with a rating of B+ or worse

Outcome	Type 2 Error					
Control Group	Unlimited (Germany)		Limited (Austria)		Limited (Germany)	
Column	(1)	(2)	(3)	(4)	(5)	(6)
Treated x Post	0.0261***	-0.0070**	0.0540***	0.0334***	0.0201***	0.0057***
	(0.004)	(0.003)	(0.007)	(0.003)	(0.002)	(0.001)
Log (Sales +1)	-0.0117***	0.0085**	-0.0137***	0.0084**	-0.0083**	0.0073**
	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.003)
Log (Age)	-0.0833***	-0.0800***	-0.0845***	-0.0844***	-0.0769***	-0.0740***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Log (Equity +1)	-0.0101***	-0.0107***	-0.0109***	-0.0125***	-0.0105***	-0.0113***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
Log (Productivity +1)	0.0173***	-0.0037	0.0189***	-0.0033	0.0132***	-0.0029
	(0.005)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)
Log(Employees +1)	0.0183***	-0.0007	0.0200***	-0.0006	0.0130***	-0.0002
	(0.005)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)
Credit Analyst Opinion FE	No	Yes	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes	No	Yes	Yes
Year-County FE	Yes	Yes	No	No	Yes	Yes
Payment Behavior FE	Yes	Yes	Yes	No	Yes	No
Order Situation FE	Yes	Yes	Yes	No	Yes	No
Business Development FE	Yes	Yes	Yes	No	Yes	No
Controls x Post	Yes	Yes	Yes	No	Yes	No
Observations	1,767,631	1,767,631	1,786,837	1,786,837	2,093,841	2,093,841
Clusters (County)	444	444	546	546	444	444
R-squared	0.598	0.692	0.599	0.693	0.595	0.694

Panel B: Type 1 Errors defined as firms that default with a rating of A- or better

Outcome	Type 1 Error					
Control Group	Unlimited (Germany)		Limited (Austria)		Limited (Germany)	
Column	(1)	(2)	(3)	(4)	(5)	(6)
Treated x Post	-0.0038***	-0.0036***	0.0005***	0.0005***	0.0005***	0.0006***
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Log (Sales +1)	0.0004	0.0003	0.0003	0.0002	0.0005	0.0004
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log (Age)	-0.0005***	-0.0005***	-0.0004***	-0.0004***	-0.0005***	-0.0005***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log (Equity +1)	0.0004***	0.0004***	0.0001	0.0001	0.0001	0.0001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log (Productivity +1)	-0.0006	-0.0005	-0.0004	-0.0003	-0.0006	-0.0005
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Employees +1)	-0.0010*	-0.0009	-0.0007	-0.0006	-0.0010**	-0.0009*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Credit Analyst Opinion FE	No	Yes	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-County FE	Yes	Yes	No	No	Yes	Yes
Payment Behavior FE	Yes	Yes	Yes	Yes	Yes	Yes
Order Situation FE	Yes	Yes	Yes	Yes	Yes	Yes
Business Development FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls x Post	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,767,631	1,767,631	1,786,837	1,786,837	2,093,841	2,093,841
Clusters (County)	444	444	546	546	444	444
R-squared	0.312	0.312	0.310	0.311	0.298	0.299

Panel C: Type 1 Errors defined as firms that default with an investment rating (BBB- or better)

Outcome	Type 1 Error					
Control Group	Unlimited (Germany)		Limited (Austria)		Limited (Germany)	
Column	(1)	(2)	(3)	(4)	(5)	(6)
Treated x Post	-0.0211***	-0.0188***	-0.0038***	-0.0031***	0.0030***	0.0039***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.000)	(0.000)
Log (Sales +1)	0.0000	0.0001	-0.0004	-0.0002	0.0001	0.0002
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Log (Age)	0.0093***	0.0093***	0.0091***	0.0091***	0.0083***	0.0084***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Log (Equity +1)	0.0012***	0.0015***	0.0008	0.0011**	0.0005	0.0008*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log (Productivity +1)	-0.0016	-0.0015	-0.0011	-0.0011	-0.0014	-0.0015
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
Log(Employees +1)	-0.0028	-0.0029	-0.0019	-0.0021	-0.0026	-0.0029*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Credit Analyst Opinion FE	No	Yes	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-County FE	Yes	Yes	No	No	Yes	Yes
Payment Behavior FE	Yes	Yes	Yes	Yes	Yes	Yes
Order Situation FE	Yes	Yes	Yes	Yes	Yes	Yes
Business Development FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls x Post	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,767,631	1,767,631	1,786,837	1,786,837	2,093,841	2,093,841
Clusters (County)	444	444	546	546	444	444
R-squared	0.334	0.336	0.330	0.333	0.325	0.327

Notes: Panel A presents OLS regressions of Type 2 errors (defined as firms that did not default when they received a highly speculative grade), Panel B presents OLS regressions of Type 1 Errors (defined as firms that default when they received an upper middle investment grade, Panel C presents OLS regressions of Type 1 errors (defined as firms that default when they received an investment grade). Treated firms are limited-liability firms operating in Germany with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements after 2007. We have three control groups: (1) German unlimited-liability firms with the legal forms OHG or KG that were neither required before nor after 2007 to disclose financial statements; (2) limited-liability firms operating in Austria that were required to disclose already from 1996 onwards; (3) German limited-liability firms that already voluntary disclosed before 2007. *Post* is a dummy variable equal to 1 for all firms for the years after 2007, i.e. the period when financial statements of treated firms became publicly available. Variable definitions are provided in Online Appendix. Heteroscedasticity-robust standard errors are clustered at the county level and are presented in parentheses. ***, ** and * indicate a significance level of 1%, 5%, and 10%, respectively.

Table A9

REPORTING REGULATION AND DEFAULT						
Panel A: Limited (Austria) Control Group						
Outcome	Default		Payment Behavior		Order Situation	
Control Group	Limited (Austria)		Limited (Austria)		Limited (Austria)	
Column	(1)	(2)	(3)	(4)	(5)	(6)
Treated x Post	-0.037***	-0.025***	-0.025**	-0.027*	-0.278**	-0.105
	(0.002)	(0.003)	(0.012)	(0.014)	(0.121)	(0.065)
Log (Sales +1)		0.008*		-0.031***		0.180***
		(0.004)		(0.010)		(0.034)
Log (Age)		0.160***		-0.040***		0.064***
		(0.004)		(0.005)		(0.017)
Log (Equity +1)		0.002**		0.004*		-0.001
		(0.001)		(0.002)		(0.004)
Log (Productivity +1)		-0.010**		0.029***		-0.191***
		(0.005)		(0.010)		(0.033)
Log(Employees +1)		-0.018***		0.008		-0.192***
		(0.005)		(0.011)		(0.034)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-County FE	No	No	No	No	No	No
Payment Behavior FE	No	Yes	No	No	No	Yes
Order Situation FE	No	Yes	No	Yes	No	No
Business Development FE	No	Yes	No	Yes	No	Yes
Controls x Post	No	Yes	No	Yes	No	Yes
Observations	1,786,837	1,786,837	1,484,391	1,484,391	1,484,391	1,484,391
Clusters (County)	546	546	543	543	543	543
R-squared	0.339	0.374	0.576	0.585	0.688	0.805

Panel B: Limited (Germany) Control Group

Outcome	Default		Payment Behavior		Order Situation	
Control Group	Limited (Germany)		Limited (Germany)		Limited (Germany)	
Column	(1)	(2)	(3)	(4)	(5)	(6)
Treated x Post	0.026***	0.009***	0.032***	0.045***	-0.005	-0.018**
	(0.001)	(0.001)	(0.004)	(0.004)	(0.011)	(0.007)
Log (Sales +1)		0.010**		-0.028***		0.184***
		(0.004)		(0.008)		(0.027)
Log (Age)		0.144***		-0.041***		0.072***
		(0.004)		(0.005)		(0.016)
Log (Equity +1)		0.001*		0.003*		0.000
		(0.001)		(0.002)		(0.003)
Log (Productivity +1)		-0.013***		0.024***		-0.195***
		(0.004)		(0.008)		(0.026)
Log(Employees +1)		-0.021***		0.002		-0.191***
		(0.004)		(0.009)		(0.026)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-County FE	No	No	No	No	No	No
Payment Behavior FE	No	Yes	No	No	No	Yes
Order Situation FE	No	Yes	No	Yes	No	No
Business Development FE	No	Yes	No	Yes	No	Yes
Controls x Post	No	Yes	No	Yes	No	Yes
Observations	2,093,841	2,093,841	1,777,360	1,777,360	1,777,360	1,777,360
Clusters (County)	444	444	444	444	444	444
R-squared	0.336	0.368	0.592	0.600	0.707	0.807

Notes: This table presents OLS regressions on default, payment behavior and order situation. Panel A displays results using the control group: limited-liability firms operating in Austria that were required to disclose already from 1996 onwards. Panel B displays results using the control group: German limited-liability firms that already voluntary disclosed before 2007. Treated firms are limited-liability firms operating in Germany with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements after 2007. *Post* is a dummy variable equal to 1 for all firms for the years after 2007, i.e. the period when financial statements of treated firms became publicly available. Default is equal to 1 if the firm defaults in the next year when the rating was assigned, 0 otherwise. Payment behavior and order situation are variables ranging from 1 (lowest credit risk) to 6 (highest credit risk). Variable definitions are provided in Online Appendix. Heteroscedasticity-robust standard errors are clustered at the county level and are presented in parentheses. ***, ** and * indicate a significance level of 1%, 5%, and 10%, respectively.

Table A10

PUBLIC VS PRIVATE INFORMATION AND CREDIT ANALYST OPINION

Panel A: Control Group: German Unlimited

	Relation between Positive Private Information and Credit Analyst Opinion		Relation between Negative Public Information and Credit Analyst Opinion	
Period (2003-2007)	Received Good Private Signal	Received Bad Private Signal	Received Good Public Signal	Received Bad Public Signal
Analyst Provides Bad Opinion	26.41%	96.77%	24.60%	30.61%
Analysts Provides Good Opinion	73.59%	3.23%	75.40%	69.39%
	100%	100%	100%	100%
Period (2008-2012)				
Analyst Provides Bad Opinion	34.12%	93.75%	31.27%	37.50%
Analysts Provides Good Opinion	65.88%	6.25%	68.73%	62.50%
	100%	100%	100%	100%

Panel B: Control Group: Austria Limited

	Relation between Positive Private Information and Credit Analyst Opinion		Relation between Negative Public Information and Credit Analyst Opinion	
Period (2003-2007)	Received Good Private Signal	Received Bad Private Signal	Received Good Public Signal	Received Bad Public Signal
Analyst Provides Bad Opinion	42.96%	98.61%	44.03%	46.09%
Analysts Provides Good Opinion	57.04%	1.39%	55.97%	53.91%
	100%	100%	100%	100%
Period (2008-2012)				
Analyst Provides Bad Opinion	47.88%	95.81%	45.84%	51.64%
Analysts Provides Good Opinion	52.12%	4.19%	54.16%	48.36%
	100%	100%	100%	100%

Panel C: Control Group: German Limited

	Relation between Positive Private Information and Credit Analyst Opinion		Relation between Negative Public Information and Credit Analyst Opinion	
Period (2003-2007)	Received Good Private Signal	Received Bad Private Signal	Received Good Public Signal	Received Bad Public Signal
Analyst Provides Bad Opinion	28.94%	97.96%	27.78%	33.20%
Analysts Provides Good Opinion	71.06%	2.04%	72.22%	66.80%
	100%	100%	100%	100%
Period (2008-2012)				
Analyst Provides Bad Opinion	32.56%	94.98%	29.87%	36.19%
Analysts Provides Good Opinion	67.44%	5.02%	70.13%	63.81%
	100%	100%	100%	100%

Notes: This table presents descriptive statistics on the likelihood that a firm receive a positive credit opinion from an analyst give that the analyst receives either a positive or negative signal. In panel A, we present descriptive statistics for the control group German unlimited-liability firms with the legal forms OHG or KG that were neither required before nor after 2007 to disclose financial statements. In panel B, we present descriptive statistics for the control group limited-liability firms operating in Austria that were required to disclose already from 1996 onwards. In panel C, we present descriptive statistics for the control group German limited-liability firms that already voluntary disclosed before 2007. A private signal is based on payment behavior information that is privately collected by the CRA. We define a positive private signal when the analysts observe that the firm pays its debt obligations on time, and a negative private signal is defined as firms that have significant target overshoot. We define a negative public as a signal that the analysts observe when a firm has a decrease in revenues in t compared to t-1, and a positive signal when revenues increase or stay constant. Variable definitions are provided in Online Appendix.

Table A11

USE OF POSITIVE PRIVATE INFORMATION AND NEGATIVE PUBLIC INFORMATION

Outcome	Bad Credit Opinion when Negative Public Information Received (Number of Employees)			Bad Credit Opinion when Negative Public Information Received (Productivity)		
Control Group	Unlimited (Germany)	Limited (Austria)	Limited (Germany)	Unlimited (Germany)	Limited (Austria)	Limited (Germany)
Column	(1)	(2)	(3)	(4)	(5)	(6)
Treated x Post	0.084***	0.049***	0.043***	0.068***	0.029***	0.032***
	(0.011)	(0.009)	(0.004)	(0.009)	(0.008)	(0.003)
Log (Sales +1)	-0.129***	-0.139***	-0.110***	0.056***	0.041***	0.057***
	(0.014)	(0.013)	(0.013)	(0.014)	(0.013)	(0.012)
Log (Age)	0.193***	0.201***	0.188***	0.127***	0.134***	0.120***
	(0.011)	(0.010)	(0.010)	(0.009)	(0.008)	(0.008)
Log (Equity +1)	0.012***	0.016***	0.015***	0.003**	0.005***	0.004***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Log (Productivity +1)	0.135***	0.143***	0.116***	-0.115***	-0.101***	-0.117***
	(0.014)	(0.014)	(0.013)	(0.015)	(0.015)	(0.013)
Log(Employees +1)	0.033**	0.043***	0.015	-0.058***	-0.041***	-0.059***
	(0.014)	(0.014)	(0.014)	(0.015)	(0.015)	(0.013)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-County FE	Yes	No	Yes	Yes	No	Yes
Payment Behavior FE	Yes	Yes	Yes	Yes	Yes	Yes
Order Situation FE	Yes	Yes	Yes	Yes	Yes	Yes
Business Development FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls x Post	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,468,247	1,484,391	1,777,360	1,468,247	1,484,391	1,777,360
Clusters (County)	443	543	444	443	543	444
R-squared	0.533	0.495	0.522	0.460	0.430	0.446

Notes: This table presents OLS regressions. Treated firms are limited-liability firms operating in Germany with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements after 2007. We have three control groups: (1) German unlimited-liability firms with the legal forms OHG or KG that were neither required before nor after 2007 to disclose financial statements; (2) limited-liability firms operating in Austria that were required to disclose already from 1996 onwards; (3) German limited-liability firms that already voluntary disclosed before 2007. *Post* is a dummy variable equal to 1 for all firms for the years after 2007, i.e. the period when financial statements of treated firms became publicly available. The variable 'Good Credit Opinion when Positive Private Information Received' is equal to 1 when analysts provide a positive opinion when they receive a positive private signal, 0 otherwise. The variable 'Bad Credit Opinion when Negative Public Information Received' is a dummy variable that is equal to 1 when an analyst provides a negative opinion when they receive a negative public signal, 0 otherwise (defined as either a decrease in number of employees, or a decrease in productivity). Variable definitions are provided in Online Appendix. Heteroscedasticity-robust standard errors are clustered at the county level and are presented in parentheses. ***, ** and * indicate a significance level of 1%, 5%, and 10%, respectively.

Table A12

CHANGE IN SENSITIVITY– AVERAGE MARGINAL EFFECTS ACROSS GROUPS

Panel A: Trade Credit - Treated Firms vs. Unlimited (Germany)

Group	Sensitivity Credit rating on Debt	Group	Sensitivity Credit rating on Debt	Difference between Pre and Post Period
Control Pre:	-0.249***	Control Post:	-0.339***	-0.090
	(0.075)		(0.080)	(0.066)
Treated Pre:	-0.471***	Treated post:	-0.332***	0.139**
	(0.055)		(0.057)	(0.063)
		Difference-in-Difference in Sensitivity:		0.228***
				(0.058)

Panel B: Trade Credit - Treated Firms vs. Limited (Germany)

Group	Sensitivity Credit rating on Debt	Group	Sensitivity Credit rating on Debt	Difference between Pre and Post Period
Control Pre:	-0.355***	Control Post:	-0.431***	-0.077
	(0.045)		(0.045)	(0.047)
Treated Pre:	-0.443***	Treated post:	-0.343***	0.100**
	(0.044)		(0.045)	(0.051)
		Difference-in-Difference in Sensitivity		0.177***
				(0.028)

Panel C: Bank Debt - Treated Firms vs. Unlimited (Germany)

Group	Sensitivity Credit rating on Debt	Group	Sensitivity Credit rating on Debt	Difference between Pre and Post Period
Control Pre:	-1.268***	Control Post:	-1.820***	-0.552
	(0.384)		(0.424)	(0.401)
Treated Pre:	-0.775***	Treated post:	-0.231	0.543*
	(0.238)		(0.286)	(0.322)
		Difference-in-Difference in Sensitivity:		1.096***
				(0.347)

Panel D: Bank Debt - Treated Firms vs. Limited (Germany)

Group	Sensitivity Credit rating on Debt	Group	Sensitivity Credit rating on Debt	Difference between Pre and Post Period
Control Pre:	-0.439**	Control Post:	-0.476*	0.037
	(0.215)		(0.247)	(0.277)
Treated Pre:	-0.753***	Treated post:	-0.475*	0.278
	(0.214)		(0.244)	(0.289)
		Difference-in-Difference in Sensitivity:		0.316*
				(0.180)

Notes: This table presents descriptive statistics of the sensitivity between treated and control groups in the pre and post period. Sensitivities are obtained from the coefficients estimated in Table 12. Treated firms are limited-liability firms operating in Germany with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements after 2007. We have two control groups: (1) German unlimited-liability firms with the legal forms OHG or KG that were neither required before nor after 2007 to disclose financial statements (Panel A and C); (2) German limited-liability firms that already voluntary disclosed before 2007 (Panel B and D). *Post* is a dummy variable equal to 1 for all firms for the years after 2007, i.e. the period when financial statements of treated firms became publicly available. Variable definitions are provided in Online Appendix. Heteroscedasticity-robust standard errors are clustered at the county level and are presented in parentheses. ***, ** and * indicate a significance level of 1%, 5%, and 10%, respectively.

Table A13

REPORTING REGULATION AND CREDIT RATINGS (DEBT SAMPLES)

Panel A: Total Debt Sample

Outcome	Credit Rating Index		
Control Group	Unlimited (Germany)	Limited (Austria)	Limited (Germany)
Column	(1)	(2)	(3)
Treated x Post	0.415***	0.296***	0.199***
	(0.046)	(0.048)	(0.015)
Log (Sales +1)	-0.352***	-0.387***	-0.265***
	(0.043)	(0.048)	(0.039)
Log (Age)	-0.578***	-0.547***	-0.581***
	(0.022)	(0.023)	(0.021)
Log (Equity +1)	-0.154***	-0.144***	-0.163***
	(0.008)	(0.009)	(0.007)
Log (Productivity +1)	0.391***	0.417***	0.292***
	(0.044)	(0.049)	(0.041)
Log(Employees +1)	0.287***	0.321***	0.174***
	(0.049)	(0.055)	(0.045)
Firm FE	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes
Year-County FE	Yes	No	Yes
Payment Behavior FE	Yes	Yes	Yes
Order Situation FE	Yes	Yes	Yes
Business Development FE	Yes	Yes	Yes
Controls x Post	Yes	Yes	Yes
Observations	892,408	914,563	1,139,775
Clusters (County)	443	542	444
R-squared	0.858	0.849	0.858

Panel B: Trade Credit Sample

Outcome	Credit Rating Index	
Control Group	Unlimited (Germany)	Limited (Germany)
Column	(1)	(2)
Treated x Post	0.316***	0.181***
	(0.047)	(0.018)
Log (Sales +1)	-0.158**	-0.085
	(0.062)	(0.056)
Log (Age)	-0.541***	-0.559***
	(0.025)	(0.024)
Log (Equity +1)	-0.161***	-0.169***
	(0.012)	(0.010)
Log (Productivity +1)	0.132**	0.034
	(0.063)	(0.057)
Log(Employees +1)	0.019	-0.085
	(0.071)	(0.064)
Firm FE	Yes	Yes
Year-Industry FE	Yes	Yes
Year-County FE	Yes	Yes
Payment Behavior FE	Yes	Yes
Order Situation FE	Yes	Yes
Business Development FE	Yes	Yes
Controls x Post	Yes	Yes
Observations	262,489	378,531
Clusters (County)	442	443
R-squared	0.903	0.897

Panel C: Bank Debt Sample

Outcome	Credit Rating Index	
Control Group	Unlimited (Germany)	Limited (Germany)
Column	(1)	(2)
Treated x Post	0.330***	0.177***
	(0.047)	(0.017)
Log (Sales +1)	-0.148**	-0.045
	(0.058)	(0.054)
Log (Age)	-0.513***	-0.529***
	(0.024)	(0.023)
Log (Equity +1)	-0.175***	-0.178***
	(0.010)	(0.009)
Log (Productivity +1)	0.142***	0.017
	(0.060)	(0.055)
Log(Employees +1)	0.020	-0.115*
	(0.067)	(0.062)
Firm FE	Yes	Yes
Year-Industry FE	Yes	Yes
Year-County FE	Yes	Yes
Payment Behavior FE	Yes	Yes
Order Situation FE	Yes	Yes
Business Development FE	Yes	Yes
Controls x Post	Yes	Yes
Observations	304,045	431,283
Clusters (County)	442	443
R-squared	0.900	0.894

Notes: Panel A presents OLS regressions of the credit ratings using the reduced sample with non-missing total debt data, Panel B uses the samples with non-missing trade credit data, and Panel C uses the samples with non-missing bank debt data. Treated firms are limited-liability firms operating in Germany with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements after 2007. We have three control groups: (1) German unlimited-liability firms with the legal forms OHG or KG that were neither required before nor after 2007 to disclose financial statements; (2) limited-liability firms operating in Austria that were required to disclose already from 1996 onwards; (3) German limited-liability firms that already voluntary disclosed before 2007. *Post* is a dummy variable equal to 1 for all firms for the years after 2007, i.e. the period when financial statements of treated firms became publicly available. The credit rating index range from 1 (AAA) to 21 (C). A positive (negative) coefficient indicates that the credit rating gets worse (better). Variable definitions are provided in Online Appendix. Heteroscedasticity-robust standard errors are clustered at the county level and are presented in parentheses. ***, ** and * indicate a significance level of 1%, 5%, and 10%, respectively.

Table A14

REPORTING REGULATION AND CREDIT RATINGS
(ALTERNATIVE SETTING: MICRO FIRMS DEREGULATION)

Setting:	Micro vs Small Firms -Period (2009 – 2015)				
Outcome	Analyst Opinion	Speculative Grade		Credit Rating Index	
Column	(1)	(2)	(3)	(4)	(5)
Treated x Post	-0.015***	-0.042***	-0.022***	-0.173***	-0.125***
	(0.004)	(0.003)	(0.002)	(0.013)	(0.007)
Firm FE	Yes	Yes	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes	Yes	Yes
Year-County FE	Yes	Yes	Yes	Yes	Yes
Credit Analyst Opinion FE	No	No	Yes	No	Yes
Observations	836,511	836,511	836,511	836,511	836,511
Clusters (County)	442	442	442	442	442
R-squared	0.722	0.702	0.893	0.772	0.939

Notes: This table presents OLS regressions on credit analyst opinions and Credit Ratings. Treated firms are limited-liability micro firms operating in Germany with were eligible to reduce their disclosure from 2013 onwards. We define eligible firms as firms that do not surpass 2 out of the following 3 thresholds in 2010: total assets less than or equal to €350,000, total revenues less than or equal to €700,000, and an average number of up to 10 employees. Control firms are firms that surpass these thresholds in 2010, and do not surpass the thresholds to be categorized as a medium-sized firm. *Post* is a dummy variable equal to 1 for all firms for the years after 2012, i.e. the period when treated firms were allowed to reduce their disclosures. The credit rating index range from 1 (AAA) to 21 (C). The credit analyst opinion ranges from 1 (best possible opinion) to 5 (worst opinion). A positive (negative) coefficient indicates that the credit rating/opinion gets worse (better). Variable definitions are provided in Online Appendix. Heteroscedasticity-robust standard errors are clustered at the county level and are presented in parentheses. ***, ** and * indicate a significance level of 1%, 5%, and 10%, respectively.

Table A15

REPORTING REGULATION AND CREDIT RATINGS
(FALSIFIATION TESTS)

Setting:	Austrian GmbH vs Austrian OHG		German GmbH (voluntary disclosure) vs German OHG	
Outcome	Credit Analyst Opinion	Credit Rating Index	Credit Analyst Opinion	Credit Rating Index
Column	(1)	(2)	(3)	(4)
Placebo Treated x Post	-0.014	0.088	-0.013	0.033
	(0.038)	(0.105)	(0.012)	(0.041)
Log (Sales +1)		0.407***		-0.145***
		(0.144)		(0.052)
Log (Age)		-0.134***		-0.640***
		(0.041)		(0.028)
Log (Equity +1)		-0.137***		-0.175***
		(0.031)		(0.009)
Log (Productivity +1)		-0.367**		0.136**
		(0.146)		(0.054)
Log(Employees +1)		-0.656***		-0.010
		(0.174)		(0.061)
Firm FE	Yes	Yes	Yes	Yes
Year-Industry FE	Yes	Yes	Yes	Yes
Year-County FE	Yes	Yes	Yes	Yes
Payment Behavior FE	No	Yes	No	Yes
Order Situation FE	No	Yes	No	Yes
Business Development FE	No	Yes	No	Yes
Controls x Post	No	Yes	No	Yes
Observations	46,438	46,438	369,002	369,002
Clusters (County)	98	98	442	442
R-squared	0.721	0.891	0.615	0.852

Notes: This table presents OLS regressions on firms' credit ratings. Placebo Treated firms are limited-liability firms operating in Austria with the legal forms GmbH or GmbH Co. KG that were obliged to disclose financial statements from 1996 onwards. We compare the credit ratings of these firms with Austria unlimited-liability firms with the legal form OHG and KG. In our second specification, our Placebo Treated firms are German limited-liability firms that already voluntarily disclosed financial statements to the public before the enforcement change. We compare the credit ratings of this group of firms with German unlimited-liability firms that were neither required before nor after 2007 to disclose financial statements to the public. *Post* is a dummy variable equal to 1 for all firms for the years after 2007. The credit rating index range from 1 (AAA) to 21 (C). The credit analyst opinion ranges from 1 (best possible opinion) to 5 (worst opinion). A positive (negative) coefficient indicates that the credit rating/opinion gets worse (better). Variable definitions are provided in Online Appendix. Heteroscedasticity-robust standard errors are clustered at the county level and are presented in parentheses. ***, ** and * indicate a significance level of 1%, 5%, and 10%, respectively.

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