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How does accounting and auditing regulations affect firm growth and cost of capital?

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Abstract

This thesis provides an understanding of how new audit regulation affect firm growth and how audits affect the cost of capital. To investigate the effect of audit reforms on employment growth, we exploited a Swedish reform made in November 2010 that gave certain firms the option to opt out of previously imposed statutory audits. We find that firms which fulfilled the requirements for voluntary auditing, compared to a control group of similar firms that did not, increased their employment growth rate by 0.39%. Furthermore, the reform was also exploited to investigate if audited financial statements add value for firms in the private debt market. We find that firms with audited financial statements, on average, save 1.26 percentage points on cost of debt compared to firms with unaudited financial statements. Thus, the reform creates a possibility for firms that have the ambition to grow in employment to do so by not auditing, and those who want to grow by investments in capital to do so by reducing the cost of such investments by auditing. However, the current ceiling of the reform is also likely to force some firms to operate at sub-optimal levels, those without having the option to opt out of audit even though they might not accrue any benefit from auditing, at least in the short-run. One can argue that is partly due to how institutions evolve, generally slower than other actors in the society do.

Keywords: New institutional economics, firm growth, small business economics, regulatory reform, audit reform, mandatory audit, audit complexity, SMEs, private limited firms

List of papers included in the Licentiate thesis

1.

Free to choose: Do voluntary audit reforms increase employment growth?

Asif M Huq, Sven-Olov Daunfeldt, Fredrik Hartwig, Niklas Rudholm

HUI Working Paper Series, number: 131

March, 2018

Submitted to a scientific journal.

March, 2018

2.

Do audited firms have lower cost of debt?

Asif M Huq, Fredrik Hartwig, Niklas Rudholm

HUI Working Paper Series, number: 132

May, 2018

Submitted to a scientific journal and currently under revision

May, 2018

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1. Introduction

This licentiate thesis in Microdata analysis investigates “How does accounting and auditing regulations affect firm growth and cost of capital?” Microdata analysis is a multi-disciplinary field, which brings together knowledge from fields such as, but not limited to artificial intelligence, business administration, computer science, data science, economics, human geography, and statistics. Microdata analysis is a comprehensive and fluid field, and can thus be applied to almost any interdisciplinary field of research and research question that warrants any or all of the elements of Microdata analysis such as data collection, data assessment and transformation, data storage, data modelling, data analysis to aid decision making (Dalarna University, 2018). Microdata analysis usually deals with big data but can also be applied to smaller data sets if the research design warrants; generally, research subjects are studied at the individual or micro level. For the purpose of this thesis, a Microdata analysis approach is applied in the field of Accounting and Auditing. The elements of Microdata analysis covered in this licentiate thesis are secondary data collection, data assessment and transformation, and data analysis to aid business decision making and policy recommendation. Today, the most striking difference between Microdata Analytic research approach and other Social Sciences research approach is perhaps the use of computer science methods in Microdata, not just the volume but also the depth of the methods used. One other difference would be the pure data driven approach of Microdata compared to the more theoretic approach in Social sciences.

Accounting and auditing are two distinct yet interdependent fields. The two fields complement each other in a way that audit legitimizes accounting while accounting makes firms auditable (Power, 1996). Accounting historians and other researchers have documented the existence of the two fields deep in known history.¹ However, one can argue, the current practices in accounting and auditing evolved around the 1920s and 1930s through the works of Paton and Littleton (Zeff, 1999). It was followed by a time-period when financial statements got connected with the users due to the demand for uniformity, especially because of the return of small investors after the great depression, emergence of institutional investors (after the end of 1950s), and due to the emergence of professional analysts. Henceforth, accounting became an important part of business decision-making process from previously merely being a historical record-keeping system (Young, 2006).

¹ See Brown (1905) for a detailed discussion.

The beginning of the 21st century was marked with some of the most infamous accounting scandals that led to a comprehensive modification of auditing regulations, especially in the U.S., which made auditing stricter for both auditors and auditees (DeFond & Francis, 2005; Knechel, 2015).² That time-period also marked a major step towards the harmonization of global accounting practices through the adoption of the International Financial Reporting System (IFRS). In the EU, the Fourth Company Law Directive (78/660/EEC), was one of the first steps towards the harmonization of accounting information disclosure for EU firms and also mandated that EU member states could exempt small- and medium-sized enterprises (SMEs)³ meeting certain conditions from mandatory audits (European Economic Community, 1978).⁴ Five years later in 1983, the Seventh Company Law Directive (83/349/EEC) was introduced to further harmonize accounting practices in EU through the regulation of consolidated financial statements for firms operating in EU (European Economic Community, 1983). Finally, in 2002, after the enactment of EC Regulation no 1606/2002 all EU member states were mandated to adopt IFRS by 2005 (European Commission, 2002). As of 25 April 2018, almost all listed firms in 144 jurisdictions use IFRS in some form or other while another 13 jurisdictions permit the use of IFRS (IFRS Foundation, 2017). At the same time, advocacies for more attuned and relaxed regulation for SMEs picked up and gained momentum over the years. In 2007, the EU promised to reduce administrative burden for SMEs by 25 per cent by 2012 and followed up by a written declaration (2010/88) in 2010 (European Small Business Alliance, 2018). Furthermore, in 2009, a proposal (COM/2009/0083 final) was made to simplify the accounting and auditing requirements of micro firms⁵ which was mandated along with other updates in the Company Directives in 2013 through the enactment of a new Accounting Directive (2013/34/EU); the new directive also repealed the Fourth (78/660/EEC) and the Seventh (83/349/EEC) Directives (European Commission, 2013). The EU definition of “small undertakings” who are exempted from mandatory audits are based on certain threshold values for any two of the three criteria for the last two consecutive years at balance sheet date of the firms. The three criteria are number of employees, net turnover, and balance sheet total (total assets). The EU maxima for the average number of employees remains unchanged at 50 while

² See Green (2004) for an overview of these accounting scandals.

³ According to the definition of European Commission (2003) SMEs are individual firms with staff head count of less than 250, and an annual turnover of less than or equal to 50 million EUR or a balance sheet total of less than or equal to 43 million EUR.

⁴ Article 51 requires all active limited liability firm must be audited annually while articles 11 and 27 stipulates firms below certain size thresholds, known as “small undertakings”, can be exempted from mandatory audit.

⁵ According to the definition of European Commission (2003) micro firms are individuals firms with staff head count of less than 10, and an annual turnover of less than or equal to two million EUR or a balance sheet total of less than or equal to two million EUR.

the turnover ceiling was increased from 5 million EUR in 1999 to 7.3 million EUR in 2003 and further to 8.8 million EUR in 2008. The ceiling for balance sheet total was also increased on the two occasions from 2.5 million EUR in 1999 to 3.65 million EUR in 2003 and further to 4.4 million EUR in 2008. The latest EU maxima as per the Accounting Directive (2013/34/EU) are 50 for average number of employees during the year, and 8 million EUR for annual turnover but not exceeding 12 million EUR or 4 million EUR in balance sheet total but not exceeding 6 million EUR. Furthermore, member states are allowed to do a 5% adjustment in either direction due to conversion to local currency and rounding off effect.⁶ In the backdrop of these events, the UK was one of the first EU member states to exempt small firms from mandatory audit in 1994. The initial threshold levels in the UK were quite low compared to the allowed EU maxima of that time but have been increased in steps until 2016. Some of the late adopters among EU member states include Denmark (in 2006), Finland (in 2008), and Sweden (in 2010).

The aim of the two papers in this licentiate thesis is to evaluate the effect of such audit reforms on firm employment growth (explored in paper 1) and cost of debt capital (explored in paper 2). For the purpose of the first two studies, the Swedish Audit Reform of November 2010 was exploited. In paper 1, we studied the effect of audit reform on employment growth while in paper 2 we studied the benefit or value of audit in terms of reduced cost of debt (*CoD*). In general, studies on economic consequences of audit regulations (Leuz & Wysock, 2016), private firm audits (Vanstraelen & Schelleman, 2017), and effect of accounting regulations on firm growth (Akisik, 2013) are quite scarce while smalls firms are an important economic contributor (Birch, 1979).

The remainder of the thesis is organized as follows: the Swedish setting in section 2, theoretical framework in section 3, the state of the art is presented in section 4, conclusions from the licentiate papers in section 5, suggestion for further research in section 6, and the papers composing the licentiate thesis is included in the Appendix.

2. Meanwhile in Sweden

Audit reforms are still debated both in and outside of EU. For instance, Sweden being one of the last adopters of the EU wide reform has an ongoing debate (2017/18) where some instances have suggested reinstating the audit for micro firms and SMEs. The Office of Auditor General (OAG) presented a report stating that the reform cost more than it saved (Swedish Government,

⁶ The latest threshold levels as of 2016 for the different EU member states are reported in Table 1 of Paper 1 of the thesis and in Table A1 in the appendix of Paper 2 of the thesis.

2018), while the small business community along with some other stakeholders argued the other way around (SRF Konsulterna, 2018; Svenskt Näringsliv, 2018). Based on the results from paper 1 in this thesis, one of the co-authors took active part in the debate, arguing that reinstating mandatory audits would come at a cost in terms of jobs not created. The Swedish Government decided not to reinstate the reform at this time, but will consider the report from the OAG in future decision making that pertains to the effects of this reform and regulations related to simplifying the business conditions for micro firms and SMEs (Swedish Government, 2018).

Auditing has a long-standing history in Sweden. It may have started to take its present form in the middle of the nineteenth century when limited firms started to develop in England and Scotland but Swedish firms are one of the early adopters of voluntary audits which dates back to the 1650s. The official foothold took place after the introduction of the Companies Act 1848 that also enabled firms to raise funds from outside investors. However, it was not until in 1895 when the Companies Act made it mandatory for Swedish limited firms to appoint independent auditors (Öhman & Wallerstedt, 2012). Since then, all the limited firms in Sweden were subject to statutory audit; including even the smallest ones often termed as the micro companies. One of the election promises of the Center Party before the 2006 general election in Sweden was to liberalize the rules and regulations for Swedish limited companies. The party promised, if elected, to lower the administrative burden of Swedish limited firms in line with European Commission's plan to curb SME's administrative burden by 25%, but the parameters were not explicitly mentioned in the election manifesto. Even though the Center Party became part of the Government, they only secured 8.3% of the parliamentary seats. Thus, it is safe to say that the Swedish limited firms did not expect the specifics of reform. Nonetheless, the reform was passed and came into effect from 1st November 2010 to be applied for financial year that started after 1st November 2010. The reform was expected to exempt around 72% of all Swedish limited companies from statutory audit (Svanström & Sundgren, 2012). Besides reducing the administrative burden a 5.2 billion SEK (approximately 507 million EUR) in annual cost saving was also expected following the reform (Swedish Government, 2010).

3. Theoretical framework

Societies are bounded by formal and informal practices often infused and preserved by institutions. According to North, institutions are “the humanly devised constraints that structure political, economic, and social interactions. They consist of both informal constraints (sanctions, taboos, customs, traditions, and codes of conduct), and formal rules (constitutions, laws, property rights)” (1991, p. 97). Many institutions emerged or were formed primarily with

the view to minimize cost of exchange or production cost and to make trade more efficient; however, institutions can often act as barriers against such outlooks when institutions evolve slower than the other actors in society do. Modern day institutions and instruments such as the capital market, bills of exchange, insurance and the current accounting and auditing practices (and the enforcement of accounting and auditing practices) have evolved from the blending between informal practices and formal institutions, including the state over centuries (North, 1991). Like institutions, firms are just another element within a society often multiple societies in this era of globalization. Institutions set the rules of the game while firms play the game (Williamson, 1998). Firms exist because direction of the resources not only depend on the price mechanism but also on the entrepreneur. Furthermore, in the absence of firms large-scale and high-volume trade would most likely be inefficient and costly. Existence of firms do not eliminate the need for contracts completely but greatly reduces the number as often many short-term contracts are taken over by fewer long-term contracts to carry out the different activities (Coase, 1937). Firms itself are “nexus of contracts” (Jensen & Meckling, 1976) that are “unavoidably incomplete” (Williamson, 1998) and a “moving equilibrium” (Coase, 1937). As institutions evolve, firms need to adapt as well, to the least to sustain or to improve their economic performance.

The aim of this licentiate thesis is to investigate how regulation affects certain firm outcomes (including growth and cost of debt), and thus explores how the formal “rules of the game” affect the ones who “play the game.” It is done so through the lens of “new institutional economics (NIE).” The phrase “new institutional economics” was coined by Oliver Williamson to differentiate the thought from “old institutional economics” (Coase, 1998). NIE views firms as a governance structure, which is an organizational construction, rather than firms as a production function, which is a technological construction (Williamson, 1998). Furthermore, unlike neo-classical economics, NIE does not assume institutions as static or given, rather includes institutions in part of the analysis. Indeed, because “... the costs of exchange depend on the *institutions* of a country: its legal system, its political system, its social system, its educational system, its culture, and so on (Coase, 1998, p. 73 [emphasis added]).” Williamson explains that there are four level of social analysis and NIE operates on two of the four levels; figure 1 adopted from Williamson (1998) highlight the four levels.

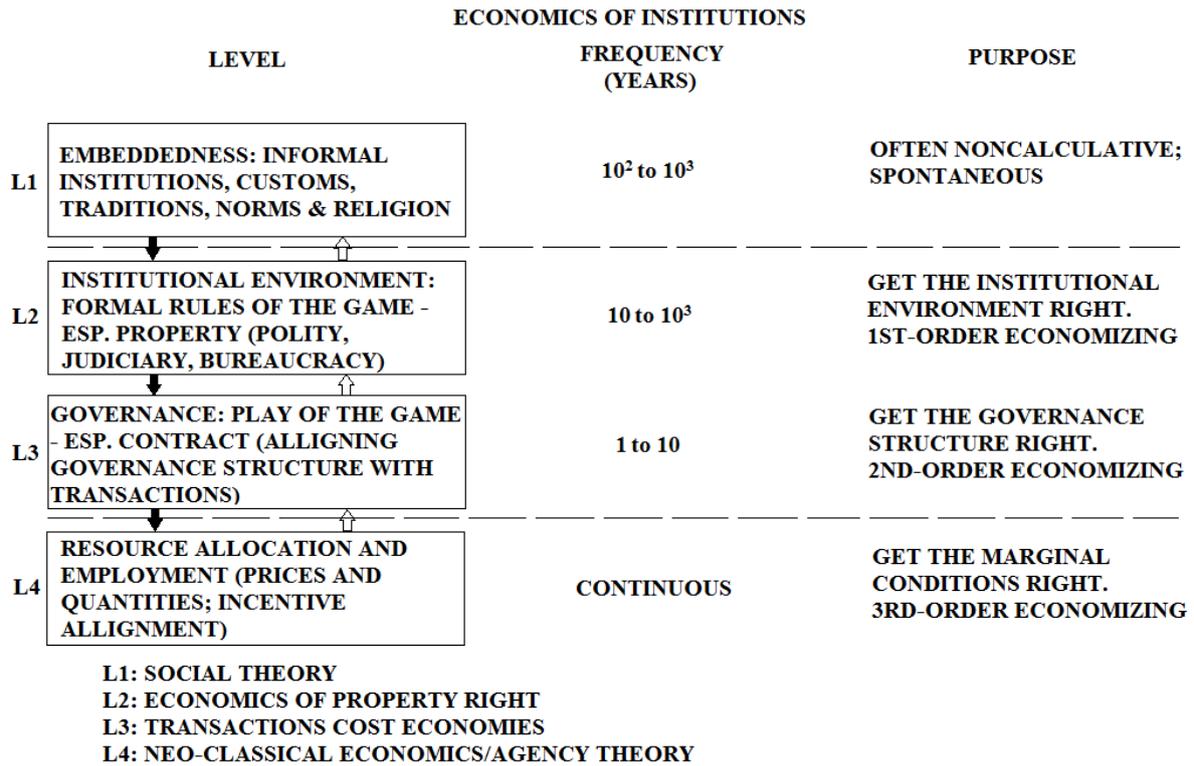


Figure 1: Four levels of social analysis adopted from (Williamson, 1998)

The solid arrows in the figures signifies constraints imposed from higher levels while the hollow arrows show feedbacks from lower levels. Level 1 is “social embeddedness level” that infuses informal constraints, level 2 is “institutional environment” and infuses formal constraints (i.e. rules of the game), level 3 is where “institutions of governance” operates including firms and markets (i.e. play of the game), and finally level 4 deals with marginal analysis, a shift from discrete structural analysis from the first three levels. Level 4 is where neo-classical economics and agency theorists focus while NIE focuses in level 2 and 3 and transaction cost economies (TCE), a branch of NIE, is primarily concerned with level 3 analysis (Williamson, 1998) and predominantly concerned with economizing on transaction cost thus, among other things, proposes a limit on firm size (Williamson, 2007).

The papers of this thesis analyses firm behavior/growth (paper 1) and firm output/cost of debt capital (paper 2) at level 4 after changes in the institutional environment (i.e. level 2). It may be contended here that to see how the game is played at level 3 marginal analysis at level 4 is required. Indeed, agency theory and transaction cost economies are not mutually exclusive rather complementary for analyzing different situations (Williamson, 1998). As Williamson highlighted, institutional environment evolves rather slowly compared to the speed of the game played and resource allocation (referring to the frequency column in figure 1), economy often

operates in sub-optimal as employment growth is hampered, as shown in paper 1. Laws and regulation in general penalizes the one generating the harmful effects without employing a holistic evaluation of how all players could be rearranged for an optimal economic solution thus a sub-optimal point is often reached (Coase, 1960), hence, often to restrict the wrong doings of a few everyone else is also penalized. This is the case of the Swedish reform of November 2010 where the choice of voluntary financial statement audit is available to micro firms only. While if the ceiling of the audit choice is increased more firms could decide what is optimal for them. For instance, those who want to grow in employment (as shown in paper 1) or use the cost saving from not having to audit for any other purpose could chose to opt out from audit while firms that want to grow in capital could chose to audit as audit helps to reduce cost of debt (as shown in paper 2). Thus, the two papers together provides evidence that since institutions evolve slowly (Williamson, 1998) some firms operates at sub-optimal (from not having the choice to decide what is best for their business) levels in the transitions.

4. State of the art

The reforms that made financial statement audit voluntary for micro firms and SMEs made it possible to study several interesting research questions for private limited firms. Some notable findings from studies based on EU firms include: firms that opt for voluntary audit typically have dispersed ownership, in other words, a large number of outside shareholders, they have relatively higher funding from banks or financial institutions compared to owners, the presence of a significant principal-agent relationship, and were already dependent heavily on auditors for non-audit services (Collis, 2010; Collis, 2012; Niemi, et al., 2012; Dedman, et al., 2014; Ojala, et al., 2016). Other factors include the director's perception of the value of information carried by voluntary audit (Collis, et al., 2004); access to outside capital, access to outside capital at a lower cost, and better credit rating (Collis, et al., 2004; Lennox & Pittman, 2011; Dedman & Kausar, 2012). The option to choose audit also allows companies to signal information (Lennox & Pittman, 2011), for example, their risk type. Firms that chooses to audit voluntarily are more likely to be a low-risk borrower compared to the ones that chooses not to be audited (Melumad & Thoman, 1990). However, when given a choice most SMEs opt out of audit (Dedman, et al., 2014; Ojala, et al., 2016; Rennie, et al., 2003).

Interesting findings also emerged from countries where such reform did not take place. For example, studies from Hong Kong (Chung & Narasimhan, 2001) and Malaysia (Kamarudin, et al., 2012) concluded SMEs often view auditing as burdensome and inefficient. In the U.S., private limited firms that audited voluntarily had better access to credit and at a lower cost,

were highly levered and larger in size (Chow, 1982; Blackwell, et al., 1998; Allee & Yohn, 2009; Minnis, 2011); the reduction in interest rates due to auditing decreased with debt size (Blackwell, et al., 1998), and that audited financial statements showed better predicting ability of future cash-flows (Minnis, 2011). Findings from Australia showed advice from external accountants positively influenced financial performance of SMEs (Barbera & Hasso, 2013; Carey, 2015).

However, to the best of our knowledge, how such audit reforms may affect employment growth has not been studied in the past. Furthermore, there is a general issue of endogeneity concerns with studies related to cost of debt and past studies have not shed light about how audit affects cost of debt across various industries.

5. Conclusions from the included papers

The results show that the audit reform increased average employment growth rates in the treated firms by 0.39%, which corresponds to 1,830 new jobs during 2011, suggesting that mandatory audits act as a growth barrier for small firms. In Sweden, even after the reform the current threshold level for mandatory audits is still significantly lower compared to most other European countries. For instance, most European countries require mandatory audits when the firm reaches 50 employees, while the same number in Sweden is only three employees. This suggests that more jobs could be created if the Swedish policymakers increased the threshold level for mandatory audits and made it more in line with the audit regulations in the rest of Europe.

On the other hand, auditing indeed adds value to the firm, at least in terms of reducing the firm's *CoD*. Our findings show that on average firms with audited financial statements save 1.26 percentage points (or 126 basis points) on interest charges on external debts. Thus, an average firm in our sample would save about 16 900 EUR on annual interest charges.⁷ It must be noted here that unaudited firms in our sample rarely borrow more than median values of 360 000 SEK (37 000 EUR), and the debt size of an average unaudited firm is 627 000 SEK (64 585 EUR). As such, these average unaudited firms could save about 7 900 SEK (814 EUR) on annual interest charges, if they chose to be audited. According to our discussion with multiple small business owner, the minimum audit cost for small and micro firms in Sweden averages between 15 000 SEK (1 500 EUR) to 20 000 SEK (2 000 EUR). These estimates excludes any additional

⁷ An average firm in our sample had total long-term debt of 13 million SEK in 2012 equivalent to 1.3 million EUR as per exchange rate on 2018-07-07.

internal staff time and cost for the preparation and carrying out of the audit, and this cost is even higher for larger and more complex SMEs. Thus, a typical unaudited firm in our sample does not have any additional benefit in terms of reduced *CoD* from switching to having audited financial statements, at least not in the short-run. Nor is there any additional benefit of using reputed or Big6 audit firms, which suggests borrowing firms audit choice is more important than auditor choice (Kim, et al., 2011), especially for private limited firms. Table 1 summarizes the findings from other settings as compared to the Swedish setting:

Korean setting (Kim, et al. 2011)	US setting (Minnis, 2011)	Spanish setting (Huguet & Gandía, 2014)	Slovenian setting (Koren, et al., 2014)	Swedish setting (explored in this thesis)
Voluntary audit reduces <i>CoD</i> from 56 to 124 basis points depending on the regression method used and after controlling for other risk factors	Audit reduces <i>CoD</i> by approximately 69 basis points after controlling for other risk factors	Audit reduces <i>CoD</i> by approximately 18 basis points after controlling for other risk factors	Voluntary audit increase <i>CoD</i> by 21 basis points	Audit reduces <i>CoD</i> on average by 126 basis points.
	Approximately 21,535 Euros (\$25,000) in annual interest savings			Approximately 20,700 Euros in annual interest saving

Table 1: Findings from other settings as compared to the Swedish setting

Lastly, we find that the effect of audit on *CoD* varies between industries. As such, we find that firms in industries that have been identified in previous studies to have a more complex information structure, and therefore more complex auditing process, also save more on *CoD* relative to other industries when audited.

A potential cost associated with such reform is the risk of tax evasion and other forms of economic crime. According to the The Swedish National Council for Crime Prevention (2018) the number of violations regarding the Revenue Offences Act (1971:69) decreased from 21,572 in 2009, to 17,808 in 2011, while for the Accounting Act (1999:1078), the number of violations increased from 11,044 in 2009, to 12,260 in 2011. The number of violations reported for the Revenue Offences Act and the Accounting Act in 2016 were 15,827 and 12,499 respectively.

The statistics does not seem to show any significant increases in economic crime, either in the short-term or long-term, following the voluntary audit reform. Furthermore, as mentioned earlier the thresholds for voluntary audit are much higher in most of Europe compared to Sweden which indicates that other European legislators have concluded that the benefits of voluntary audit outweigh the costs, including those associated with possible tax evasion and other forms of economic crime. Thus a higher threshold will give more firms the possibility to adopt the auditing practices that they find most suitable to the firm, while auditors can improve their efficiency by concentrating on larger firms to a higher extent (e.g. Chung & Narasimhan, 2001). The benefit for society is that the option of not auditing removes a growth barrier for small firms. As most firms in the economy are small firms that do not grow, or grow only slowly, such reforms can have a significant aggregate impact on job growth.

Taking the results from the two papers together, the results show that firms that opt out of audit have a higher employment growth, while the *CoD* for firms choosing voluntary audit is lower. Under a system with voluntary audits, the firms are then free to choose the alternative considered to be best for them. Those with an intention to grow in the number of employees (while still below the thresholds) can then choose not to audit, thus increasing cash-flow that could be used to pay salaries. Firms with an intention to grow through capital investment can then instead choose to voluntary audit to decrease the *CoD* associated with the financing of their investments in capital. Finally, note that the results can also be used as an interventionist regulator. If increased employment is the main concern, the regulator should try to increase cash-flow for the firms, while if increases in the capital stock is more important, the regulator could argue for more auditing.

6. Suggestions for future research

Presently we do not have access to any information on the auditing costs for firms across different industries but such information could give the opportunity for several interesting avenues of future research. First, does industries that experienced a positive effect on firm employment growth and higher reductions of *CoD* due to the voluntary audit reform have high auditing cost also? If so, this would strengthen our argument that the positive impact of audit reform on firm growth is a causal effect of the reform. It will also help to cross validate that industries with complex information structure has high auditing cost and thus further strengthen our argument that firms opting to audit in industries with complex information structure saves more from auditing in terms of *CoD*. Second, how does the cost of auditing in different industries in Sweden compare to the estimates from other countries? We also lack

comprehensive knowledge about the net benefit of audit, i.e. the benefits after deducting the direct and indirect costs of auditing, as well as how banks view and value audits.

The focus of the first study has been on the employment effects of voluntary audits since reforms that reduce the regulatory burden on firms are most often implemented to create more jobs in the economy. However, such reforms could have other effects too. For instance, the additional resources that are made available due to the reform could be used for capital investments or for building up internal capital. We believe that this also constitutes an interesting area for further research. In the second study, even though our results from the Swedish setting are very similar to those from US, Korean and Spanish settings, findings from other settings within the EU, or outside the EU, may vary, since risk varies greatly between developed and developing countries, and there is disparity within different EU countries too (Sbarcea, 2015). Thus, future studies with cross-country samples would help us to better understand if the institutional differences influence the relationship between audits and *CoD*. Future studies can also benefit from a more comprehensive measure of *CoD* as most studies, including ours, only have access to interest rate data, however, total cost of debts also includes other contract terms, such as maturity, collateral, and additional conditions, if any, stipulated by the lender.

Lastly, results from OAG's report indicated that firms that chose to audit had higher growth than similar firms which did not conduct any audits. This could likely be due to the firms choosing to audit having higher growth ambitions than their non-audited counterparts and previous studies (Dedman et al., 2014; Ojala et al., 2016) found that choosing voluntary audit is a strong indication of the firm having growth ambitions. As such, firms that choose audit voluntarily are like to exceed the threshold levels in the coming periods and it can be investigated if that is the case; this may be investigated in the second part of the thesis.

In the second part, besides effects of formal rules I will also investigate how firms behave in the absence of formal rules and in the presence of informal constraints. To do so I will supplement econometric and statistical methods with computer science methods, including but not limited to machine learning and reinforced machine learning, thereby exploiting other dimensions of Microdata analysis. When it came to decision-making, so far the thesis investigated how decisions taken outside the firm affected firm dynamics. In the next part of the thesis, I will investigate how decisions are taken inside the firm and how those decisions affect the outside environment and firm performance.

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Appendix 1: Paper 1

Free to choose: Do voluntary audit reforms increase employment growth?

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ABSTRACT: Many European countries have abolished mandatory audits for small firms to reduce the regulatory and administrative burden for these firms. However, we still lack knowledge on whether such legislative changes affect employment growth for those firms that become free to choose to have external audits. We investigate this question using a Swedish reform that made audits voluntary for small firms fulfilling certain requirements. The reform created an almost ideal natural experiment, which we use to evaluate the effects of voluntary audits on employment growth for small firms using a difference-in-difference estimator. We find that firms which fulfilled the requirements for voluntary auditing, compared to a control group of similar firms that did not, increased their employment growth rate by 0.39%. This corresponds to 1,830 jobs being created in the year following the reform, suggesting that mandatory audits act as a growth barrier for small firms.

Keywords: Firm growth, small business economics, regulatory reform, mandatory audit

JEL-codes: M42, M48, D22, J23

1. Introduction

It has long been realized that small and medium-sized firms (SMEs) are important job contributors (Birch, 1979). SMEs have therefore attracted a lot of attention from policymakers, and several policies have been introduced to induce, sustain, and improve the operation and growth of SMEs (Nightingale & Coad, 2014).

However, most SMEs do not grow at all or grow very slowly (Hodges & Østbye, 2010), despite having the financial resources to do so (Bornhäll, et al., 2015). Many of these SMEs might have chosen to increase their number of employees if the institutional conditions for firm growth had been more favorable (Davis & Henrekson, 1999). Growth of small firms is, in general, more sensitive to regulations than the growth of large firms (Demirguc-Kunt & Maksimovic, 1998; Beck et al., 2005), suggesting that the regulatory burden of SMEs might act as one such growth barrier. One policy reform that has been widely used in Europe to reduce the regulatory burden of SMEs is the abolition of mandatory audit requirements (Federation of European Accountants, 2016).

Auditing is often considered as burdensome and inefficient, suggesting that it might prevent SMEs from increasing their number of employees (Chung & Narasimhan, 2001; Kamarudin, et al., 2012). On the other hand, external audits have also been claimed to be positive for SMEs (Collis, et al., 2004; Minnis, 2011; Dedman, et al., 2014), and even have a positive influence on the performance of SMEs (Barbera & Hasso, 2013; Carey, 2015). However, most SMEs opt out of audit when given a choice (Dedman, et al., 2014; Ojala, et al., 2016), indicating that the perceived costs of auditing tend to outweigh the benefits for the firm.

Legislative changes that decrease the regulatory burden on small firms are often justified on the grounds that regulation favors large firms, but decreases small firms' growth aspirations (Nooteboom, 1993; Henrekson & Johansson, 1999; Klapper, et al., 2006). However, empirical studies on how accounting regulations affect firm growth are rare (Akisik, 2013). Previous studies have instead tried to identify what determines the demand for voluntary audits (e.g., Seow, 2001; Rennie, et al., 2003; Collis, et al., 2004; Collis, 2010; Lennox & Pittman, 2011; Collis, 2012; Dedman & Kausar, 2012; Niemi, et al., 2012; Dedman, et al., 2014; Ojala, et al., 2016), the potential benefits of auditing, (Allee & Yohn, 2009; Minnis, 2011) or the costs associated with mandatory audits (Kamarudin, et al., 2012). These studies are often restricted to very small firms (Niemi, et al., 2012; Ojala, et al., 2016), and based on survey data with

samples that are small and non-representative (Chung & Narasimhan, 2001; Rennie, et al., 2003; Collis, 2012).

We take a different approach by investigating the effect of a Swedish audit reform in 2010 on the employment growth of small firms. The reform reduced the regulatory and administrative burden on Swedish micro firms, and was designed in a way that created a natural experiment with clearly defined treatment and control groups. Except for differences in their status, regarding mandatory or voluntary audits, firms in the treatment and control group shared many characteristics. The details of the reform were not discussed, neither in parliament nor in the media, for any long period before the legislation was implemented. It is thus unlikely that the new regulation was anticipated by the firms, which means that the reform can be considered as an exogenous event for the treated firms. Such natural experiments constitute one of the best ways to identify causal effects (Pischke & Angrist, 2009), although they rarely have been used to investigate the effects of financial reporting regulation (Leuz and Wysocki, 2016).

The treatment group consists of all firms that after the reform satisfied the criteria for voluntary audits, while our control group consists of all firms with fewer than 20 employees that still were subject to mandatory audits. As far as we know, our study is the first to use a natural experiment to investigate how a change in audit regulations affects employment growth for small firms. Note that our study also covers all limited liability firms in Sweden active during the whole study period (2009-2013), which means that we have no selection bias, as long as inference is drawn for surviving firms. Surviving firms in the control group can thus be used to estimate the counterfactual outcome, i.e., how firms in the treatment group would have developed in the absence of the audit reform.

We find that the number of employees increased, on average, by 0.39% in the treated firms, compared to firms in the control group. This implies that 1,830 new jobs were created in the year following the reform. We also find substantial industry heterogeneity in how the reform affected employment growth, suggesting that there are significant industry differences in how audit regulations affect the growth aspirations of a firm and their perceived costs of auditing (Anderson & Zéghal, 1994; Gonthier-Besacier & Schatt, 2007; Hassan & Naser, 2013; Kikhia, 2015). Our findings thus indicate that mandatory audits act as a growth barrier, and provide support for institutional reforms that make audits voluntary for small firms.

The remainder of this paper is structured as follows: Section 2 discusses the Swedish audit reform and presents our hypotheses. Section 3 presents the data, the empirical model and our estimation results. Finally, our results are summarized and discussed in Section 4.

2. The Swedish audit reform and hypotheses to be tested

The EU Fourth Company Law Directive (78/660/EEC) provides the EU member states with the option to exempt SMEs from mandatory audits (European Economic Community, 1978), and most countries within the EU also use this option to exempt SMEs from auditing. Sweden was for a long time a rare exception, with audits being a requirement for all Swedish limited firms, even the smallest ones. The Swedish legislation can be dated back to 1895 when the Companies Act was re-written, making it mandatory for all limited firms to appoint independent auditors (Öhman & Wallerstedt, 2012).⁸

In 2006, a center-right government was elected in Sweden. The newly elected government submitted the Bill, “A Voluntary Audit” (Prop. 2009/10:204), to the Swedish parliament on April 14, 2010, proposing that small firms should be allowed to choose whether they would have an auditor or not. The reform was justified on the grounds that the government wanted to reduce the regulatory burden on small firms, which complied with the European Commission’s plan⁹ to reduce SME’s administrative burden by 25%. The bill was passed by the Swedish Parliament on June 21, 2010 (SFS 2010:834), and the new legislation allowed firms not exceeding certain thresholds to be exempted from statutory audits. The change applied to fiscal years beginning on, or after, November 1, 2010 (SFS 2010:834), and the reform was expected to exempt approximately 72% of all Swedish limited firms from mandatory audits (Svanström & Sundgren, 2012).

Formally, the Swedish Companies Act (*Aktiebolagslagen*, 2005:551) Chapter 9 §1 still stipulates that - as a starting point - all Swedish limited firms are required to have an auditor.¹⁰ The Articles of Association of a privately owned, limited firm may, however, from November

⁸ Voluntary audits can be dated back to the 1650s in Sweden, and official, but nevertheless voluntary, audits were also mentioned in the Companies Act of 1848.

⁹As per the EU Fourth Company Law Directive (78/660/EEC). Reports from the European Commission highlighted the importance of SMEs for the European economy and called for a more business-friendly environment for SMEs, including micro firms, so that they could become more competitive in the global economy.

¹⁰Note that according to the Swedish Companies Act (*Aktiebolagslagen* 2005:551) Chapter 9 § 12, only authorized public accountants, or approved public accountants, are allowed to conduct statutory audits. In larger and/or listed firms, at least one auditor must be an approved public accountant. Regulations concerning authorized public accountants and approved public accountants can be found in the Swedish Public Accountants Act (*Revisorslag* 2001:883).

1, 2010, specify that the firm does not need to have an auditor, given that at least two of the following three conditions are met:¹¹

- i. The average number of employees for the previous two consecutive fiscal years amounts to no more than 3.
- ii. Reported total assets for the previous two consecutive fiscal years amounts to no more than 1.5 million SEK.
- iii. Reported net sales for the previous two consecutive fiscal years amounts to no more than 3 million SEK.

Table 1: Threshold values (in euros) for mandatory audit in European countries as of May 2016 with corresponding increase from last ceiling.

<u>Country</u>	<u>Total assets</u>	<u>Increase</u>	<u>Net turnover</u>	<u>Increase</u>	<u>Employees</u>	<u>Increase</u>
Austria	5,000,000	3%	10,000,000	3%	50	-
Belgium	4,500,000	23%	9,000,000	23%	50	-
Bulgaria	1,000,000	33%	2,000,000	60%	50	-
Croatia	2,000,000	-	4,000,000	-	25	-
Cyprus	3,400,000	-	7,000,00	-	50	-
Czech Republic	1,500,000	-	3,000,000	-	50	-
Denmark	4,837,000	-	9,674,000	-	50	-
Estonia	2,000,000	100%	4,000,00	100%	60	100%
Finland	100,000	-	200,000	-	3	-
France	1,550,000	-	3,100,000	-	50	-
Germany	6,000,000	24%	12,000,000	24%	50	-
Greece	4,000,000	60%	8,000,000	60%	50	-
Hungary	-	-	965,000	44%	50	-
Iceland	1,400,000	-	2,800,000	-	50	-
Ireland	4,400,000	-	8,800,000	-	50	-
Italy ¹⁶	4,400,000	-	8,800,000	-	50	-
Latvia	800,000	100%	1,600,000	100%	50	100%
Lithuania	1,800,000	-	3,500,000	-	50	-
Luxembourg	4,400,000	-	8,800,000	-	50	-
Malta	46,600	-	93,000	-	2	-
Netherlands	6,000,000	36%	12,000,000	36%	50	-
Norway	2,500,000	-	625,000	-	10	-
Poland	2,500,000	-	5,000,000	-	50	-
Portugal	1,500,000	-	3,000,000	-	50	-
Romania	3,650,000	-	7,300,000	-	50	-
Slovakia	1,000,000	-	2,000,000	-	30	-
Slovenia	4,000,000	-9%	8,000,000	-9%	50	-
Spain	2,850,000	-	5,700,000	-	50	-
Sweden	150,000	-	300,000	-	3	-
Switzerland	18,203,000	-	36,405,000	-	250	-
United Kingdom	6,541,000	56%	13,082,000	57%	50	-

¹¹This also applies to the parent company of a group (even though the threshold levels in the parent company are not exceeded), if the group meets more than one of the specified conditions. All intercompany claims and transactions should, however, first be eliminated.

The threshold levels mean that only micro firms have the option to opt out of the mandatory audit in Sweden. In other European countries, with Finland and Malta as the only exceptions, the thresholds for mandatory audits are much higher (see Table 1) and apply to SMEs rather than just micro firms.

The total audit process can be highly complex and is something that requires a large amount of time, depending on the size and characteristics of the client. It thus requires a substantial amount of resources, both for the auditor and the firm being audited. The voluntary audit reform has been estimated to save firms in the treatment group 5.8 billion SEK¹² annually (SOU 2008:32), and this figure does not include cost savings due to reductions in the amount of work in the treated firms during the audit process. Note that firms that still choose to audit after the change in regulation will also benefit from having the possibility of voluntary audits as it increases the firm's range of measures to reduce costs in times of economic difficulty. As such, all firms in the treatment group benefit, either directly or indirectly, from the reduction in regulatory burden that the reform creates, making resources available for firms in the treatment group to increase employment relative to those in the control group. The first hypothesis that we want to test is therefore:

H1: Firms having the option of voluntary audit will have higher employment growth than similar firms not having this option.

Previous studies have found significant heterogeneity in auditing costs for different industries (Anderson & Zéghal, 1994; Gonthier-Besacier & Schatt, 2007; Hassan & Naser, 2013; Kikhia, 2015). Firms within some industries have reported high auditing costs, e.g., IT-industries (Gonthier-Besacier & Schatt, 2007) and manufacturing industries (Kikhia, 2015), even though Hassan & Naser (2013) found that manufacturing companies pay significantly lower audit fees compared to service and retail firms. Anderson & Zéghal (1994) also found that the transportation, communication and utilities industry pay significantly lower audit fees compared to other industries, but they did not find any significant difference between mining and manufacturing industries when compared separately to other industries. This indicates that the direct and indirect benefits of belonging to the treatment group will differ among industries.

We have not found any Swedish studies of how the costs of auditing differ across industries and our dataset does not contain any information regarding auditing costs specifically.

¹² Approximately 643 million USD, exchange rate 2017-12-11.

However, given that previous studies have found that such differences exist in other countries, it seems unlikely that they would not do so also in Sweden. We thus expect that the reduction in regulatory and administrative burden from voluntary audits differs among industries, and that the impact of the audit reform of 2010 on employment growth consequently differs among industries. Our second hypothesis is therefore:

H2: Differences in the reduction in regulatory and administrative burden across industries will cause industry heterogeneity in the effect of the reform on employment growth.

3. Empirical Study

3.1. Data

The data are collected from the Retriever database, which contains corporate information of all registered limited liability firms in Sweden. In our sample, we include all firms that were registered before January 2009, and still active in December 2013. This means that our study is based on surviving firms, and that inference cannot be drawn for start-ups and firms that exited during the study period.

Our treatment group consists of all firms that were not subject to mandatory audit after the reform, while our control group consists of all firms with fewer than 20 employees that did not satisfy the criteria for voluntary audits.¹³ We restrict our control group to firms with fewer than 20 employees, because growth patterns and growth ambitions differ substantially between small and large firms (Nightingale & Coad, 2014).¹⁴

Our study period runs from 2009 to 2011, with the control period being 2009, the intervention period being 2011, and with 2010 excluded due to it being the year the reform was introduced.¹⁵

¹³ Results (available upon request) are similar when the firm size cut-offs are 10, 15, 25 or 30 employees.

¹⁴ Riksrevisionen (2017) instead compares the outcome for firms that chose not to audit with firms that chose to continue auditing after the reform. Their results indicate that firms that chose to audit had higher growth than similar firms which did not conduct any audits. However, this result is likely due to the firms choosing to audit having higher growth ambitions than their non-audited counterparts. Previous studies (Dedman et al., 2014; Ojala et al., 2016) found that choosing voluntary audit is a strong indication of the firm having growth ambitions, and external financiers also often provide investment capital at lower rates for audited firms (Huq et al., 2018). As such, these firms would likely have grown faster even in the absence of the voluntary audit reform.

¹⁵ To check the sensitivity of the model, two additional regressions were also run. As the reform was introduced in November 2010, the first considers the reform year 2010 as an intervention period, and the second considers 2010 as belonging to the control period. Additional regressions are also run using 2009 as the control period, and 2011-2013 as intervention period, excluding 2010 from the regressions. The results from all these additional estimations are similar to those reported in the paper and are available upon request.

We use relative growth in the number of employees as our dependent variable, where the relative employment growth rate of firm i during year t is calculated as follows:

$$G_{i,t} = \text{Ln employees}_{i,t} - \text{Ln employees}_{i,t-1}$$

Logarithmic difference is one of the most frequently used firm growth measures (Coad, 2009; Coad, et al., 2014), with the convenient property of being symmetric for positive and negative growth rates (Törnqvist, et al., 1985).

3.2. Empirical method and descriptive statistics

To test whether firms in the treatment group grow faster than firms in the control group, due to their option not to conduct any audits, we estimate the following difference-in-difference model:

$$G_{i,t} = \alpha_i + \beta_1 tp_t + \beta_2 tg_{i,t} + \beta_3 (tp_t \times tg_{i,t}) + \varepsilon_{i,t} \quad [1]$$

where $G_{i,t}$ is relative employment growth in firm i in year t , tp_t is an indicator variable equal to one in the treatment period, zero otherwise; and $tg_{i,t}$ is an indicator variable equal to one for firms belonging to the treatment group, zero otherwise. The primary variable of interest in the model is the interaction term ($tp_t \times tg_{i,t}$), which shows how firms in the treatment group and treatment years grow, compared to firms in the treatment group in the pre-treatment period, and firms in the control group over the whole study period. The estimated parameter β_3 will thus identify the effect of the Swedish audit reform on employment growth in the treated firms, all else being equal.¹⁶

In order to control for possible firm-level heterogeneity within the intervention and control groups, we also include firm-level fixed effects, α_i , in the analysis.¹⁷ These fixed effects control for possible heterogeneity among firms in both the intervention and control groups in variables, such as growth ambitions, leadership skills, access to internal and external capital, firm location, year of firm entry, etc., given that they are (at least roughly) constant over the years under study.

¹⁶ Note that the period under study coincides with the years after the financial crisis, starting with the default of Lehman Brothers in September 2008. However, for this to cause bias in the estimated reform effect, there needs to be a correlation both between the impact of the crisis and the fact of the firm being an intervention or control group firm specifically, as well as there being a second wave of the crisis in 2010 that affected the intervention or control group firms differently. We are not aware of any such events.

¹⁷ Random effects models were also estimated with similar results, but since a Hausman test favored the use of fixed effects, the results from fixed effects models are presented in the paper. The results from the random effects estimations are available from the authors on request.

Descriptive statistics for the variables included in the estimation of eq. [1] are presented in Table 2.

Table 2: Descriptive statistics.

Variable	Mean	SD	Definition
$G_{i,t}$	-0.00002	0.3002	Relative growth in percent in the number of employees from year t-1 to t.
$tp_t \times tg_i$	0.4109	0.4920	Interaction between tp and tg . Measures the effect of the reform on the treated firms.
tp_t	0.4989	0.4999	An indicator variable equal to one during the treatment period, zero otherwise.
$tg_{i,t}$	0.8637	0.3431	An indicator variable equal to one if the firm belong to the treatment group, zero otherwise.
Total sales $_{i,t}$ (L)	4.75e+10	3.13e+13	Total sales (in SEK) in year t-1. Used as a measure of firm size.
Total assets $_{i,t}$ (L)	1.87e+11	8.40e+13	Total assets (in SEK) in year t-1. Used as a measure of firm size.

Note: The descriptive statistics is based on the final sample used in the main regression analysis.

As a robustness check, several additional regressions have been estimated. First, our results can be biased if there are omitted variables that are correlated with our interaction term measuring the reform effect (Studenmund, 2011, p. 171).¹⁸ Some early studies (Samuels, 1965; Singh & Whittington, 1975) suggest large firms have higher average growth rates than small firms, while more recent studies (Audretsch, et al., 1999; Calvo, 2006; and Daunfeldt & Elert, 2012) tend to find that small firms grow faster. As the reform is targeted specifically at micro firms, there will be differences in size between treated and untreated firms, even after introducing the 20 employees' cut-off. To control whether the size differences have an impact on our estimate of the reform effect, we also choose to include firm size as an explanatory variable in our estimated model.

We use two different variables to measure firm size, total sales and the value of total assets. Both variables are lagged one year to alleviate a potential endogeneity problem. If the reform was unexpected by the affected firms, there will be no correlation between the timing of the reform and firm size, and then the inclusion of the firm size variables will not change the size of the estimated reform effects in any significant way. If the reform was instead anticipated,

¹⁸ Note that this requires the omitted variable to be correlated not only to being a treatmentgroup firm, but also to the timing of the reform.

and a correlation between size and the reform indicator exists, the inclusion of the size variables will reveal this as the estimated reform effect will change when the size variables are included.

Note that the estimated parameter β_3 shows the average reform effect over all Swedish industries. However, we know that it is likely that there are industry level differences in the reduction in the regulatory and administrative burden due to the reform (Section 2 above). The average reform effect over all industries could thus be driven by the outcome in a few industries, while firms in other industries are not significantly affected by the reform. We therefore also estimate eq. [1] separately for each of the 18 Swedish two-digit industry classification levels.

3.3. Estimation results

The results of the fixed-effects estimation of eq. [1] are presented in Table 3.

Table 3: Estimation results, dependent variable $G_{i,t}$.

Variables	Model 1	Model 2	Model 3
$tp_t \times tg_i$	0.0039* (0.0022)	0.0039* (0.0022)	0.0039* (0.0022)
tp_t	-0.0020 (0.0015)	-0.0020* (0.0015)	-0.0020 (0.0015)
$tg_{i,t}$	-0.0229** (0.0050)	-0.0232** (0.0050)	-0.0229** (0.0050)
Total sales (L)		-9.24e-11 (6.33e-11)	
Total assets (L)			1.69e-16* (5.85e-18)
Constant	0.0159* (0.0035)	0.0171* (0.0036)	0.0159* (0.0035)
Firm-specific f.e.	Yes	Yes	Yes
Observations	296,691	296,691	296,691
% change in $G_{i,t}$	0.39*	0.39*	0.39*

*Note: The 19 employee firm-size cut-off is used in these estimations. **statistically significant at the 5% level, * statistically significant at the 10% level. Standard errors in parenthesis. (L) indicates variable lagged one year.*

We find that the reform, on average, increased the employment growth rate in the treated firms by 0.39% (statistically significant at the 10% level). In total, 469 463 employees were employed in the treated firms the year before the reform was implemented. This implies that voluntary audits resulted in 1 830 additional new jobs in Sweden during 2011.¹⁹

¹⁹ 469 463 * 0,0039 = 1830 new jobs.

The results also show that the estimates of the reform effect do not change when firm size is included as an explanatory variable. This implies that the exclusion of firm size does not cause any omitted variable bias, and the results are also stable with regard to all robustness test regressions mentioned above.

Table 4: Estimation results, industry by industry, dependent variable $G_{i,t}$.

Industry	$tp_t \times tg_i$	tp_t	tg_i	Observations.	% change in $G_{i,t}$
Agriculture	0.0460** (0.0113)	-0.0271** (0.0076)	-0.0348** (0.0168)	8829	4.60**
Mining	0.2668** (0.0707)	-0.0086 (0.0192)	-0.0064 (0.0965)	421	26.68**
Manufacturing	-0.0220** (0.0070)	0.0467** (0.0039)	-0.0259* (0.0150)	26812	-2.20**
Electricity & gas	-0.0487 (0.0823)	-0.0331 (0.0300)	0.2680** (0.1304)	447	-4.87
Water and waste management	-0.0569 (0.0530)	0.0319 (0.0231)	0.1284 (0.1102)	671	-5.69
Construction	0.0029 (0.0064)	0.0043 (0.0042)	-0.0183 (0.0126)	38793	0.29
Retail and wholesale trade	-0.0011 (0.0046)	0.0001 (0.0026)	-0.0280** (0.0097)	61534	-0.11
Transportation	0.0051 (0.0095)	0.0165* (0.0060)	-0.0580** (0.0175)	16194	0.51
Hotels and restaurants	-0.0002 (0.0144)	-0.0183** (0.0071)	-0.0002 (0.0262)	6668	0.02
Information and communication	0.0410** (0.0104)	-0.0420** (0.0092)	-0.0551** (0.0253)	18142	4.10**
Finance and insurance	0.0552** (0.0198)	-0.0567** (0.0161)	-0.0359 (0.0439)	5266	5.52**
Real estate	0.0135 (0.0118)	-0.0228** (0.0089)	-0.0435* (0.0280)	13185	1.35
Professional services	0.0224** (0.0062)	-0.0249** (0.0057)	-0.0341** (0.0144)	59957	2.24**
Renting real estate	0.0188 (0.0144)	-0.0009 (0.0101)	0.0392 (0.0287)	9772	1.88
Training	0.0501** (0.0204)	-0.0587** (0.0167)	0.0295 (0.0433)	4489	5.01**
Health care and social services	0.0195* (0.0108)	-0.0330** (0.0091)	-0.0287 (0.0265)	10346	1.95*
Culture and recreation	0.0164 (0.0180)	-0.0221 (0.0154)	-0.0541 (0.0437)	5593	1.64
Other Services	0.0231 (0.0156)	-0.0209 (0.0121)	0.0576 (0.0404)	4583	2.31

*Note; The 19 employee firm-size cut-off is used in these estimations. **statistically significant at the 5% level, * statistically significant at the 10% level. Standard errors in parenthesis. (L) indicates variable lagged by one period.*

The results when we make separate estimations for 18 Swedish two-digit industries are presented in Table 4, showing that voluntary audits had a positive effect on the employment growth rates for firms in six out of 18 industries. We thus find substantial industry level heterogeneity in how the reform affected firm growth.

One possible explanation for these industry differences is that there are significant differences among industries in the reduction of the regulatory and administrative burden due to the reform. Such differences can be due to industry differences in the cost of auditing, something that has been found in several previous studies (Anderson & Zéghal, 1994; Gonthier-Besacier & Schatt, 2007; Hassan & Naser, 2013; Kikhia, 2015). The option not to audit will thus have a larger growth effect for those firms that are active in industries where auditing costs are high, thereby creating industry-level heterogeneity in the reform effect.

4. Summary and discussion

Most countries in the European Union have made auditing voluntary for small firms (Federation of European Accountants, 2016). One reason is that auditing increases the regulatory and administrative burden on small firms, and this burden might act as a growth barrier for small firms.

Sweden has, for a long time, been a rare exception in Europe, with auditing being mandatory for all limited liability firms. However, the Swedish government implemented a reform in 2010 that made auditing voluntary for the smallest firms. The construction and timing of the reform made it an almost perfect natural experiment since the specifics of reform were only discussed a short period before the legislation was passed, which means that it is highly unlikely that the reform was anticipated by the treated firms. In addition, no part of the reform was under the control, of even influence, of the affected firms, making the reform an exogenous event for firms in the treatment group. This means that the reform can be used as a natural experiment to investigate the impact of voluntary auditing on the growth in the number of employees.

Our results show that the reform increased average employment growth rates in the treated firms by 0.39%, which corresponds to 1,830 new jobs during 2011, suggesting that mandatory audits act as a growth barrier for small firms.

The threshold level for mandatory audits is significantly lower in Sweden than in most other European countries, even after the reform. Most European countries require mandatory audits when the firm reaches 50 employees, while the same number in Sweden is only three

employees. This suggests that more jobs could be created if the Swedish policymakers increased the threshold level for mandatory audits and made it more in line with the audit regulations in the rest of Europe.

Note that firms with certain characteristics and objectives²⁰ will continue to hire external accountants and auditors, and may also choose to voluntarily audit the firm, even if they are not subject to mandatory audits. However, a higher threshold will give more firms the possibility to adopt the auditing practices that they find most suitable to the firm, while auditors can improve their efficiency by concentrating on larger firms to a higher extent (see e.g., Chung & Narasimhan, 2001). The benefit for society is that the option of not auditing removes a growth barrier for small firms. As most firms in the economy are small firms that do not grow, or grow only slowly, such reforms can have a significant aggregate impact on job growth.

A potential cost associated with the reform would be if firms no longer required to audit were to a larger extent involved in tax evasion or other forms of economic crime after the reform. We do not have access to any data regarding the prevalence of tax evasion or economic crime at the firm or industry level. However, the Swedish National Council for Crime Prevention presents statistics on the number of yearly violations reported regarding the Revenue Offences Act (1971:69), and the Accounting Act (1999:1078). Regarding the Revenue Offences Act, the number of violations decreased from 21,572 in 2009, to 17,808 in 2011, while for the Accounting Act, the number of violations increased from 11,044 in 2009, to 12,260 in 2011. In 2016, the last year of data, 15,827 and 12,499 violations were reported for the Revenue Offences Act and the Accounting Act, respectively. As such, there does not seem to be any significant increases in economic crime, either in the short-term or long-term, following the voluntary audit reform. Also, it should be noted that the thresholds for voluntary audit are much higher in most of Europe compared to Sweden, indicating that European legislators have concluded that the

²⁰ According to numerous previous studies (e.g. Chow, 1982; Allee & Yohn, 2009; Collis, 2010; Collis, 2012; Niemi, et al., 2012; Dedman, et al., 2014; Ojala, et al., 2016), among others, some typical characteristics of firms opting to voluntarily audit have dispersed ownership, in other words, a large number of outside shareholders, relatively higher funding from bank or financial institutions compared to owners, the presence of a significant principal-agent relationship, and already depend heavily on auditors for non-audit services. The Director's perception of the value of information is also a prominent driver of voluntary audit (Collis, et al., 2004). Other objectives include, but are not limited to, access to outside capital, access to outside funds or capital at a lower cost, and better credit rating (Blackwell, et al., 1998; Allee & Yohn, 2009; Lennox & Pittman, 2011; Dedman & Kausar, 2012). Lennox & Pittman (2011) also argue that the option to choose audit allows companies to signal their type. Type refers to risk type of the borrowing company; a company that chooses to be audited voluntarily is more likely to be a low-risk borrower compared to a company which chooses not to be audited (Melumad & Thoman, 1990).

benefits of voluntary audit outweigh the costs, including those associated with possible tax evasion and other forms of economic crime.

We also find that the effect of the reform on employment growth depends on the industry in which the firm is active. Industries for which we found a positive impact include agriculture, mining, information and communications, finance and insurance, professional services, training, and health care and social services. At present, we do not have access to any information on the auditing costs for firms at industry level. However, if such information could be collected, this would give the opportunity for several interesting avenues of future research. First, is it the case that the high cost of auditing industries in Sweden also coincides with those where we find a positive effect of the voluntary audit reform on firm employment growth? If so, this would strengthen our argument that the positive impact of audit reform on firm growth found in this paper is a causal effect of the reform. Second, how does the cost of auditing in different industries in Sweden compare to the estimates from other countries?

Our study has focused on the employment effects of mandatory audits, because reforms that reduce the regulatory burden on firms most often are implemented to create more jobs. However, such reforms might also influence firms in other ways. The additional resources that are made available due to the reform could, for example, be used for capital investments or for building up internal capital. We believe that this also constitutes an interesting area for further research.

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Appendix 2: Paper 2

Do audited firms have lower cost of debt?

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ABSTRACT: The purpose of this study is to investigate if audited financial statements add value for firms in the private debt market. Using an instrumental variable method, we find that firms with audited financial statements, on average, save 1.26 percentage points on cost of debt compared to firms with unaudited financial statements. We also find that using the big, well-known auditing firms does not yield additional cost of debt benefits. Lastly, we find that the effect of audit on cost of debt varies between industries. As such, we find that firms in industries that have been identified in previous studies to have a more complex information structure, and therefore more complex auditing process, also save more on cost of debt relative to other industries when audited.

Keywords: Audit reform, Audit complexity, SMEs, Private limited firms

JEL-codes: D22, D24, M42, M48

1. Introduction

The long-run economic progress of a country is, to a large extent, determined by the level of investments creating a productive stock of capital. Investments are, however, in most cases associated with risk, and having access to high-quality information regarding the well-being of firms trying to raise external capital for investment purposes can be of vital importance for financiers. This creates an incentive for well-managed firms to provide high-quality information for financiers to have access to capital at a lower cost than less well-managed firms. A remaining question is then how to ensure that the financiers know that the information given is of high quality, creating a potential motive for the firm to use external audits. If audited information is regarded to be of higher quality by financiers, this would then lead to lower cost of debt (*CoD*) for firms with audited financial statements.

The question we would like to address is thus, “Do audited financial statements add value in the private debt market?” One way to answer that question is to look at the economic consequences, if any, of having audited financial statements, i.e. do firms with audited financial statements have lower *CoD*? We know little about such effects in general (Leuz & Wysock, 2016), and furthermore, this research question is largely understudied, especially for private firms (Vanstraelen & Schelleman, 2017). Also, the results from previous studies are mixed. For instance, Kim, et al. (2011), Minnis (2011), and Huguet & Gandía (2014) found that audit decreases *CoD*, while Koren, et al. (2014) found the opposite. Finally, Allee & Yohn (2009) did not find any significant association between audit and *CoD* for private limited firms.

Raising capital for investments can be of special importance for small and medium-sized enterprises (SMEs), and such firms are significant contributors to economic growth (Birch, 1979). According to an EU report (European Commission, 2011), SMEs account for two-thirds of the private sector employment and 99% of the firms in Europe. Of all European firms, 92% are micro firms with fewer than 10 employees. Just as in most other economies, small- and medium-sized firms make up the largest share of firms in the Swedish economy. There are about 1.2 million firms in Sweden of which about 97% are micro firms. Together with small- and medium-sized firms they make up about 99% of all firms, while the remaining 1% are large firms with more than 250 employees (Tillväxtverket, 2017). In Sweden, lending to non-financial corporations from monetary financial institutions amounted to approximately 1.7

trillion SEK²¹ as of December 2014 (Statistiska centralbyrån, 2017). In recent years, smaller firms applied for lesser loans and credits compared to larger firms, and the rejection rate for loans and credits was higher among service-sector firms compared to other industries (Tillväxtverket, 2017).

SMEs are important customers for commercial banks. According to a survey of 91 banks from 45 countries by Beck, et al. (2008), on average, banks' loan exposure to SMEs was between 11-13% compared to 32% towards large firms. The exposure can be significantly higher (up to 85%) for banks that specialize in SME financing (Bruns & Fletcher, 2008). According to OECD (2017), the median value of SME's loan share as a percentage of total corporate loans worldwide was about 40% in 2013, with Slovakia and Portugal having the highest share at 80%, while Canada and the Russian Federation had the lowest at 20%. The report also noted that the new loan share for SME's showed an increasing trend for most countries in recent years. Thus, gathering more evidence on the economic consequences of accounting and auditing decisions of SMEs is important for policy makers, the SMEs themselves, and bank managers as well.²²

Sweden provides an interesting setting for analyzing the value of audited financial statements as it allows the relaxation of some of the restrictions of previous studies. First, Sweden has a well-developed capital market (Bruns & Fletcher, 2008), but the primary source of external financing for small firms comes from banks (Winborg & Landström, 2000). Second, in 2010, there was a regulatory reform introduced making audits voluntary for firms fulfilling certain requirements. The reform was in line with the European Commission's (2011) directive to reduce the administrative burden of SMEs. Sweden was one of the last countries to adopt this EU-wide reform, and prior to the reform all firms were subject to mandatory audit. Sweden also has one of the lowest threshold levels to opt out of mandatory audit, second only to Finland. The threshold levels thus allow only very small firms to opt out of audit.²³

Methodologically, the identification of how auditing affects the firm's *CoD* is quite difficult since firms may choose auditing to systematically reduce *CoD*, creating a selection bias. In such a situation, OLS estimation will be biased as the indicator variable for a firm being audited will be correlated with the error term. To take this problem into consideration, we use an

²¹ 1.7 trillion SEK = 175 billion Euro, exchange rate 2017-10-29. Throughout the paper all exchange rates used are from 2017-10-29.

²² For a more detailed discussion about the importance of empirical evidence on economic consequences of disclosure and financial reporting regulation, see Leuz & Wysock (2016).

²³ See Appendix A for a description of the Swedish reform along with the threshold levels for mandatory audits in other European countries.

instrumental variable estimator to identify how auditing affects firms' *CoD*, using the above-mentioned Swedish reform to create our instrumental variable.

This is, however, only part of the difficulty in measuring how *CoD* is affected by having audited financial statements since there are several other factors suggested in the literature that affect firm level *CoD*. As the reform was focused on micro firms, we need to ensure that firm size does not drive the results, and as such we control for firm size and several other variables that could affect firm-level *CoD* in the empirical section of the paper.

Our results show that auditing reduces *CoD* with, on average, 1.26 percentage points, indicating that audits are deemed to contain significant information by financiers. There has also been a discussion that audits made by the well-known Big6 auditing firms are of special value for financiers as they have been deemed to be of higher quality than audits made by the average auditing firm.²⁴ We found no evidence of that using Big6 auditing firms, in fact, on average increased the *CoD* of the firms somewhat. Lastly, we found that industries, such as professional services, training, utilities, real estate, information and communications, and hotel and restaurants save more on *CoD* from financial statement audit than firms in other industries.

Our study contributes to the literature in several ways: Firstly, we provide unbiased estimates in a European private-firm setting that a financial statement audit, mandatory or not, reduces *CoD*. We do so in a setting where private debts are the only source of external financing for these private firms since they do not have access to public debts, and approximately half of the firms move from a mandatory audit regime to a voluntary audit regime, due to an EU-wide regulatory reform to reduce the administrative burden for SMEs. Secondly, we contribute to the discussion “if lenders look at audit choice or auditor choice or both”, finding that audit choice is more important than auditor choice. Lastly, we provide the first evidence that the benefits of an audit (in terms of reduced *CoD*) vary across industries due to the variation of complexity of information structure and the audit process across the different industries.

The remainder of the paper is organized as follows. Section 2 discusses prior literature and presents our hypotheses. Section 3 presents the data, the empirical model and our estimation results. Section 4 summarizes our results and discussion.

²⁴ The Big4 auditing firms consist of PricewaterhouseCoopers, Ernst and Young, Deloitte and KPMG. In Sweden, BDO and Grant Thornton are usually also included as big auditing firms that in addition to the Big4 make up the Big6 (Vourc'h & Morand, 2011).

2. Prior literature and hypotheses to be tested

One of the best ways to describe the role of audit and how it developed is perhaps through the lens of agency theory.²⁵ Even though the premise is largely applied to bigger firms, agency problems may still persist in smaller firms since they are also complex and diverse (Eisenhardt, 1989; Ang, 1992). Though certain stakeholders are placed closer to smaller firms (Dedman, et al., 2014), some SMEs often have high information asymmetries (Fenn, 2000; Santos, 2006), especially those that look to raise funds through external debt financing. Since there exists a principal-agent relationship between the firm and the lender (Eisenhardt, 1989; Pentland, 1993; Power, 1999), firms that look to raise funds through external debt will actively seek ways to improve the quality of their accounting information (Burgstahler, et al., 2006), and thereby reduce the information asymmetry between the firm and the lender (Jensen & Meckling, 1976). Auditing may not guarantee better quality of accounting information, but when combined with the social construct of the accounting standards and the accounting profession together they suggest that auditing can provide higher assurance of better quality accounting information (Pentland, 1993; DeFond & Zhang, 2014). Thus, external audit is expected to add value (Power, 1996), and Clatworthy & Peel (2013) found that unaudited financial statements of small private firms were twice as likely to contain accounting errors compared to audited financial statements of similar firms. Thus, from an agency theory point of view, audited financial statements should reduce firms' *CoD* as they reduce the information asymmetry between the firm and the lender (Jensen & Meckling, 1976). This leads to our first hypothesis:

H1: Firms that are audited will have lower cost of debt compared to firms that are not audited, all else being equal.

Prior literature suggests that using well-known Big auditing firms improves accounting quality (DeFond & Jiambalvo, 1991; Teoh & Wong, 1993; Becker, et al., 1998), and that better accounting quality results in lower *CoD* (Mansi, et al., 2004; Pittman & Fortin, 2004). On the other hand, Fortin & Pittman (2007) conclude that private firms do not benefit from better yield spreads or credit rating of public debt from the retention of a well-known Big auditor. However, there is not much evidence of private firms that solely depend on private debts for external funding benefiting from an audit by well-known Big auditing firms, except for some recent studies. Kim, et al. (2011), using a sample of Korean firms, found that the appointment of a well-known Big auditing firm does not significantly reduce the firm's *CoD*, and Huguet &

²⁵ See Agency theory and the role of audit, Institute of Chartered Accountants in England & Wales (2005).

Gandía (2014) found similar results for a sample of Spanish firms. On the other hand, Karjalainen (2011), studying how auditing quality affected private firms' *CoD* in Finland, found that audits by well-known Big audit firms tended to decrease *CoD*. Since the Swedish private firm-setting is more similar to the Finnish private firm-setting, as are the financial systems (Hyytinen & Pajarinen, 2001), we hypothesize:

H2: Firms that chose to be audited by Big6 auditing firms have lower cost of debt compared to firms that audit with non-Big6 auditing firms, all else being equal.

Previous studies have also found that auditing cost varies across industries and, among other reasons, attributed these differences in costs to differences in the complexity of the auditing process for different industries (Firth, 1985; Anderson & Zéghal, 1994; Hay, Knechel, & Wong, 2006; Gonthier-Besacier & Schatt, 2007; Cahan, Jeter, & Naiker, 2011; Hassan & Naser, 2013; Kikhia, 2015). Past studies have shown that the information & communications industry (Gonthier-Besacier & Schatt, 2007) pays significantly higher audit costs, while firms in transportation communication and utilities industries (Simunic, 1980; Anderson & Zéghal, 1994; Carcello, Hermanson, Neal, & Riley, Jr., 2002) pay significantly lower audit costs. The findings for the manufacturing industry are mixed. For instance, Kikhia (2015) found manufacturing pays significantly higher audit costs, while Hassan & Naser (2013) found manufacturing firms pay significantly lower audit fees compared to service and retail firms. On the other hand, Anderson & Zéghal (1994) did not find any significant difference between the mining and manufacturing industries when compared separately to other industries. If auditing provides information for financiers, we expect firms in industries with more complex information structures and more complex auditing processes to have larger reductions in *CoD* from financial statement audits. Thus, for example, we expect the effect of audited financial statements on *CoD* to be larger in the information and communication industry and lower in the transportation industry, compared to the average effect for all other types of firms. We also expect the effect to be relatively higher for the wholesale and retail industry and services industries, compared to the manufacturing industry, since wholesale and retail, and services may have more extensive inventory and knowledge-based assets, respectively, and firms with such attributes are argued to be more difficult to audit (Hay, Knechel, & Wong, 2006). This leads to our third hypothesis:

H3: The magnitude of the effect of audits on CoD will vary across industries due to differences in the complexity of the auditing process.

3. Empirical Analysis

3.1. Data

The data for this study is collected from the Retriever database, containing corporate information of all registered limited liability (both listed and non-listed) firms in Sweden. It should be noted that we only have information about which firms that were audited for one year, 2013, and that this is a cross-sectional study. Our estimations are run on a sample of 123 773 surviving firms in 2014 which were registered prior to 31st December 2006. Our study is thus based on surviving firms over that period, and inference cannot be drawn for firms that made an entry or exit during the study period. We arrived at the dataset used in the regression analysis in the following manner (Table 1):

Table 1: Sample selection process

Total no of firm year information retrieved from the database	489 131
Total no of firms registered before 2006-12-31 and active until 2013-12-31	202 883
Excluding firms with no Industry classification	(15 121)
Excluding Finance and Insurance firms & Government organizations	(8 811)
Excluding listed firms	(438)
No of unique firms in the final sample	178 513
Excluding firms who have reported zero or negative CoD	(53 659)
Excluding firms whose PPE exceeds total assets	(1 081)
Final sample	123 773

The Swedish audit reform was introduced in November of 2010, and we will use the threshold levels for voluntary audits available for the firm to create our instrumental variable. If using the threshold level of the reform on data for the firm in 2013, we would still have the problem of firms self-selecting into auditing, so in order to create an exogenous instrumental variable we use firm level data for 2009, one year before the reform was introduced or even presented to parliament or the public, to create our instrument. We use the actual threshold level for voluntary audits based on number of employees, total assets and total sales introduced by the Swedish Government in the November 2010 reform, but on firm data for 2009, and thus have an instrumental variable that cannot be affected by self-selection into treatment.

The database contains historical financial information on about 489 131 firms, but it includes many inactive firms. We first eliminated firms registered after 31 December 2006, since our calculation of the exogenous instrument in 2009 requires data for number of employees, total assets and total sales for the financial years 2007 and 2008, as the threshold levels in year t is determined based on the values of the parameters in years $t-1$ and $t-2$. Next, we eliminated firms

that were not active after 31 December 2014, by only including firms that had submitted a financial report for the year 2014. Then we excluded firms in the finance and insurance industry and public administration, since they are subject to stricter or different rules and regulations regarding auditing compared to firms in other industries. Furthermore, we eliminated listed firms, since they are still subject to mandatory audit and thus not affected by the 2010 audit reform. Finally, we removed firm observations where calculated *CoD* was less than zero and/or when the total reported value of plant, property and equipment was more than total assets, resulting in a dataset containing 123 773 firm observations.

3.2. Empirical model and descriptive statistics

In this section we discuss the regression model, the variables used in the analysis, and their descriptive statistics. The regression model to be estimated is written as follows:

$$\begin{aligned}
 CoD_i = & \beta_0 + \beta_1 Audited_i + \beta_2 AudBig6_i + \beta_3 ICR_i + \beta_4 LR_i + \beta_5 PPE\ share_i \\
 & + \beta_6 Leverage_i + \beta_7 Ln_TA_i + \beta_8 Growth_i + \beta_9 ROA_i \\
 & + \beta_{10} Neg.Equity_i + \beta_{Industry} + u_i
 \end{aligned} \tag{1}$$

Cost of Debt (CoD): The dependent variable *CoD* is calculated following Minnis (2011), and Huguet & Gandía (2014), and was calculated as reported external interest expenses divided by the average of bonds, long-term loans from credit institutions, other long-term liabilities, short-term liabilities from credit institutions and other short-term liabilities at the beginning and end of 2013. In line with previous studies (Pittman & Fortin, 2004; Minnis, 2011), we excluded firms with negative or extremely high values of *CoD* to make sure these extreme observations did not affect our regression results. Without any restriction on upper and lower limits on *CoD*, in 2013, the mean *CoD* for the total sample was 8.8%, the median was 1.0%, while 95% of firms reported *CoD* less than 8.0%, and 99% of the firms reported *CoD* less than 26.1%. According to OECD (2016), in 2013, the average interest rate for SMEs in Sweden was 3%.

The descriptive statistics in Table 2, where the mean *CoD* is 3.11% with a standard deviation of 3.29%, is based on the restriction that reported *CoD* is greater than 0% and less than, or equal to, 30%.²⁶ The lower limit is chosen since it seems unreasonable that lenders would pay to finance the firms. Although previous studies have also used an upper limit on the *CoD* (Minnis,

²⁶ Untabulated two-way median band plots show that the differences in *CoD* are small for the two groups of firms (audited versus unaudited) when the total debt is below 200 000 SEK (20 600 Euros), but more substantial around 100 000 SEK (10 300 Euros) and 300 000 SEK (30 900 Euros) in total debts, and that unaudited firms rarely borrow at median values higher than 350 000 SEK (36 050 Euros). It must also be noted that an average audited firm has total long-term debt of 23 million SEK (236 915 Euros), and an average unaudited firm has total long-term debt of 627 000 SEK (64 585 Euros).

2011; Kim, et al., 2011), there is no clear-cut rule that has been used consistently to determine the limit. As such, we chose the upper limit to be 30% after having considered the distribution of *CoD* among the firms in our sample, and as robustness checks of how this choice will affect our results, we also run additional regressions increasing the upper limit of *CoD* in steps up to using a 150% cut-off. Lastly, additional robustness check estimations were run after logarithmic transformation²⁷ of the *CoD* variables, the results of which are presented in Table A4 in the Appendix.²⁸

Audited: The identification of how auditing affects the firm's *CoD* is quite difficult for several reasons. One of the reasons is that there exists a simultaneous relationship between the firm's *CoD* and the firm's decision to audit their financial statements (Minnis, 2011; Koren, et al., 2014; Huguet & Gandía, 2014), a phenomenon that numerous past studies drawing inference on how auditing affects *CoD* have failed to capture (Kim, et al., 2011; Huguet & Gandía, 2014). Since the choice of being audited is endogenous, OLS estimation will be biased as the variable audited is correlated with the error term. To take this problem into consideration, we use a two-stage least square (2SLS) instrumental variable (IV) estimator to identify how being audited affects firms' *CoD*.

An indicator variable equal to one, if the firm was audited in 2013 (*Audited*), and zero otherwise is our endogenous variable to be instrumented. In our sample, approximately 77.6% of the firms audited their financial statements in 2013, while 22.4% did not. Our endogenous variable *Audited* will be instrumented using the variable *Reform 2010*, which is an indicator variable equal to one, for firms that fulfilled the requirements for voluntary audit, based on information from the year 2009, and equal to zero otherwise.²⁹ Fulfilling the requirements of the audit reform clearly influences whether or not the firm will be audited, while being below or above the mandatory audit threshold level should not in itself influence the firm's cost of debt after controlling for firm size and other relevant exogenous variables. Furthermore, since the firms were unaware of the reform and its requirements at the time we measured the instrumental

²⁷ Since the distribution of *CoD* is skewed to the right and principally should be strictly positive.

²⁸ After comments from an editor, additional robustness checks were made using the endogenous switching model (used by Minnis, 2011 to deal with endogeneity), Heckman selection models and nearest neighbor matching. The initial estimations show that the results from the endogenous switching model are very similar at both the aggregate level and industry level. The results for Heckman selection model and nearest neighbor matching is also very similar at the aggregate level while the results from Heckman selection model was a bit profound and the results from nearest neighbor matching was a little less profound compared to our original IV estimation. The results from the additional robustness checks will be included in the revised version of the paper.

²⁹ As explained in Section 3.1, in line with the Swedish audit reform of November 2010, the parameter values in 2007 and 2008 are used to determine if firms would have been below or above the mandatory audit threshold in 2009.

variable, there is no reason to believe that it is correlated with the error term of the regression.³⁰ In our sample, 46.9% of the firms would have been below the mandatory audit threshold level had the reform been introduced in 2009, while 45.9% of the firms were actually below the mandatory audit threshold levels in 2013.

AudBig6: To measure the effect of being audited by a Big6 audit firm, an indicator variable equal to one, if being audited by a Big6 firm, is included in the model. About 14% of the audited firms chose a Big6 auditor. A robustness check with Big4 audit firms instead of Big6 is presented in Table A5 in the appendix, and the results are similar to those presented below.

Following Minnis (2011), Kim, et al., (2011), and Koren, et al., (2014), we also include control variables, such as liquidity ratio (*LR*), interest coverage ratio (*ICR*), plant, property and equipment share (*PPE_share*), debt by equity (*Leverage*), log of total assets (*Ln_TA*), sales growth (*Growth*), return on assets (*ROA*), and an indicator variable equal to one for firms with negative equity (*Neg. Equity*). To reduce the risk of these variables being also endogenous, in the sense that they are correlated with the error term of the regression equation, we use one year lagged values to measure these control variables. Lastly, to control for possible industry differences in the average CoD, we also include industry indicator variables.

Interest coverage ratio (ICR): The variable is calculated as earnings before interest, taxes, depreciation and amortization divided by interest expense. In 2012, the average ICR for audited firms was 91.69 times, while for unaudited firms it was 19.66 times.

Liquidity ratio (LR): The variable is the ratio of current assets over current liabilities. In 2012, the average LR for audited firms was 3.63, and for unaudited firms it was 5.93.

Plant, property and equipment share (PPE_share): This variable is calculated by adding firms' holdings of land and buildings, machinery and equipment and dividing with total assets. Observations for which the reported plant, property and equipment value were higher than the reported value of total assets were excluded from the analysis.³¹ In 2012, audited firms, on average, had 26% of their total assets as PPE, while unaudited firms had a PPE share of 22% of the total assets.³²

³⁰ Note that the Swedish Reform Bill was passed in the parliament on 21 June 2010 and the specifics were not made public until after that. The reform was effective from November 2010. Thus, we believe that firms could not have predicted and adopted their behavior to the threshold levels of the reform in 2009.

³¹ By restricting plant, property and equipment to be less than reported total assets, we lost 1081 observations.

³² As an alternative measure, we in some regressions use the natural log of collateral since this variable was readily available in our dataset. The untabulated results from these estimations are similar to those reported below.

Table 2: Descriptive statistics for the total sample

Variable	Mean	Std. Dev.	Description
CoD	3.1111	3.2871	Cost of Debt is the dependent variable reported in percentage for the year 2013, and calculated as explained in Section 3.2.
Audited	0.7761	0.4168	This is an indicator variable equal to 1, if the firm was audited in the financial year 2013, and zero otherwise.
Reform2010	0.4696	0.4991	This is an indicator variable used to instrument the variable of interest “Audited”. The value equals to zero if a firm was below the statutory audit threshold, and equal to one if a firm is above the statutory audit threshold in 2009. Thus, a value of zero means a firm was not subject to statutory audit in 2009, and a value of one means the firm was subject to statutory audit in 2009.
AudBig6	0.1088	0.3114	This is an indicator variable equal to one, if the firm was audited by a Big6 auditing firm in 2013, and zero otherwise.
ICR	75.554	932.14	Interest coverage ratio calculated on EBIDTA for the year 2012. Control variable for the firm’s ability to pay future interest expenses.
LR	4.1465	72.078	Liquidity ratio for the year 2012. Control variable for the liquidity of a firm.
PPE share	0.2479	0.3067	Share of total plant, property & equipment of the total assets for the year 2012. Control variable for tangibility of the firm.
Leverage	0.9821	42.749	Leverage calculated as total debt divided by total assets for the year 2012. Control variable for the financial risk of the firm.
Ln_TA	15.128	1.8670	Natural log of (1+total assets) for the year 2012. Control variable for firm size.
Growth	-0.0303	0.5909	Growth is measured as year-over-year sales growth between 2011 and 2012. Control variable for the business risk of a firm.
ROA	-2.0136	660.38	Return on assets calculated as net income divided by total assets for the year 2012. Control variable for the profitability of a firm.
Neg. Equity	0.0447	0.2066	An indicator variable equal to 1, if a firm has negative equity and, zero otherwise in the year 2012. Control variable for financial distress.

Note: Accounting and financial control variables: ICR, LR, PPE share, Leverage, Ln_TA, Growth, ROA, Neg. Equity are lagged by one year to avoid a potential endogeneity problem.

Table 2 presents descriptive statistics and variable descriptions for all variables in the analysis, while Table 3 reports descriptive statistics of the two sub-groups: audited and unaudited firms.³³

Table 3: Descriptive statistics by the two sub-groups

Variable	Unaudited firms in 2013 (26,792 firms)		Audited firms in 2013 (92,895 firms)	
	Mean	Std. Dev.	Mean	Std. Dev.
Audited	0	0	1	0
CoD	3.6532	3.7923	2.9551	3.1092
Reform2010	0.8657	0.3409	0.3600	0.4800
AudBig6	0	0	0.1402	0.3472
ICR	19.661	208.11	91.691	1051.8
LR	5.9257	107.18	3.6336	58.149
PPE share	0.2196	0.3047	0.2559	0.3068
Leverage	1.3685	15.903	0.8709	47.759
Ln_TA	13.603	1.5060	15.568	1.7240
Growth	-0.1072	0.7673	-0.0091	0.5300
ROA	-5.1662	327.69	-1.1077	728.57
Neg. Equity	0.0967	0.2955	0.0297	0.1697

Note: Accounting and financial control variables: ICR, LR, PPE share, Leverage, Ln_TA, Growth, ROA, Neg. Equity are lagged by one year to avoid a potential endogeneity problem.

Leverage: This variable is calculated as total debt divided by total asset. The average leverage in 2012 of an audited firm was 0.87 times, while for an unaudited firm it was 1.37 times.

Total Assets (Ln_TA): This variable is reported in the dataset, and following previous studies (Karjalainen, 2011; Minnis, 2011), we take natural log of (1 + total assets) to be included in the model. On average, audited firms had total assets of 60 million SEK (6.2 million Euros), while unaudited firms had total assets of 2 million SEK (0.2 million Euros) in 2012.

³³ To investigate if multicollinearity might be a problem in our estimations, we also present statistics over how high the correlations between the variables are, see Table A2 in Appendix B. The correlations are, in most cases, low enough to make it unlikely that our results are affected by multicollinearity. One high correlation stands out, and that is between ROA and Leverage. However, removing these potentially collinear variables one by one does not alter the results regarding how being audited affects *CoD*, and thus we choose to include both these variables in the estimations presented in the paper.

Growth: This variable is calculated as yearly relative sales growth from year t-1 to year t. Audited firms had on average negative growth rates of -0.01%, while unaudited firms had a negative growth rate of -0.11% during the period from 2011 to 2012.

Return on Assets (ROA): Return on assets was calculated as reported net income over reported total assets. In 2012, audited firms, on average, had a negative ROA of -1.32%, while it was -6.50% for unaudited firms.

Negative Equity (Neg. Equity): This is an indicator variable equal to one, for firms that have negative equity, and zero otherwise. In 2012, 9.7% of the unaudited firms had negative equity, while 3% of the audited firms had negative equity.

Table 4: Sample distribution according to industry

Industry	No of firms	Percentage of total sample	Audited firms in 2013 (%)
Agriculture	4174	3.4	74.8
Mining	231	0.2	90.0
Manufacturing	13057	10.6	84.3
Electricity & gas	680	0.6	85.0
Water and waste management	374	0.3	89.8
Construction	14896	12.0	76.7
Retail and wholesale	25537	20.4	81.2
Transportation	7189	5.8	79.3
Hotel & restaurants	4073	3.2	82.0
Information and communication	5964	4.7	70.8
Real estate	14589	12.2	83.4
Professional services	20596	16.7	67.3
Renting real estate	4320	3.4	77.5
Training	1581	1.2	72.0
Health care and social services	3083	2.6	70.2
Culture and recreation	2019	1.6	67.3
Other service activities	1410	1.1	63.1
Total	123773	100	77.2

Industry classification: To capture industry level heterogeneity, indicator variables for different types of industry have been created according to the first two digits of the firms NACE classification code. Some summary statistics by industry are presented in Table 4. Firms from industries, such as manufacturing, construction, retail and wholesale, real estate, and professional services account for about 72% of the total sample. Other major industries include

transportation (5.9%), information communication (4.6%), hotel and restaurants (3.3%), agriculture (3.5%), and renting real estate (3.3%). In our sample, firms from industries such as professional services (56.9%), real estate (53.9%), culture and recreation, and information communication (42.1%) had the highest share of audited firms.

3.3. Estimation Results

Results from the estimation of equation (1), using *Reform2010* as an instrument for *Audited*, are presented in Table 5. Due to missing observations in one or more variables the number of firms is reduced from 123 774 to 113 020 in the main regression. The first stage estimation results of our 2SLS procedure are presented in Table A3 in Appendix C. Since heteroscedasticity-consistent standard errors are used in the estimations, Wooldridge's (1995) robust score test is used to test if *Audited* can be considered exogenous, and the results show that exogeneity can be rejected at the 1 percent significance level. The first stage F-statistics of the endogenous regressor are also reported; for one endogenous regressor, if the F statistic exceeds 10 then the inference is reliable and the instrument is not weak (Stock & Yogo, 2005), which is clearly the case in our estimations. The R-squared of the first step regression is 26.9%, and the partial R-squared related to our instrument *Reform2010* equals 6.4%. Based on these statistics and how the instrument was created, we consider our instrument to be both strong and exogenous, resulting in valid inference regarding how auditing affects *CoD*.

Turning to the results from the second-stage regression, our findings indicate firms with audited financial statements, on average, have lower *CoD* compared to firms with unaudited financial statements. On average, *CoD* for firms with audited financial statements are 1.26 percentage points lower than for firms with unaudited statements, and the difference is statistically significant at the 5% level. As such, we find that our first hypothesis is supported.

Turning to the control variables, the signs for *ICR*, *Growth*, *ROA*, *Ln_TA*, and *Neg. Equity* are as expected from prior literature, while the signs for *LR*, *PPE_share*, and *Leverage* are not. *ICR* is negative and statistically significant, but too small to be economically significant.³⁴ Inconsistent with past studies, *LR* was positive and significant, as was *PPE_share*. The size of the parameter estimates indicates that *LR* only has a minor economic impact on *CoD*, while the impact of *PPE_share* is more pronounced. Consistent with theory, and inconsistent with some

³⁴ Since *ICR* and *Leverage* are both proxies of financial risk, there could be issues of multicollinearity, even though the correlations between these variables (reported in Table A2 in Appendix B) are not that severe. As such, we have re-run our estimations removing these potentially collinear variables one by one, as we did with *ROA* and *Leverage* above. However, doing this does not alter the results regarding how being audited affects *CoD* in any significant manner, and we choose to include both these variables in the estimations presented in the paper.

past studies, *Leverage* has a negative statistically significant impact on *CoD*. On the other hand, both *Growth* and *ROA* have a negative impact on *CoD*, but only the estimate for *Growth* has any economically significant impact on *CoD*. Also, we find that having negative equity increases the *CoD* by, on average, 0.95 percentage points.

Table 5: 2SLS estimation results, dependent variable CoD, all industries.

Independent Variables	Coefficients
Audited	-1.2603* (0.1024)
AudBig6	0.1559* (0.0318)
ICR	-0.0001* (0.0000)
LR	0.0021* (0.0006)
PPE_share	1.3944* (0.0351)
Leverage	-0.0088* (0.0028)
Ln_TA	-0.1356* (0.0138)
Growth	-0.1190* (0.0193)
ROA	-0.0001 (0.0000)
Neg. Equity	0.9510* (0.0618)
Constant	5.6011* (0.1564)
Industry level fixed effects	YES
Observations	113,020
R-sq. second stage reg.	0.0412
R-sq. first stage reg.	0.2686
Partial R-sq. first stage reg. <i>Reform 2010</i>	0.0634
F-statistic	6706.95

*Note: Robust standard errors in parenthesis. * significant at the 5% level.*

Finally, to test hypothesis 2, we look at the magnitude and significance level of the *AudBig6* variable which is positive and statistically significant at the 5% level. The size of the parameter estimate indicates that having a Big6 auditing firm increases the *CoD* by 0.16 percentage points, holding the impact of the other variables in the regression model constant. Note that since

auditing reduces *CoD* by 1.26 percentage points, on average, auditing will still reduce the *CoD*, but somewhat less if firms chose a Big6 auditing firm. Our findings here are inconsistent with Karjalainen (2011), who found that using Big6 auditing firms reduced the *CoD*.

Table 6: Estimations by industry, estimated coefficient of the variable Audited is presented along with the first stage Adjusted R-sq, and second stage R-sq. and Partial R-sq. of first stage reg. of Reform2010.

Dependent variable:	Audited	R-sq. second stage reg.	R-sq. first stage reg.	Partial R-sq. Reform2010	F-statistics
CoD					
Agriculture	0.3932 (0.3450)	0.0284	0.3367	0.1102	363.00
Mining	-1.5035 (4.3522)	0.1454	0.2090	0.0266	2.8268
Manufacturing	-0.9758* (0.2665)	0.0402	0.3149	0.1201	965.04
Electricity & gas	-4.8900* (1.8665)	.	0.2363	0.0436	24.479
Water and waste management	-1.727 (1.4114)	0.0260	0.3612	0.1715	27.189
Construction	0.1453 (0.2463)	0.1232	0.2955	0.0663	781.37
Retail and wholesale	-0.7974* (0.2229)	0.0350	0.3039	0.0947	1675.7
Transportation	-0.6132* (0.2813)	0.0984	0.3103	0.0861	437.78
Hotel & restaurants	-1.8724* (0.5746)	0.0401	0.2534	0.0698	213.96
Information and communication	-1.1106* (0.4964)	0.0532	0.2577	0.0582	337.00
Real estate	-3.6805* (0.9231)	.	0.1569	0.0066	108.74
Professional services	-2.700* (0.3779)	.	0.2093	0.0278	634.65
Renting real estate	-1.8789* (0.5719)	0.0437	0.2823	0.0698	245.83
Training	-2.2445* (0.6378)	0.0515	0.2772	0.0831	143.53
Health care and social services	-0.8150 (0.5024)	0.0878	0.2612	0.0692	225.63
Culture and recreation	1.3156 (0.7570)	0.0303	0.2782	0.0616	159.22
Other service activities	-0.7728 (0.8114)	0.1160	0.2993	0.0544	81.68

*Note: Robust standard errors in parenthesis. * significant at 5% level.*

To test hypothesis 3, we estimate equation (1) for each of the 19 industries defined by their 2-digit NACE-codes. The effect of having audited financial statements on *CoD* is negative and

significant for 13 out of 17 industries, and, as expected, the magnitude of the effect is more pronounced for some industries than for others. As presented in Table 6, the average effects in percentage points for the different industries were, Manufacturing (-0.98), Electricity & gas (-4.89), Retail & wholesale (-0.80), Transportation & storage (-0.61), Hotel & restaurants (-1.87), Information & communication (-1.11), Real estate (-3.68), Professional services (-2.70), Rental real estate (-1.88), and Training (-2.24). All these effects were statistically significant at 5% level. For example, as expected, based on the result of previous studies on audit complexity and cost, the negative impact of having audited financial statements on *CoD* is higher for the information and communication industry compared to the transportation and storage industry. Also, as expected from previous studies, the effect was more pronounced in (most of) the service sectors compared to the manufacturing sector. However, contrary to expectation, retail and wholesale had a similar effect of auditing on *CoD*, compared to the manufacturing sector.³⁵

4. Summary and discussion

Financial statement verification indeed adds value to a firm, at least in terms of reducing the firm's *CoD*. Our findings suggest firms with audited financial statements, on average, save 1.26 percentage points (or 126 basis points) on interest for debts. Thus, an average firm in our sample would save about 16 900 EUR on annual interest charges.³⁶ In contrast, in the US private-firm setting, Minnis, (2011) found that audits reduce *CoD*, on average, by 69 basis points, equivalent to 25 000 USD (21 535 EUR) in annual interest charge savings by an average firm; Kim, et al., (2011) in the Korean private firm-setting found voluntary audits reduce *CoD* by 56 to 124 basis points, depending on model specifications; and Huguet & Gandía, (2014) in the Spanish SME-setting found that audits reduce *CoD* by, on average, 18 basis points; and Koren, et al., (2014) for a sample of Slovenian firms found voluntary audits increase *CoD* by 21 basis points. As such, our results are in line with most previous studies in that we find a reduction in the *CoD* of being audited, but also in the size of the effects, at least when compared to Minnis (2011), in terms of USD saved, and Kim et al., (2011) in terms of basis points.

However, as mentioned above, unaudited firms rarely borrow more than median values of 360 000 SEK (37 000 EUR), and the debt size of an average unaudited firm is 627 000 SEK (64 585 EUR). As such, these average unaudited firms could save about 7 900 SEK (814 EUR)

³⁵ Several robustness checks have been performed to verify the results presented in this section. Firstly, we increased the upper cut-off point of *CoD* in steps up to 150%, and also used logarithmic transformation of the dependent variable *CoD*, since it attributed a heavily skewed distribution. See Appendix D for results.

³⁶ An average firm in our sample had total long-term debt of 13 million SEK (1.3 million EUR) in 2012.

on annual interest charges, if they chose to be audited. The minimum audit cost for small and micro firms in Sweden averages between 15 000 SEK (1 500 EUR) to 20 000 SEK (2 000 EUR), excluding any additional internal staff time and cost for the preparation and carrying out of the audit, and this cost is even higher for larger and more complex SMEs. Thus, a typical unaudited firm in our sample does not have any additional benefit in terms of reduced *CoD* from switching to having audited financial statements, at least not in the short-run.

We also find that there is no additional benefit to firms in terms of reduced cost of debt for employing Big6 audit firms. Our results are similar to the findings of Huguet & Gandía, (2014), and Kim, et al., (2011), but contradict the findings of Koren, et al., (2014) and Karjalainen, (2011). The share of Big4 audit in the sample of Koren, et al., (2014), and Karjalainen, (2011), was 27.8% and 24.2%, respectively, while in our sample it is 14 %, and for Huguet & Gandía, (2014) and Kim, et al., (2011) the shares were 4.3% and 33.8%, respectively. As such, the different results could be driven by differences in the Big4s' share of audit in the sample, as suspected by Karjalainen, (2011), and this question warrants more research. However, from our results it seems that lenders look more at audit choice than auditor choice as a way of reducing *CoD* for borrowing firms. This was also reported by Kim, et al., (2011), and then especially in the case of private limited firms.

Lastly, we found firms belonging to the industries that have been shown in previous studies to have more complex information structure and more expensive auditing to also save more on interest charges by auditing their financial statements. Our results here are not directly comparable to any previous studies, since, to the best of our knowledge, previous studies did not look at the differences in the effect of audit across various industries. However, literature on audit fees suggests audit charges vary, among others things, due to the complexity of the audit process in a specific industry. Thus, we expected that firms in industries with more complex information structures and more complex auditing processes to have larger reductions in *CoD* from financial statement audits, and this is also what we find.

Even though our results from the Swedish setting are very similar to those from US, Korean and Spanish settings, findings from other settings within the EU, or outside the EU, may vary, since risk varies greatly between developed and developing countries, and there is disparity within different EU countries too (Sbarcea, 2015). Thus, future studies with cross-country samples would help us to better understand if the institutional differences influence the relationship between audits and *CoD*. Future studies can also address some of the caveats of this present study, and some of the past studies, in this line of work. For example, a more

comprehensive measure of *CoD* can definitely improve future studies. Most studies, including ours, only have access to interest rate data, however, total cost of debts also includes other contract terms, such as maturity, collateral, and additional conditions, if any, stipulated by the lender. Furthermore, factors, such as the firm-lender relationship, and the individual lender's risk appetite also influence debt pricing, and lenders tend to optimize their risk-return relationship with a balance between these factors (Bharath, Sunder, & Sunder, 2008), and future studies should, if possible, also incorporate these variables in the analysis. The literature also lacks comprehensive knowledge about the net benefit of audits, i.e. the benefits after deducting the direct and indirect costs of auditing, as well as how banks view and value audits. As such, researchers could interview loan officers and credit analysts to better understand how they value and/or evaluate a firm's audit and auditor choices. These are, however, suggestions for future studies and outside the scope of the present paper.

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Appendix A: The Swedish Audit Reform

The EU Fourth Company Law Directive (78/660/EEC) provides the EU member states with the option to exempt SMEs from mandatory audits (European Economic Community, 1978), and most countries within the EU use this option to exclude SMEs, while Sweden choose not to exercise this right when joining the European Union in 1995. Sweden was for a long time an exception, with statutory audit for all Swedish limited firms, even the smallest ones. This legislation can be dated back to 1895 when the Companies Act was re-written, making it mandatory for Swedish limited firms to appoint independent auditors (Öhman & Wallerstedt, 2012). Voluntary audits can be dated back to the 1650s in Sweden, and official, but still voluntary, audits were also mentioned in the Companies Act of 1848.

In 2006, a center-right government was elected in Sweden, and one of their campaign promises was to reduce the administrative burden of firms. This was also in line with the European Commission's plan to reduce SME's administrative burden by 25%, as per the EU Fourth Company Law Directive (78/660/EEC). Reports from the European Commission highlighted the importance of SMEs for the European economy and called for a more business-friendly environment for SMEs, including micro firms so that they would become more competitive in the global economy. The Swedish government submitted the bill "A Voluntary Audit" (Prop. 2009/10:204) to the Swedish parliament on 14 April 2010, proposing that small firms should be allowed to choose whether they should have an auditor or not. The bill was passed by the Swedish Parliament on 21 June 2010 (SFS 2010:834), and the new legislation allowed firms not exceeding certain thresholds to be exempted from statutory audits. The change applied to fiscal years beginning on, or after, 1 November 2010 (SFS 2010:834), and the reform was expected to exempt approximately 72% of all Swedish limited firms from mandatory audit (Svanström & Sundgren, 2012).

Formally, the Swedish Companies Act (*Aktiebolagslagen*, 2005:551) Chapter 9 §1 still stipulates that - as a starting point - all Swedish limited firms are required to have an auditor who audits the financial statements. The articles of association of a privately-owned limited firm may, however, from 1 November 2010 specify that the firm should not have an auditor, given that at least two of the following conditions are met. However, the general meeting may according to the Swedish Companies Act chapter 9 § 1a decide to appoint an auditor:

- The average number of employees for the last two consecutive fiscal years amounts to no more than 3.

- Reported total assets for the last two consecutive fiscal years amounts to no more than 1.5 million SEK.
- Reported net sales for the last two consecutive fiscal years amounts to no more than 3 million SEK.

The above also applies to the parent company of a group (even though the threshold levels in the parent company are not exceeded), if the group meets more than one of the specified conditions. All intercompany claims and transactions should, however, first be eliminated.

It shall be further noted that only authorized public accountants, or approved public accountants, are according to the Swedish Companies Act (Aktieföretagslagen 2005:551) Chapter 9 § 12, allowed to conduct statutory audits. In larger and/or listed firms, at least one auditor must be an approved public accountant. Provisions on authorized public accountants and approved public accountants can be found in the Swedish Public Accountants Act (Revisorslag 2001:883).

Table A1. Threshold values (in Euros) for mandatory audit in European countries as of May 2016 with corresponding increase from last ceiling.

<u>Country</u>	<u>Total assets</u>	<u>Increase</u>	<u>Net turnover</u>	<u>Increase</u>	<u>Employees</u>	<u>Increase</u>
Austria	5,000,000	3%	10,000,000	3%	50	-
Belgium	4,500,000	23%	9,000,000	23%	50	-
Bulgaria	1,000,000	33%	2,000,000	60%	50	-
Croatia	2,000,000	-	4,000,000	-	25	-
Cyprus	3,400,000	-	7,000,00	-	50	-
Czech Republic	1,500,000	-	3,000,000	-	50	-
Denmark	4,837,000	-	9,674,000	-	50	-
Estonia	2,000,000	100%	4,000,00	100%	60	100%
Finland	100,000	-	200,000	-	3	-
France	1,550,000	-	3,100,000	-	50	-
Germany	6,000,000	24%	12,000,000	24%	50	-
Greece	4,000,000	60%	8,000,000	60%	50	-
Hungary	-	-	965,000	44%	50	-
Iceland	1,400,000	-	2,800,000	-	50	-
Ireland	4,400,000	-	8,800,000	-	50	-
Italy16	4,400,000	-	8,800,000	-	50	-
Latvia	800,000	100%	1,600,000	100%	50	100%
Lithuania	1,800,000	-	3,500,000	-	50	-
Luxembourg	4,400,000	-	8,800,000	-	50	-
Malta	46,600	-	93,000	-	2	-
Netherlands	6,000,000	36%	12,000,000	36%	50	-
Norway	2,500,000	-	625,000	-	10	-
Poland	2,500,000	-	5,000,000	-	50	-
Portugal	1,500,000	-	3,000,000	-	50	-
Romania	3,650,000	-	7,300,000	-	50	-
Slovakia	1,000,000	-	2,000,000	-	30	-
Slovenia	4,000,000	-9%	8,000,000	-9%	50	-
Spain	2,850,000	-	5,700,000	-	50	-
Sweden	150,000	-	300,000	-	3	-
Switzerland	18,203,000	-	36,405,000	-	250	-
United Kingdom	6,541,000	56%	13,082,000	57%	50	-

Source: Federation of European Accountants, 2016.

Appendix B.

Table A2: Pearson correlations

	CoD	Audited	Reform2010	AudBig6	ICR	LR	PPE_share	Leverage	Ln_TA	Growth	ROA	Neg. Equity
CoD	1.0000											
Audited	-0.0873	1.0000										
Reform2010	0.1026	-0.4215	1.0000									
AudBig6	-0.0376	0.1950	-0.1817	1.0000								
ICR	-0.0589	0.0313	-0.0522	-0.0457	1.0000							
LR	0.0220	-0.0085	0.0212	0.0007	-0.0177	1.0000						
PPE_share	0.0760	0.0487	-0.0048	0.0110	-0.0238	-0.0239	1.0000					
Leverage	0.0031	-0.0048	0.0091	-0.0008	-0.0011	-0.0009	-0.0063	1.0000				
Ln_TA	-0.1166	0.4373	-0.4752	0.3451	0.0689	0.0208	0.2218	-0.0429	1.0000			
Growth	-0.0409	0.0682	0.0241	0.0184	0.0215	-0.0244	0.0369	-0.0126	0.0681	1.0000		
ROA	-0.0090	0.0033	-0.0066	0.0029	0.0023	0.0012	0.0035	-0.5583	0.0284	0.0335	1.0000	
Neg. Equity	0.0829	-0.1357	0.0970	-0.0537	-0.0183	-0.0081	-0.0245	0.0551	-0.3074	-0.0438	-	1.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0043	0.0000	0.0000	0.0000	0.0000	0.0418	0.0000

Note: Items in bold are significant at the 5% level and ICR, LR, PPE share, Leverage, Ln_TA, Growth, ROA, Neg. Equity are lagged by one year.

Appendix C.

Table A3. First-stage estimation results.

Independent variables	Coefficients
Reform2010	-0.2313* (0.0028)
AudBig6	0.0391* (0.0021)
ICR	2.69e-06* (5.55e-07)
LR	-0.0001* (0.0000)
PPE_share	-0.0220* (0.0044)
Leverage	0.0004 (0.0003)
Ln_TA	0.0682* (0.0008)
Growth	0.0370* (0.0023)
ROA	-3.65e-06* (9.91e-06)
Neg. Equity	-0.0539* (0.0069)
Constant	-0.1866* (0.0143)
Industry level fixed effects	YES
Observations	113,020
Adjusted R-sq.	0.2684

Note: * significant at 5% level.

Appendix D. Robustness checks.

Several robustness checks have been carried out in this study. As mentioned above, the estimates presented in Table 5 in the main text are based on CoD greater than zero, and an upper limit of CoD equaling 30%. First, the upper limits of CoD were increased to 50%, 100% and then 150%, and the results from these estimations are not qualitatively different from those presented in the main text, although the estimated effect of auditing on CoD increases as the upper limit is increased. Secondly, a log transformation of CoD was used as the dependent variable in the estimations, since CoD was found to have a skewed distribution, and again the results were qualitatively similar to those reported in the main text. Lastly, estimations where an indicator variable equal to one for Big4 rather than Big6 auditing firms were performed, and the results are again similar to those presented in the main text..

Table A4: Robustness checks: Dependent variable calculated CoD and upper limit of 50%, 100%, 150% & logarithmically transformed CoD.

Independent variables	CoD <= 50 Coefficients	CoD <= 100 Coefficients	CoD <= 150 Coefficients	Logarithmic transformed calculated CoD
Audited	-1.6729* (0.1306)	-2.2394* (0.1841)	-2.6690* (0.2312)	-0.7702* (0.0440)
ICR	-0.0002* (0.0000)	-0.0002* (0.0000)	-0.0002* (0.0000)	-0.0002* (0.0000)
LR	0.0026* (0.0010)	0.0038 (0.0020)	0.0044 (0.0025)	0.0007* (0.0002)
PPE_share	1.2551* (0.0450)	1.0124* (0.0655)	0.8729* (0.0834)	1.1893* (0.0158)
Leverage	-0.0093* (0.0029)	-0.0099* (0.0032)	-0.0094* (0.0031)	-0.0046* (0.0015)
Ln_TA	-0.0964* (0.0181)	-0.0414 (0.0260)	0.0245 (0.0336)	-0.0833* (0.0062)
Growth	-0.1085* (0.0252)	-0.1302 (0.0376)	-0.1737 (0.0479)	-0.0569* (0.0078)
ROA	-0.0001 (0.0001)	-0.0001 (0.0000)	-0.0001 (0.0000)	-0.0000 (0.0000)
AudBig6	0.2530* (0.0393)	0.4729* (0.0622)	0.6214* (0.0773)	-0.0933* (0.0161)
Neg. Equity	0.9227* (0.0708)	0.8196* (0.0877)	0.7530* (0.0910)	0.1713* (0.0212)
Constant	5.4526* (0.2037)	5.1806* (0.2943)	4.5746* (0.3743)	2.1410* (0.0688)
Industry level fixed effects	YES	YES	YES	YES
Observations	113442	113804	113903	114,154
R-sq.	0.0219	0.0064	0.0008	0.1056
R-sq. first stage reg.	0.2688	0.2692	0.2692	0.2691
Partial R-sq. first stage reg. of <i>Reform 2010</i>	0.0635	0.0634	0.0624	0.0636
F-statistics	6738.4	6760.4	6766.2	6837.3

Note: Robust standard errors in parenthesis. * significant at 5% level.

Table A5: Robustness check: Audit by Big4 instead of Big6, originally reported in the paper

Independent variables	Coefficients
Audited	-1.2594* (0.1024)
AudBig4	0.1618* (0.0324)
ICR	-0.0002* (0.0000)
LR	0.0021* (0.0006)
PPE_share	1.3935* (0.0351)
Leverage	-0.0088* (0.0028)
Ln_TA	-0.1356* (0.0138)
Growth	-0.1889* (0.0193)
ROA	-0.0001 (0.0001)
Neg. Equity	0.9512* (0.0618)
Constant	5.9662* (0.1565)
Industry level fixed effects	YES
Observations	113,020
R-sq.	0.0413
R-sq. first stage reg.	0.2685
Partial R-sq. first stage reg. of <i>Reform 2010</i>	0.0634
F-statistics	6706.3

Note: Robust standard errors in parenthesis. * significant at 5% level.