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The Impartial Need of Joint Audit

Evidence from Swedish firms

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Background and Problem: Since the financial crisis, it has become of greater importance to secure audit quality, and there is an ongoing discussion concerning the matter of how to assure that auditors do contribute to a higher level of financial stability. Joint audit is mandatory in France and has been mandatory in Denmark and Sweden up until recently. Moreover, the stakeholders rely on highly qualitative financial information in the financial reports in order to make well informed decisions.

Purpose of Study: The purpose is to investigate how a firm's accounting quality is linked to joint audit. The study is carried out in accordance with the many stakeholders' interest in minimizing information asymmetry and acquiring impartial financial reports. Is the application of an additional auditor a higher accounting quality assertion?

Boundaries: Firstly, no assessment is projected to separate a firm using two audit teams from the same or different firms. Also, there are various ways to measure accounting quality and the cause for certain results in accounting quality can be due to many external factors, which have not been investigated.

Methodology: From our elaborated sample on the top largest Swedish firms (developed by revenue) we use a quantitative method and earlier developed equations where joint audit is a dichotomous variable, to calculate the relationship between joint audit and accounting quality.

Results and Conclusions: We state that our conclusions are of the same quality as the quality of the method. On the basis that accounting quality has been measured by addressing income smoothing and SPOS. This study discovers that joint audit is negatively linked to accounting quality through a more frequent use of income smoothing and a higher tendency to manipulate earnings by the statistically significant positive correlation between SPOS and joint audit. This implies that applying joint audit does not mean that the accounting quality is elevated.

Future Studies: We wish to inspire further studies on whether there are other factors that provoke the need for an additional audit team. Research could be subjected again to Swedish firms to confirm our results. This research should then concern a wider span of accounting quality proxies in addition to a larger sample.

Keywords: Audit, joint audit, accounting quality, earnings quality, SPOS, income smoothing

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1 Introduction

The first chapter introduces the study and presents a background to the importance of accounting quality (abbreviated AQ). The section's purpose of the study: together with the problem discussion, discharge into the research question: how accounting quality is linked to joint audit. The chapter ends with boundaries of the research, definitions of important expressions and the disposition of the study.

1.1 Introduction to the Study

Financial reports are prerequisites for the ongoing concern of a business and of importance for our ongoing everyday life. And these reports are undoubtedly of importance in order to live up to expectations of high quality for readability, comparability and reliability for stakeholders. Asserting closer scrutiny on these reports moreover could improve accounting quality. Certain events in the not very distant past have contributed to changes in the climate of presenting financial reports. Events like for instance subprime loans in the United States up until 2008 and the Kreuger incident in the 1930s that was a milestone and reshaped regulations on for example consolidation in Sweden (Jönsson, 1991). In the Kreuger incident, stakeholders were negatively affected when their investments were dissolved. The lesson thereafter was the understanding of the need to minimize risks for investors, hence scrutinized disclosure of the group (Jönsson, 1991).

Further on, corporate governance is a subject that is addressed in this study on the topic of accounting quality. Corporate governance can be addressed with differing definitions depending on the chosen viewpoint. Aguilera and Jackson (2010) suggest that corporate governance could be defined broadly as the study of power and influence over decision making within the firm. In this study, corporate governance is intended to discuss what decisions managers make and how these decisions affect the financial reports and hence in extension also affect investors' investment decisions, interest rates, equity ratio etcetera. Since these two parties pursue private means and act on their own personal self-interest, an obvious information asymmetry arises. One way to externally control for these differing requirements of information is to employ third-party auditors to certify reliable and to a higher degree impartial information presented in the financial statements.

Through this study we wish to expand the research and discussion on the topic of joint audits, primarily reflecting and discussing what the effects are. Joint audit is the process where two audit teams perform audit for a firm. A goal is contributing and encouraging to further research on the connection between joint audit and the quality of accounting. The topic is scrutiny and avoiding misinformation and opening up to straightforward communication without hidden agendas or questionable results and financial reports. The goal would be an open industry where no secrets are too big to tell. Many previous studies focus on analyzing audit quality and joint audit, whereas we provide another dimension by subjecting the quality of accounting to the analysis. Prior studies give a variety of opinions on the subject of joint audit. Some present positive findings on joint audit like Mazars (2010), Bisogno and De Luca (2016), and André, Broye, Pong and Schatt (2009) to mention a few, while some are opposing and claim that joint audit cause free rider problems and do not live up to good enough effects, (Neveling, 2007) or a

comparison between the audit quality derived from two Big 4 or only one Big 4 firm (Deng, Lu, Simunic and Ye, 2014).

1.2 Background

Since the financial crisis, it has become of greater importance to secure audit quality, and there is an ongoing discussion concerning the matter of how to assure that auditors contribute to a higher level of financial stability. As the European Commission addresses the topic in their Green Paper; Audit Policy: *Lessons from the Crisis* (2010).

“Robust audit is key to re-establishing trust and market confidence; it contributes to investor protection and reduces the cost of capital for companies”

Humphrey, Kausar, Loft and Woods (2011) also critically discuss the problematic question of how to adopt a high quality audit environment by regulatory means. Furthermore, according to an article on the website of the professional membership organization ICAEW (Martindale, 2015), regulators and governments have had an interest in creating environments where there are no opportunities to knowingly or, otherwise overstate the financial statements. Nor disguise poor performance of the firm.

Moreover, as presented by Ball, Robin and Wu (2003), *“High quality [accounting] standards do not imply high quality reporting”*. It is stated that accounting information and the quality of this information is underlying the financial statements of the firms. When auditing disclose information in annual reports, it is of importance that the accounting information reflects a high quality summary of the firm’s current situation.

Joint audit is a phenomenon present in France for publicly listed firms that prepare group financial reports (Francis, Richard and Vanstraelen 2009), in Denmark joint audit was mandatory until 2005 (Holm and Thinggaard 2014) and in Sweden, banks were obliged to adopt joint audit (Zerni, Haapamäki, Järvinen and Niemi, 2012). In all of the previous cases, it was required by law for a firm to be jointly audited by two independent auditors. It is obvious that asserting high quality in a firm’s financial statements is of importance to legislators, yet not unanimous. Deciding whether a higher level of scrutiny and to which degree it actually is improving the quality of financial statements is inconclusive according to various international prior studies (Zerni et al., 2012; Bisogno and De Luca, 2016; et cetera). Our study hence examines the voluntary choice of applying joint audit within Swedish firms. It has been found interesting to analyze the presence of joint audit among Swedish firms since there has not been a wide range of research within the Swedish context of joint audit.

1.3 Purpose of the Study and Problem Discussion

Not only do the actors of the stock market rely on high quality financial statements but also stakeholders in terms of macroeconomics in the sense that basically all activity in society is dependent on one another as the theme of the ongoing concern. The sole existence of firms on the market that need to be competitive, calls for attentive financial statements. For an efficient market, it is of high importance that only wealthy and auspicious firms are present, offering a certain level of supply and demand. If financial reports would not fulfill a reasonable degree of quality, it can be hurtful to the system in the long run. An efficient market, moreover, driven by Adam Smith's *invisible hand*, supplies and demands various goods and services in between clients, distributors, suppliers etcetera. Now, if a particular distributor were suffering from lower accounting quality, and did not identify its ominous insolvency issue arising, setbacks could be caused for its stakeholders. What would be the best way to handle this lack of safety? Could problems related to accountancy be diminished and hence a higher accounting quality be attained.

Audit in general can be seen as both costly and efficient, mostly depending on the size of the firm. A larger firm with a higher amount of money and power is of greater interest due to the larger number of stakeholders involved. Joint audit is at a first glance costlier since twice the job is performed but this is a point where research is not unanimous (Francis et al., 2009; André et al., 2009). But how to assure that scrutiny is undertaken and resulting in higher quality of auditing and accounting? Is a result of two people working on the same task of higher quality? And along with rising complexity in governance and finance among organizations, objectivity is of importance for stakeholders to make well informed decisions. The contribution of this paper to currently existing research is the adding of joint audit to the equation of accounting quality. This study presents results reached from the Swedish context which is rarely present in previous studies.

The purpose of this study is to investigate the connection between a firm's accounting quality and joint audit. It is important that the firm's financial statements acquire a high quality in order for the financial statements to be a proper basis for investors when making an investment decision. As an investor, without access to inside information, it is of essence to rely on the accuracy of information assembled in the annual report. A further investigation of whether the presence of joint audit increases or decreases the quality of accounting will be made.

1.3.1 Research question

This study aims to answer the following question:

“How is accounting quality linked to joint audit?”

1.4 Research boundaries

There are certain limits to this study, which are presented in this section. Some areas were desired to examine but unfortunately deemed outside the scope of this study.

Firstly, we do not take into account how the joint audit was performed referring to what exact assignments the two audit teams performed. For example, it is considered of non-significant relevance whether two teams jointly revised the same assignments independently or if the assignments were split and each separate data was scrutinized by only one team. Though this circumstance could add an additional level of quality to the study, but the data is not available to our chosen method of research.

Secondly, regarding accounting quality, since the difficulty to apply a single and one sided definition of accounting quality, we have made a fine selection of a few proxies that we argue are suitable for this study. We argue for suitable proxies acclaimed in previous research. Important proxies outside the scope of this study were cash flow-related income smoothing correlated with accruals, such as the accrual and cash flow Spearman correlation used in Barth, Landsman and Lang (2008). Furthermore, no relationship has been measured between accounting quality and the subsequent stock price as performed by Barth et al., (2008).

Finally, accounting quality is disputable regarding what factors are the determinants of accounting quality. Accounting quality is most probably the effect of several decisions. It would be narrow-mindedly to allege the few reasons as earnings management. There could also be external factors affecting such as reverse causality issues, and volatile currencies for internationally trading firms that show fluctuating results from one year to another but is not controllable for the managers, which are not tested in this study. And on the other hand, since regulations could be changed every now and then, accounting quality is hence subjective. Maybe accounting quality is not the best measure, but other alternative measures such as economic income (Merchant and Van der Stede, 2012) based on cash flow rather than accruals and prudence concept conservatism.

1.5 Definitions

This section includes four important aspects of this study that are needed to be defined to simplify for the reader, as well as make the paper more understandable.

1.5.1 Joint Audit

As stated in Ratzinger-Sakel, Audoussert-Coulier, Kettunen and Lesage's (2012) overview of existing research on joint audit:

Joint audit can be defined as an audit in which financial statements are audited by two independent auditors with:

- Shared audit effort;
- One single auditor's report signed by both auditors; and
- Joint liability for both auditors

1.5.2 Big 4

Big 4 is a concept that is frequently used in the industry of auditing. The concept refers to the four biggest participants in the worldwide auditing market. Previous research has shown that

accounting quality should elevate if a Big 4 firm is hired (Francis et al., 2009). The four largest firms are:

- PriceWaterhouseCoopers (PwC)
- EY
- KPMG
- Deloitte

1.5.3 Accounting Quality

Higher accounting quality is, in this study, defined as smaller or none earnings manipulation in the reported earnings which we deem more relevant for different users of accounting. Accounting quality is hence a result of proxies derived from reported earnings, SPOS and net income scaled by total assets. Henceforward, we address accounting quality with the abbreviation AQ.

1.5.4 SPOS

SPOS is an abbreviation for small profit earnings and is the firm's aim to avoid negative results. The proxy SPOS is a way to identify earnings manipulation, it measures the net income scaled by total assets.

1.6 Outline

Onwards, the paper proceeds by presenting a literature review of previous studies and findings on the topic joint audit and accounting quality in chapter two. In the same chapter we present our hypotheses. In chapter three, our method and equations are introduced. Thereafter follows our results and analysis of these results in chapters four and five. Finally, our conclusions are revealed in chapter six.

2 Literature Review

In this chapter, previous studies in the field of accounting quality and joint audit are presented in an extensive review. Firstly, the accounting quality (AQ) is presented together with the chosen proxies. Afterwards, joint audit is presented along with its positive and negative effects. The chapter finalizes in a summary of the literature in a comprehensive section.

2.1 Accounting Quality

In the process of determining the definition of AQ, it is essential to put forward arguments for which proxies to use. Marton (2013) argues that the most central measure is the reported earnings. With this in mind, many studies use different measures of earnings quality as a proxy for AQ (Barth et al., 2008; Ahmed, Neel and Wang, 2013; Lang, Raedy and Yetman, 2003; Leuz, Nanda and Wysocki, 2003). However, to identify the earnings quality, there is a need to use proxies as well. Dechow, Ge and Schrand (2010) organize proxies for earnings quality in three main categories: *properties of earnings*, *investor responsiveness to earnings*, and *external indicators of earnings misstatements*. Where Barth et al. (2008) among others focus mainly on the properties of earnings which can be explained through the shift from the prudence concept conservatism and the matching principle towards the new principle of relevance (Marton, 2013). The principle of relevance identifies a higher AQ when the reported earnings are of great usefulness for decisions for different users. In the meantime, the quality of accounting can depend greatly on its purpose, different users have interests in different parts of the accounting (Dechow et al., 2010).

The investor responsiveness to earnings take a starting point in the stock market which is a good indicator since the investor is viewed as the most important user; however, these measures are influenced by many other aspects, creating a *noise* for the direct effect from the accounting. On the other hand, insufficient measures of the extent of effects on AQ can degrade the usefulness of external indicators of earnings misstatements. This further contribute with expertise on what can be viewed as relevant or not (Marton, 2013; Dechow et al., 2010). The advantage of proceeding from the properties of earnings is the neutral stand that views solely the numbers presented in the financial reports. It is directed to any kind of user which may better describe the extent of research in the field of AQ (Barth et al., 2008; Lang et al., 2003; et cetera).

Many of the studies in the field of joint audit examine the effects joint audit has on audit quality. However, the proxies used in those studies are the same or similar as for those used to measure earnings quality (Francis et al., 2009; Barth et al., 2008). Hence, the conclusion is that the attempt to measure the quality of accounting can take many forms and there is no actual definition of what it really means. We return to the arguments of Marton (2013) and define AQ as a result from the proxies from the reported earnings, the earnings quality. In the following sections, we describe the proxies used in this study, in line with Barth et al. (2008), Lang et al. (2003), Ahmed et al. (2013), and Leuz et al. (2003). Income smoothing is presented as the change in net income divided by total assets of the firm, and SPOS is the occurrence of small positive earnings. Hereafter, Income smoothing and SPOS are described.

2.1.1 Income Smoothing

One element with repeated appearance in the literature for any kind of AQ, whether referring to audit quality, earnings quality or any of the many definitions, is the phenomenon of income or earnings smoothing (Ahmed, et al., 2013; Barth et al., 2008; Lang et al., 2003; Leuz, et al., 2003; Lang, Raedy and Wilson, 2006). Income smoothing is an important part of the accrual-based accounting used around the world. The outcome of the use of accruals may result in smoothed earnings which better suits the goal of the firm, because in the accrual-based system it is up to judgements from the managers to decide which period revenues or expenses belong to. Ahmed, et al. (2013) base their study of income smoothing on comparing the variability of net income to the variability of cash flow to identify if managers use accruals to smooth changes in cash flow when reporting net income. They suggest that the variance of net income should be less than the variance of cash flow. Since the standard setters have established this framework rather than a cash-based system, the income smoothing is inevitable; however, it is of interest to proclaim whether it is an artificial smoothness or simply developed through fundamental performance (Dechow et al., 2010). This is not within the scope of this study, yet it is of essential knowledge to the limits of the study of the proxy, and the use of similar proxies. Additionally, as suggested in Lang et al. (2003) the evidence provided is circumstantial because of the difficulties in disentangling accounting differences from underlying economics. This leads to the conclusion that income smoothing is an interesting aspect to this study because it appears to be a common corporate practice (Dechow et al., 2010). Yet it is difficult to clearly disentangle the economic background to the employment.

In accordance with the purpose of our study, it is important to identify reliable measures for AQ per se. As mentioned in section 2.1. *Accounting Quality*, the category *properties of earnings* presents a valuable neutral stand to the AQ (Dechow et al., 2010). The proxy *income smoothing* is one way to appoint the AQ with moderate reliability, where focus of the measure lays on the variability of earnings. Smoothed earnings would implicate earnings management in the financial statements and result in a lower degree of AQ. The AQ depends however partially on the target user. The stock market is interested in a steady level of earnings in order to increase the degree of usefulness for investment decisions. Dechow et al. (2010) suggest that more persistent and less volatile earnings yield better results in equity valuation models, thus the management has incentives to manipulate their earnings to adapt to the perceived needs from the stock market. Dechow et al. (2010) accentuate that there are many proxies that use the same properties of earnings even though the measures are contradictory, they will not necessarily be wrong. However, to maintain the neutral stand on AQ, this study will stick to the approach used in Lang et al. (2003), Leuz et al. (2003) and Barth et al. (2008) that contravenes the earnings persistence idea. In the above mentioned studies, income smoothing is used to indicate the degree of AQ. Either the earnings are more volatile and have a higher variance, as an indication of no smoothing and a higher degree, or the opposite, less volatile and a lower variance indicating a lower degree of AQ.

Furthermore, there is a use of several measures for the income smoothing in order to assure consistent results across the different measures and not due to other factors (Leuz et al. 2003; Lang et al. 2003). Studies on the subject of income smoothing as a proxy for AQ present mainly three different aspects of income or earnings smoothing. Firstly, the variability of the change in net income scaled by total assets, $\Delta NI/A$. Secondly, (as mentioned above,) the variability of the change in net income

scaled by the variability of the change in operating cash flows: $\Delta NI/\Delta CF$. As with the nature of income smoothing, more smoothed earnings, exposed to earnings management, would be less volatile. The desirable result for the highest AQ would be that these first measures were more volatile. Ultimately, concerning the Spearman correlation between accruals and cash flows, Myers, Myers, Skinner, Gu and Jain (2007), and Land and Lang (2002) argue that the correlation between accruals and cash flow matters. They assert that a negative correlation indicates that managers respond to poor cash flow by increasing the accruals, and according to yet another study, a negative correlation would also be expected between accruals and cash flow since accounting accruals reverse over time (Barth et al., 2008).

2.1.2 SPOS

The ambition for a firm to not show a negative net income might lead onto earnings management in the process of accounting. And this process will possibly deliberately affect the earnings to reach just above zero. From this logic, a higher number of firms than statistically expected have earnings just above zero than otherwise would be expected. Burgstahler and Dichev (1997) examine the phenomenon of avoiding negative earnings through earnings management and find the exertion of this in 30 to 44 percent of the firms with slightly negative pre-managed earnings. In the study, a histogram is presented with earnings scaled by the initial market value (see Appendix Figure 1). The distribution is single-peaked and bell-shaped, except in the region near zero, where earnings slightly above zero are identified to a higher degree of frequency than the earnings slightly below, to a higher degree of occurrence than expected. Firms are motivated to avoid negative results to keep transaction costs with stakeholders as low as possible. Through manipulation of cash flows from operations and changes in working capital, the firm can avoid negative earnings and maintain a good reputation. This would even, for the interest of the present study, implicate lower AQ.

Another reason why a Swedish firm would choose to manage the earnings towards a SPOS is the Swedish context of tax-driven accounting (Påhlsson, 2014). The tax burden is directly related to the net income, leading to an incentive for managers to manipulate the earnings for a lower tax burden. Since SPOS is derived from net income, and tax burden is included in net income, it is an adequate measure for the impact that the manager has on AQ. Other possible incentives behind the employment of this kind of earnings management is referred to the obtained improved terms regarding agreements from suppliers or lenders due to the higher profitability. Customers are willing to pay a higher price if the firm is assumed to be on better terms economically, and employees are more likely to stay (Burgstahler and Dichev, 1997).

Dechow et al. (2010) is more critical to this proxy for accounting and earnings quality where they present the SPOS as a common, but controversial interpretation of earnings management. This means that studies have drawn the conclusion that the occurrence of SPOS indicates lower AQ. However, Dechow et al. (2010) states that there are other reasons for the small profits, such as discretionary accruals that are not differentiated between small profit and small loss firms (Dechow, Richardson and Tuna, 2003). Or according to Beaver, McNichols and Nelson (2007) that SPOS is explained by tax asymmetries, rather than opportunistic choice.

Despite some critical viewpoints, the SPOS is used in several papers to assess AQ. Barth et al. (2008) examines the measure as an indicator of earnings management. The small positive earnings are measured through a dichotomous variable that equals 1 if net income from one

year, scaled by total assets is between 0 and 0.01. The firms where this measure is not identified are subsequently those with higher AQ. Similarly, Lang et al. (2003) and Bisogno and De Luca, (2016) utilize the same measure as one of their proxies. Barth et al. (2008) and Lang et al. (2003), use several control variables to minimize underlying economic differences from accounting differences. However, as presented in Lang et al. (2003), the results are generally unchanged without the control variables which are why the model of Bisogno and De Luca, (2016) is valuable to this current study. In addition, their equation for SPOS includes fewer control variables and those are used consequently in the equation, which raises the understanding with the simplicity of the variables (Bisogno and De Luca, 2016). Apart from fewer control variables, Bisogno and De Luca, (2016) also measure SPOS as the dependent variable. This is consistent with our proposed methodology in chapter 3.

Leuz et al. (2003) also measure the occurrence of small profits, but with a different approach. In their paper they investigate the small loss avoidance by examining the ratio of small profits to small losses. The results present the extent of earnings management to avoid reporting losses. Likewise, small profits are calculated as earnings scaled by total assets that falls in the range of 0 to 0.01, on the contrary small losses are defined as the same ratio but in the range of -0.01 to 0.

2.2 Joint Audit

In the literature of joint audit, both advantages and disadvantages are presented. The support for mandatory or voluntary joint audit argues the provision of increased confidence for the auditor due to the fact that debatable issues need agreements from both parties before being signed (Mazars, 2010). Along this line, the failure from both auditors ought to occur on a rarely basis, signaling an increased audit quality (Bisogno and De Luca, 2016). Another benefit is the assurance of auditor rotation, which maintains the impartiality necessary for high quality auditing, while still enabling preservation of knowledge and expertise of the audit (Mazars, 2010; Carcello and Nagy, 2004). The adoption of joint audit also expands the audit market and stimulates the market competition, the Big 4 would no longer dominate the market and hence give non-Big 4 firms an opportunity to grow in accordance with the market competition (Andrè et al., 2009; Mazars, 2010). However, this may also imply a decrease in audit quality. As suggested by Francis et al. (2009), the involvement of a Big 4 or even a pair of Big 4 increases the audit quality, and the lack of an involved Big 4 firm in the audit process, exposes the firm to a lower degree of audit quality. What Mazars (2010) views as beneficial in this situation, is the greater entrance of the market of non-Big 4 firms, leading them to learn and increase their competence to supply the market with a wider spectrum of choices of qualified auditors.

The last enumerated benefit of joint audit presented in this study is the better resistance of managerial pressure. The need for auditors to produce an independent audit, not affected by managers of the firm, is a risk for the system of auditing. A joint audit should lead to better abilities to stand up to bribes or other pressure from managers since they are mutually responsible for the audit and it will force the managers to engage in informal negotiations to a greater extent in order to obtain their desired results (Zerni et al., 2012). Studies suggest an

augmented independence for auditors in a joint audit, which is important in the aspect of its quality (Carcello and Nagy, 2004; Zerni et al., 2012).

Besides the beneficial effects of joint audit, other studies have found discouraging results of joint audit. Arguments contesting the joint audit feature the risk for free-rider problems. Neveling (2007) describes this as the risk for an auditor neglecting his or her responsibility and instead rely on the other auditor for doing all the work. This along with the conclusion from Francis et al. (2009) would indicate that a pair of two Big 4 firms and a pair of one Big 4 firm and one non-Big 4 firm are in higher risk for free rider problems and decreases the accounting quality. Moreover, the audit firms are entangled in a controversy obliged to cooperate in the collaboration process of joint audit despite their shared competitive position. In other words, a cooperation which inevitably would lead to lower quality of auditing. The need for exchanging information may be disregarded according to Neveling (2007) having yet another negative impact on joint audit. Finally, Neveling (2007) brings up the shortcomings of accounting standards per se, which are open for different interpretations. Accordingly, this might cause conflicts and reduced cooperation between the auditors.

2.3 Joint Audit and Accounting Quality

In this section of the Literature Review, the effects of joint audit on AQ are presented. The section first introduces studies showing a positive effect from employing joint audit. Secondly, studies arguing for the non-existent or negative effects on AQ of joint audit are presented.

2.3.1 Positive Effects of Joint Audit on Accounting Quality

Considering the scarcity of joint audit regulation in the world, a lower variety of studies has researched the subject. There is a belief that *“two heads are better than one”* and would accordingly, in this case, mean that having two separate audit firms performing audit, the financial reports would lead to a higher level of AQ (Francis et al., 2009). Additionally, Francis et al. (2009) have reached the conclusion that two auditors are better than one through identifying a significant correlation between abnormal accruals and audit fees with a high earnings quality. The study investigates firms from France that mandatorily employ joint audit, causing a non-direct link to our study. The contribution to the impact of joint audit is at the same time greater with this material. Being forced to adapt to joint audit makes the sample used in Francis et al. (2009) more comparable to other research, not taking into consideration what kind of firms choose to adopt joint audit. This could implicate limitations in our study, where joint audit is voluntarily applied, but the Swedish and French firms are at least attributed to a similar ownership concentration with mainly few, larger shareholders (Francis et al., 2009; Agnblad, Berglöf, Högfeldt and Svancar, 2001). Other findings in the study of Francis et al. (2009) suggest that even though the earnings quality are perceived to comprise higher quality, it does not affect the valuation on the stock market, creating a doubt in whether joint audit produces higher quality audits than those of single-audit-kind. However, the study finds that the French firms are valued higher than the Belgian single-audit which would indicate that the market still values the incidence of joint audit.

Other studies confirming the positive effects on AQ from employing joint audit are Bisogno and De Luca, (2016), El Assy (2015), and Zerni et al. (2012). The outcome of the first-mentioned

study presents a strong, positive relationship between joint audit and the proxy used for earnings quality: SPOS (Bisogno and De Luca, 2016). In their findings, the presented results are that the mere presence of joint audit increases the quality of accounting, reduces earnings management, and can better confront the influence from the strong influential owners in the Italian SMEs' (small and medium sized enterprises) highly concentrated ownership. The control for earnings quality is on the other hand tested on one mere proxy unlike other studies (Barth et al., 2008; Lang et al., 2003; Leuz et al., 2003). The results presented are still of use in this study due to the similar context of samples from only one country and firms with highly concentrated ownership. Additionally, in the study of El Assy (2015) the findings suggest a connection between joint audit and increased earnings conservatism, as a proxy for audit quality. El Assy (2015) finds no significant difference between firms audited by joint auditors voluntarily or mandatorily. Zerni et al. (2012) examine the relationship between joint audit and audit quality in the similar setting as our current study. Similarly to El Assy (2015), the proxy utilized is earnings conservatism, which once again is suggested to increase the quality of auditing. Additional findings include lower abnormal accruals, better credit ratings and lower perceived risk of becoming insolvent within the next year than other firms with the reservation of limitations in the empirical approach of a matching procedure. The control variables used in the study might not have been sufficient to fend for uncontrolled disparity in client characteristics rather than the characteristics of auditors.

2.3.2 Negative Effects of Joint Audit on Accounting Quality

Nevertheless, existing research in this field is not unified. While Francis et al. (2009) and Bisogno and De Luca, (2016) among others find a positive correlation between joint audit and AQ, other studies suggest the opposite. As many other studies, Lesage, Ratzinger-Sakel and Kettunen (2012) research the subject of AQ on joint audit as a part of a greater whole. In their findings from Danish firms, where mandatory joint audits were abolished just before the study, they could not identify a higher audit quality associated with joint audit. Similar caveats appear in this study as abovementioned. The research is implemented in one single country and it is difficult to draw conclusions for the whole market on that aspect alone. Concurrently, only one proxy for audit quality is measured despite pointing out the fact of the hardship of observing audit quality.

In the study of Deng et al. (2014), the benefits and perceived higher quality as a consequence of joint audit is challenged. They argue that the audit will not be of higher quality in a joint audit collaboration consisting of one Big 4 and one non-Big 4 audit firm compared to a single audit performed by one Big 4 firm alone, due to free riding problems arising. Furthermore, they argue for the fact that a joint audit actually is presented to a higher risk of being affected by opinion shopping. Opinion shopping is a practice used by firms to find an auditor willing to make unqualified opinions and therefore find the financial report to be fairly presented, when they as a matter of fact are not. According to Deng et al. (2014), joint audit gives the firm an opportunity to seek this unqualified opinion between the two audit firms, and thus impair the auditor independence. The conclusion of that study is that a single audit performed by one Big 4 firm is equivalent or even better than any set of pair of joint audit.

Velte and Azibi (2015) do not find a significant positive effect on audit quality for joint audit firms. In their study, they investigate the effects of abnormal working capital, abnormal accruals, and audit fees. Referring to DeAngelo (1981), there is a risk that joint audit is in the presence of

lowballing, meaning that the initial mandate for audit fees does not cover the actual costs. This will in turn expose the audit for asymmetrical distribution of information and lead to higher incentive for coalition with the management and thus have a negative impact on auditor independence (Velte and Azibi, 2015). The joint audit is, as previously stated, said to lead to a lower market concentration. Velte and Azibi (2015) however, argue that the nonexistent positive effect of joint audit lead to the market choosing not to implement mandatory joint audit and thus will not resolve the high market concentration that exists in the industry of audit.

Finally, Marmousez (2008) examines the connection between joint audit and earnings conservatism. The study finds that the joint audit of two Big 4 firms does not lead to more conservatism. This result is argued to be caused by a less productive interaction between the firms. The incentive to provide the maximum effort is reduced due to the fact that they are likely to rely on each other compared to the joint audit pair of a one Big 4 and one non-Big 4 firm.

2.4 Summary of Literature

The following section is established to sum up the literature presented in this chapter. Firstly, the literature of accounting quality was reviewed, dominated by the effects of the accrual based accounting. The accrual based accounting enables the managers to decide as to which period the value should be actualized. Proxies used to identify these earnings management opportunities differ across studies but some appear more frequently. Barth et al. (2008), Lang et al. (2003), Ahmed et al. (2013), and Leuz et al. (2003) use proxies for income smoothing and the occurrence of small profits called SPOS. A less volatile result indicates a smoothed earning and is hence equal to lower AQ. SPOS is the managerial earnings manipulation to avoid negative earnings. Burgstahler and Dichev (1997) find that more earnings scaled by total assets fall in the ratio of 0 to 0.01 than would be statistically possible. Therefore, earnings scaled by total assets between 0 and 0.01 are an indication of managed earnings and hence lower AQ. Finally, Lang et al. (2003) argues that the use of proxies has several defects, by the nature of accounting it is hard to capture the reality and it is therefore difficult to disentangle the economic background for the accounting results behind the used proxies.

Secondly, the benefits of joint audits were presented. According to Mazars (2010), joint audit would contribute to fewer mistakes when both auditors need to sign the financial statements, and also a retained audit rotation as to not become too entangled with the firm. Further positive effects of joint audit were presented as decreased market concentration (Andr e et al., 2009) and less managerial pressure on the auditors (Zerni et al., 2012). However, the literature also presented disadvantages of joint audit, such as free rider problem (Nevelling, 2007) and a lower willingness to collaborate between competitive audit firms (Francis et al., 2009).

Subsequently, we presented the previous studies in the field of joint audit and their connection to AQ. While Francis et al. (2009), Bisogno and De Luca, (2016) and El Assy (2015) have found positive effects on the quality through the use of different proxies, other studies found a negative or no effect of joint audit (Lesage et al., 2012; Deng et al., 2014; Marmousez, 2008). Deng et al. (2014) discussed the free rider problem and found an increased risk for jointly audited firms to be affected by this, and Marmousez (2008) found that auditors had impediments relying on each

other and not spending an equal amount of effort on a joint audit. Whereas these studies examined the joint audit, several have measured joint audit against audit quality.

The literature review is the basis for the hypotheses of the study, which are presented in the next section.

2.5 Hypotheses

In accordance with the purpose of the study to find out *how accounting quality is linked to joint audit* and with the aid of the literature review we formulate the following null hypotheses. Since the AQ in this study is measured through two proxies, we also express these two different null hypotheses in order to be able to assess them separately in the analysis. Through the literature review we have reached the inference to state the hypotheses in this manner, with a neutral viewpoint of interrelations between AQ and joint audit. Both hypotheses are formulated for two-tailed tests indicating that the AQ can be positively or negatively influenced by joint audit. In the next chapter, our methodology used to perform this study is introduced and includes the equations used to test the hypothesis along with other procedures throughout this study.

***H1₀**: Voluntary joint audit firms do not have equal income smoothing compared to non-joint audit firms*

***H2₀**: There is no relationship between voluntary joint audit and SPOS*

3 Method

This chapter presents the method used to investigate the research question. Firstly, the process of sample elaboration is presented, followed by data collection. Additionally, the method for the tests of accounting quality is described and the reverse causality issue. Lastly, the reliability and validity of this paper are presented.

To accomplish the aim of this study, a quantitative study is determined to be best suited. The study is subjected to firms in Sweden where single audit and joint audit are applied. Identification of firms using joint audit is constructed by accessing the list of the top 500 Swedish firms by revenue, the list available in the database Retriever Business. The same database is further utilized to identify basic information required for calculations of AQ. AQ and design of our equations for measuring AQ are put together with inspiration from previously carried out reports on the topic. Furthermore, a logistic regression model is applied in order to depict interrelations between the selected variables of our measurement. Our use of dummy variables obliges us to use this model when measuring for SPOS.

For our statistical tests, a level of significance of 5 percent is chosen. This is a generally accepted level in the research field of business and management (Collis and Hussey, 2013). As well as Bryman and Bell (2013) state that 5 percent is the highest risk accepted in studies of social science.

3.1 Sample

Our aim in this study is to measure AQ and the link to joint audit among Swedish firms, and for this, we need a carefully elaborated sample. In fact, we use this sample in two different ways, one for testing income smoothing and one for SPOS. In the selection of sample, certain criteria are considered. Firstly, large Swedish firms is the top requirement, hence their accounting information is compiled in the database Retriever. Secondly, the probability of finding a large enough sample for obtaining a statistically significant sample of firms applying joint audit is through that same list. Moreover, since the identified number of firms using joint audit is limited; our requirements for elaborating a sample are not very radical. Due to the scarcity of firms applying joint audit, we are furthermore aware of the risk that our findings are exposed to possible disinformation when comparing accounting quality, among our samples. The possibility of choosing samples based on industry affiliation is nonexistent.

3.2 Data Collection

Secondary data is collected for this sample analysis (Cortinhas and Black, 2012). Accounting control variables are extracted from the database Retriever Business. To elaborate our exact sample, firms from a list of the top 500 largest firms in Sweden are gathered. However, a rough screening is put forward to eliminate firms with missing lines of financial information characteristics that are necessary for extracting accounting variables. This screening is useful since it would be too costly in terms of time to elevate these data. A sorting is put through to keep only firms within the same size range that of the sample of joint audits. The elimination is

vital to prevent difficulties referred to calculations and to avoid disinformation. This elimination leaves us 400 samples for our statistical tests. This exact sample is used to test for SPOS and income smoothing. In order to test income smoothing, it has been essential to identify the number of joint audit firms. Among the above mentioned 400 firms, 32 firms are identified employing joint audit. Hence, as for income smoothing, the sample is divided into two groups, joint audit and non-joint audit. Sample data is jointly collected on the year of 2014, and when change is required, data from years 2013 and 2014 are collected.

Sampling error is possibly occurring since our sample of both joint audits and non-joint audits are selected from a list of large firms. This does not take into consideration which industry our sample firms belong to. Nor is it all representative of the total number of firms registered in Sweden. In fact, the average Swedish firm is small or medium sized (SCB, 2015; Bolagsverket, 2012). Therefore, this error could affect the reliability of results of accounting quality due to unfair comparison of the AQ across industries (Nilsson, Isaksson and Martikainen, 2002).

3.3 Accounting Quality

To measure accounting quality, we have chosen to divide AQ into two sub areas. These represent two proxies for earnings quality which is then translated directly to AQ. Overall, we expect that higher quality earnings are a result of less earnings management (Barth et al., 2008).

3.3.1 Income Smoothing

In situations where accounting choices have resulted in greater income smoothing, a wider extent of earnings management as compromising faithful representation of the underlying economics is identified and hence reducing AQ (Barth et al., 2008). These findings are consistent with prior accounting studies.

According to Ahmed et al. (2013), there is no generally agreed-upon definition of AQ. But there are some measures of AQ that are related to faithful representation of the underlying economics which is to a wider extension accepted by standard setters, regulators, practitioners and users as well as by academics. We make the assumption that if Ahmed et al. (2013) can find these measures suitable for their study, then so can we. One of them is income smoothing. In accordance with prior research, the assumption is that firms with less earnings smoothing show a higher level of earnings variability (Lang et al., 2006).

The proxy *income smoothing* is addressed firstly. Income smoothing is for example a result of the usage of accruals to manage earnings. As Barth et al. (2008) have used the same equations in their study; we aim to use a similar but adapted equation (1) with factors of higher relevance for our selected sample. We want to use the following equation for deriving the ratio of variability of the change in net income (ΔNI) to the total assets (A), $\Delta NI/A$.

$$Var \frac{\Delta NI}{A} (JOINT) \neq Var \frac{\Delta NI}{A} (NON)$$

(Equation 1)

Where:

- ΔNI is the change in net income
- A is the total assets
- $Var \frac{\Delta NI}{A} (JOINT)$ is the variance for joint audit firms
- $Var \frac{\Delta NI}{A} (NON)$ is the variance for non-joint audit firms

We perform a variance ratio test to analyze the difference in variance of net income scaled by total assets. This test compares the group of joint audit firms to the group of non-joint audit firms. Our predictions are that firms with higher quality earnings are subject of less earnings management. For $\Delta NI/A$, less volatile earnings indicate lower quality (Ahmed et al., 2013). Less volatile earnings would indicate a probability that a manager actively tries to adjust earnings to some kind of predetermined firm goal. The volatility of net income is developed from the standard deviation of the $\Delta NI/A$ and then squared to find the variance. Later, to determine which group has the highest degree of AQ the results from $\Delta NI/A$ -JOINT (for the variance of joint audit firms) are compared with $\Delta NI/A$ -NON (for the variance of non-joint audit firms).

3.3.2 SPOS

One of the tests we perform in order to identify the degree of AQ is identifying small positive earnings, called SPOS, and implementing it as a proxy for AQ. As presented in chapter 2 *Literature Review*, this technique is commonly used in this field of research (Barth et al., 2008; Burgstahler and Dichev, 1997). The idea of SPOS is that earnings falling just short of zero will be managed upwards, while earnings far from threshold reserved for the future to make the thresholds more attainable (Degeorge, 1999). By identifying small positive earnings, one might conclude that the earnings have been managed and therefore decreasing the AQ. The reason for firms to participate in this matter would appear to be the preference from management to rather report a small positive earning instead of a negative result (Barth et al., 2008).

In order to identify the existence of SPOS we refer to Leuz et al. (2003), Barth et al. (2008) and Bisogno and De Luca, (2016) and calculate *the ratio of net income scaled by total assets* and code this dichotomous variable *SPOS* as 1 if the ratio is within the range of [0.00, 0.01] and 0 if not. SPOS is accordingly treated as a binomial variable and hence we have utilized the logistic regression model to test AQ for the SPOS proxy in the following equation (2):

$$SPOS(1,0) = \alpha + \beta_1 JOINT(1,0) + \beta_2 SIZE + \beta_3 D/E + \beta_4 GROWTH + \beta_5 LISTED(1,0) + \beta_6 2BIG4(1,0) + \varepsilon$$

(Equation 2)

Where:

- SPOS (1,0) is the dependent variable in the equation. It is the proxy for AQ, coded 1 in the presence of SPOS, which indicates low AQ and 0 otherwise.
- JOINT (1,0) is an indicator variable set to 1 for firms with joint audit and 0 otherwise. For joint audit to have a higher quality than non-joint audit firms, the expected sign is “-”. The negative sign implicates a less inclination to engage in earnings manipulation towards SPOS.

- SIZE is defined as the natural logarithm of the value of total assets. A larger firm ought to be more inclined to indulge in earnings manipulation, being more in need of obtaining financial resources from external subjects (Cameran and Prencipe, 2011). The purpose of SPOS is to avoid the bad publicity of having negative results; publicly listed firms would therefore have larger incentives to surrender to SPOS earnings management. As such smaller firms being less scrutinized and having less pressure from the external parties to match certain goals are less willing to upward manage their earnings to avoid a negative result, which, in the Swedish case, only would lead to a higher tax burden for them. Conclusively the expected sign is “+” due to the larger firm’s higher incentives (Bisogno and De Luca, 2016).
- D/E is used as a control variable and is represented by the financial leverage of the firm measured as the ratio of total debt scaled by shareholders’ equity. Previous studies argue that a higher degree of leverage is associated with violation of debt covenants (Press and Weintrop, 1990). Additionally, a firm with high levels of debts has higher incentives to engage in earnings management compared to other firms. In order for them to avoid reporting negative results (Becker, Defond, Jiambalvo and Subramanyam, 1998). The conclusion of this evidence is that a higher leveraged firm is more willing to use the earnings manipulation in form of SPOS and therefore we expect a sign of “+”.
- GROWTH in sales is used instead of price to book value, due to the limitations of our sample, where not every firm is listed. The calculation for the growth in sales is the percentage of change in sales in the previous year. With arguments in accordance with Bisogno and De Luca, (2016) this variable is included due to the higher likelihood of earnings management in firms with strong growth projections. Although the findings from Bisogno and De Luca, (2016) contradict their own expectations, the expected sign for this variable is “+”.
- LISTED (1,0) is used to control for differing AQ that is due to the usage of different accounting regulations. Firms listed on the stock market are obliged to present their financial reports in accordance with IFRS which is of higher quality accounting (Ahmed et al., 2013) than Swedish national regulations, K3. This dummy variable is assigned 1 in the presence of a listed firm, hence using IFRS, and 0 otherwise. The expected sign is “-” for this variable, indicating that a listed firm is less inclined to produce a manipulated financial reports.
- 2BIG4 (1,0) is used to control for a possibly higher AQ based on which firms perform the audit. Most of the sample group employing joint audit used at least one Big 4 firm, therefore this dichotomous variable is noted 1 when both auditors are Big 4 firms and 0 when only one or none of the auditors were Big 4. The Big 4 are expected to contribute with higher AQ than non-Big 4 firms, thus the expected sign is “-”.

Additionally, a correlation matrix will be presented of the variables used in the model. Especially testing the multicollinearity as to reduce the risk of erratic changes in the coefficient estimates due to small changes in the model. A multiple regression like the one used for SPOS is vulnerable to multicollinearity. To test this, a correlation matrix will be presented. This refers to Niemi’s (2005) statement that values exceeding 0.8 in the correlation coefficient are an indication for interpreting significant multicollinearity problems.

3.4 Reverse Causality Issue

In the endeavor of comparing data from the reality, the researcher often finds oneself in a situation where it is difficult to identify the causality one variable has on another. Two problems arise, where the first is the issue of an omitted variable. This situation emerges when the results suggest that one variable causes another variable when it in fact is a third, omitted variable, unknown in the original result. Even though there is no omitted variable, another issue may arise making it difficult to draw conclusions about cause and effect. This problem is due to reverse causation, implying that A causes B, when in fact B causes A (Mankiw, 2011). Or in the case of this study, whether joint audit causes better or worse AQ, or AQ causes the need for joint audit. The AQ is, as established, a difficult phenomenon to measure and thus many variables could affect the quality of accounting.

The reverse causality issue presents the mistake of wrongly inferring the direction of the cause. Considering the example presented in Mankiw (2011) where a plot of number of violent crimes per thousand people in major cities against the number of police officers per thousand people (see Appendix Figure 2.). The upward slope might lead one to conclude that an increased number of police officers causes crime, when in fact major cities employ more officers in an attempt to reduce crime. Reverse causality issue explains that a graph or a correlation do not necessarily present a direction of causality. As well as police causing crime, it also could mean that crime causes the size of the police force. Mankiw (2011) describes that the easiest way to determine the course of causality is the examination of which variable moves first. If we see an increase in crimes and then the expansion of the police force, one conclusion is reached. On the other hand, if we see the police forces expand and then an increase in crimes, another conclusion is reached. There is, however, a flaw with this approach according to Mankiw (2011), the change in behavior could be governed by expectations. A city expecting an increase in crimes could hire more police officers now to mitigate this anticipation in the future.

A further reason for not drawing precipitated conclusions about cause is the risk for the correlation to be coincidental. Two variables could in fact be entirely unrelated, but have reached a correlation by chance, due to the chosen confidence interval. A 95 percent confidence level will present a 5 percent risk for the variables to correlate by chance. The important contributions of Mankiw (2011) are to keep in mind these flaws when handling with causations.

3.5 Reliability and Validity

Addressing the subject of validity, AQ can be measured in various ways. A wide variety of research exists in the field and different conclusions have been drawn on which proxies reflect the most adequate AQ, reflected in the literature review. We argue that our chosen proxies result in a fair measure of AQ, though not complete. Moreover, concerning the validity, we cannot assure that our proxies, with a hundred percent certainty, is the source of influence on AQ by joint audit, aligned with the reverse causality issue. Nevertheless, we add control variables to our equations in order to control for a higher degree of certainty for these unexpected or random conditions. Although application of control variables, there are undoubtedly a number of external conditions that we cannot control for or predict. The AQ can be a result of change in accounting

policies, external effects such as differences in market price but constant currency or price of costs, investments et cetera.

Additionally, both our proxies are derived from measure of net income, resulting in a not so varying test. This study however assumes AQ as a result of the firm's earnings quality, and net income is the essential of that measure. Nonetheless, to create more reliability a consideration for using other proxies has been debated, but determined outside the scope of this study.

In accordance with Bryman and Bell (2013), applying higher reliability, (in a quantitative study, it is important to discuss whether the measures are stable or random) means that we choose financial information accessible from Retriever Database which further is collected from the financial statements of the firms. This financial information is closely chosen on a basis on equations similar to previous successful research. We use those equations, though with a smaller adjustment which means that they are reliable and will display a fair outcome.

4 Results

The fourth chapter includes the empirical results reached from the methodology used in the study. Firstly, the descriptive statistics of the variables in the model together with a correlation matrix are presented. Secondly, we present our findings of the proxy income smoothing. The chapter ends with presenting the results from the logistic regression model used to find the results for SPOS.

4.1 Descriptive Statistics

Table 1				
Descriptive Statistics				
Continuous Variables	Mean	Std. Dev.	Min	Max
SIZE	14.97234	1.708257	9.842516	20.02296
GROWTH	28.24237	468.3188	-.9999827	9479
D/E	5.336585	27.09492	-14.5181	476.5696
Δ NI/A	.0951738	2.684763	-19.61048	48.44672
The sample consists of 400 observations from a list of the largest Swedish firms in 2014. SIZE is the natural logarithm of total assets. GROWTH is the annual percentage change in revenue. D/E is short for financial leverage: debt to equity and is measured as the ratio of total debt scaled by shareholders' equity. Δ NI/A is the ratio of the variability of the change in net income scaled by total assets.				
Discrete Variables	N.	%		
SPOS = 1	40	10.00* (21.86**)		
JOINT = 1	32	8.00		
LISTED = 1	85	21.25* (15.63**)		
2BIG4 = 1	27	6.75* (84.38**)		
* Within the whole sample - ** Within the sub-sample of joint audit firms				
SPOS is a proxy for accounting quality, coded 1 in the presence of SPOS, indicating low AQ, and 0 otherwise. JOINT is a dichotomous variable, coded 1 if the firm is employing joint audit, 0 otherwise. LIST expresses whether the firm is publicly listed with 1 and 0 if it is not. 2BIG4 is expressed in binomial terms, coded 1 if both of the auditors in a joint audit are Big 4 companies.				

Table 1 presents the descriptive statistics for the variables used in our models. Firstly, 32 firms of our sample employ joint audit, resulting in 8.00 percent. Of those, 84.38 percent consists of two Big 4 firms, with a total of 27 equal to 6.75 percent in the whole sample of 400 observations. Secondly, SPOS is identified in 10.00 percent of the whole sample, and 21.86 percent of all joint audit firms have a net income scaled by total assets in the range of 0 to 0.01. Finally, 21.25 percent of all the studied Swedish firms are publicly listed. Within the sub-sample of joint audit firms 15.63 percent are listed. In the tests, there are some outliers identified that accordingly makes the results less representative of the correlations.

	SPOS	JOINT	SIZE	D/E	GROWTH	LISTED	BIG4
SPOS	1.0000						
JOINT	.01166	1.000					
SIZE	-.0122	-.0107	1.0000				
D/E	.01141	.0483	-.0324	1.0000			
GROWTH	.0063	.1860	.0785	-.0076	1.0000		
LISTED	.0069	.0055	.02922	-.0455	.0999	1.0000	
2BIG4	.0768	.9127	-.0067	.0574	.1912	.0072	1.0000

Table 2 shows the correlation between the proxies used in the model for SPOS.

Moderate correlations between the test and its control variables show in the correlation matrix in Table 2. The main reason for testing the correlation is to identify multicollinearity, and as presented in the literature review is a correlation of 0.8 an indication of multicollinearity. In the case of this study multicollinearity is not an issue with correlations well under the 0.8 mark (Niemi, 2005). We also notice that 2BIG4 and JOINT indicate a high correlation. This would mean that firms applying joint audit most commonly hire the auditors from two Big 4 firms. Both variables are however deemed important to keep for further analysis in the next chapter.

4.2 Income smoothing

Variable	Obs	Mean	Std. Err.	Std. Dev	Variance	[95% Conf.Interval]
$\Delta NI/A$ -NON	368	.01461	.0080	.1533	.0235	-.0011 .0304
$\Delta NI/A$ -JOINT	32	-.0054	.0171	.0969	.0094	-.0403 .0296
combined	400	.0130	.0075	.1496	.0224	-.0017 .0277
ratio = $sd(\Delta NI/A$ -NON) / $sd(\Delta NI/A$ -JOINT)						f = 2.5046
H_0: ratio = 1						df = 366, 31
H_a: ratio < 1		H_a: ratio \neq 1		H_a: ratio > 1		
Pr(F < f) = 0.9986		2*Pr(F > f) = 0.0029***		Pr(F > f) = 0.0014***		
*** the value is statistically significant to a level of .01						

Table 3 depicts the results from the variance ratio test of change in net income scaled by total assets. $\Delta NI/A$ is the ratio of the variability of the change in net income scaled by total assets. NON stands for firms with non-joint audit. JOINT stands for firms with joint audit.

The content of Table 3 depicts our findings from testing the variance of net income scaled by total assets. It is a two tailed test that portrays the probability to find out that the sample variance of joint audit firms is lower than the sample variance of non-joint audit firms. The Table 3 also

presents the mean of the two groups where the $\Delta NI/A$ for joint audit firms is negative, -.00538 and $\Delta NI/A$ for non-joint audit firms is positive, .0146.

The model is significant for the standard deviations of both samples being unequal, where non-joint audit has a higher variance and is statistically significant to even a .01 level of significance, despite our test of .05 level of significance. Reading the same test, the probability of measuring a greater variation among non-joint audit firms is higher to a more statistically significant level than it would be to find the opposite among joint audit firms. Consequently, the lower standard deviation for joint audit firms indicates more frequently occurring income smoothing compared to non-joint audit firms. This states that the results are aligned with the predictions, that the variance and hence income smoothing is not equal in our two groups, more exactly that the variance is higher in the group of non-joint audit firms indicating that they produce a higher degree of AQ.

Reading for standard error, it is not a measure that qualifies for our requirements on showing reliable results for this test. The standard error is a measure of the *dispersion* of values in the sampling distribution. Hence, the larger number of observations, the lower standard error is observed. This could be a legitimate explanation to the evidently higher (twice as high) standard error among joint audit firms (depicted in the lower line) compared to non-joint audit firms. Therefore, we prefer to base our argumentation on standard deviation. From the standard deviation we calculate the variance and its higher value among non-joint audit firms indicate that their income is inconsistent to a higher degree than joint audit firms.

4.3 SPOS

Table 4. Odds Ratio and Coefficient

Logistic Regression

Dependent variable SPOS
 Number of obs = 400
 $R^2 = 0.034$
 Log pseudolikelihood = -125.61667

SPOS	Exp. sign	Odds Ratio	Coefficient	Robust Std. Error	z	p-value
_cons		.3487	-1.0535	2.0257	-.52	.603
JOINT	-	6.976	1.9424	.9198	2.11	.035 *
SIZE	+	.9126	-.0915	.1406	-.65	.515
D/E	+	1.007	.0066	.0057	1.17	.244
GROWTH	+	.99995	-.0000456	.000177	-.26	.797
LISTED	-	1.258	.2295	.4777	.48	.631
2BIG4	-	.318	-1.1458			

* value is significant to a level of .05

Table 4 shows the Coefficients along with various results from the robust logistic regression model, with SPOS as the dependent variable. SPOS is a proxy for accounting quality, coded 1 in the presence of SPOS, indicating low AQ, and 0 otherwise. JOINT is a dichotomous variable, coded 1 if the firm is employing joint audit, 0 otherwise. SIZE is the natural logarithm of total assets. GROWTH is the annual percentage change in revenue. D/E is short for financial leverage: debt to equity and is measured as the ratio of total debt scaled by shareholders' equity. LIST expresses whether the firm is publicly listed with 1 and 0 if it is not. 2BIG4 is expressed in binomial terms, coded 1 if both of the auditors in a joint audit are Big 4 companies.

When testing the logistic regression model for SPOS as dependent variable, the results illustrate a statistical significance between SPOS and JOINT (1,0) to a level of significance at .05. The odds-ratio in the logistic regression model with SPOS as dependent variable implies that, if the odds ratio is greater than 1, having SPOS is considered to be correlated with detecting the characteristics of the independent variable (any of SIZE, D/E, GROWTH, LISTED, and 2BIG4) in the sense that having the independent variable raises the odds of having SPOS.

The following results are interpreted from our tests presented in Table 4:

- JOINT (1,0): Calculating for interrelation with SPOS, a firm applying joint audit prove a positive correlation (coefficient) that moreover has a significant p-value. The odds ratio for JOINT is 6.976 which indicate a strong correlation. A firm that has joint audit is more likely to have SPOS in our sample. Since the result has a p-value of .035, we can assure that the positive correlation between SPOS and joint audit is statistically significant to a .05 level of significance.
- SIZE: The coefficient states that larger firms tend to have a negative correlation with SPOS. The odds ratio is .9136 which indicates alongside with the previously mentioned definition of odds ratio that SIZE is not positively correlated with SPOS. We interpret this as the bigger the firm, the less likely it is to show SPOS. This finding is not statistically

significant. Since there is a high p-value of .515 we cannot affirm that the correlation is true since we cannot prove it, but on the other hand, we cannot reject the statement either, based on the same argument. But the result can still be compared to trends in prior research.

- GROWTH: Turning to the results of GROWTH interrelating with SPOS, the higher GROWTH the firm depicts, the less likely the firm is to have SPOS. This is perceived by the odds ratio .99995 which is just below 1. The relationship, hence coefficient of SPOS and GROWTH is hence slightly negative. Unfortunately, this finding is not significant, meaning that there actually could be a negative correlation between GROWTH and SPOS, but in this study, we cannot claim that either is true.
- D/E: There is a positive correlation and coefficient of the level of financial leverage and SPOS. This means that higher financial leverage characteristics of the firm, the more likely the firm will be to engage in SPOS. The correlation is slightly positive with the odds ratio 1.007, yet the ratio is not significant (p-value of .244). We cannot claim with reliability that it is a factor that explains the correlations in this model.
- LISTED: A firm that is listed on Nasdaq OMX Stockholm is more likely to present SPOS. The odds ratio is 1.258 and, SPOS and LISTED are slightly positively correlated compared to a non-listed firm, but not at a significant level with the calculated p-value of .631. This means that because a firm is listed, it is probably indicating that the firm has SPOS but we cannot state this correlation for sure.
- 2BIG4: And lastly, interpreting the results for 2BIG4, there is a negative correlation and coefficient of two Big 4 firms and SPOS, which signals that the presence of two Big 4 firms performing the audit does not have a predominant effect on SPOS. As indicated by the odds ratio of .318, the two Big 4 is suggested to have a positive impact on AQ; however, the high p-value makes the result insignificant. The tendency for two Big 4 firms involved in the auditing process rather than one to impact the AQ is high, but not statistically significant.

5 Analysis

In this chapter, a discussion of the results from chapter 4 is carried out. These results are compared to the literature review in three different stages. Firstly, an analysis of income smoothing, secondly, an analysis of SPOS, and lastly the chapter is concluded with a discussion of the effects the results have on joint audit.

5.1 Income smoothing

To test for income smoothing a hypothesis was formulated in section 2.6. Along with the results in chapter 4 it is possible to address the research question in section 1.3.1 and analyze the results by relating them to previous studies, seen in chapter 2.

H₁₀: Voluntary joint audit firms do not have equal income smoothing compared to non-joint audit firms

The acquired results of income smoothing demonstrate that the variance is significantly elevated within the sample group of non-joint audits than within the group of joint audits. The findings indicate that the difference is aligned with our prediction that the variance will not be of equal value. This is evidence of, as Dechow et al. (2010) stated, a common corporate practice. Managers are not being held back by closer scrutiny. And as further stated, also by Dechow et al. (2010), it is difficult to define what other possible intentions for income smoothing are present. It is clearly not safe to state that firms that are being more closely scrutinized are showing less exposition to alternating the income. But, this finding could also be due to chance. It could simply be subject of non-opportunistic errors in estimating accruals (Barth et al., 2008). Given the not securely setting of robustness test or other quality test, it is not reliable to claim that our tested variables are the results we want to measure.

A larger sample in the group of joint audit firms would give us a more comparable value on standard error on this test of variance of $\Delta NI/A$, but we argue that our screening on size that gives us this matched sample provides a more comparable sample and hence on the more important aspect of standard deviation, which is directly derived from the variance.

Our findings for this test indicate that the variance is higher among non-joint audit firms. This indicates that non-joint audit firms experience a higher quality of accounting, meaning that we can reject HP1. More specifically, we can accept the alternative hypothesis that voluntary joint audits will have more income smoothing than non-joint audit firms. The interpretation of the result is that a firm with higher variance is supposedly not interested in making the net income look smooth enough to manage the item. It is important to take into consideration that other studies have contained a greater number of proxies and moreover tested for a wider variability of proxies such as ΔNI scaled by ΔCF and the Spearman correlation between accruals and cash flow. This reaches the boundaries of this study because our test is not all-encompassing. Another aspect of the reason for jointly audited firms to have more smoothed earnings is that of earnings persistence. One of the criticisms for the measurement of income smoothing is the request from the investors to have a persistently steady level of net income every year, as to facilitate better equity valuation models on the stock market. However, in this study we investigate the AQ, and in order to reach a persistent net income, the earnings need to be

smoothed, or manipulated, which would directly impose a violation on the quality of the accounting.

Implications of this result are moreover indicating that it is not of any particular positive value for a firm to employ joint audit in order to achieve a higher AQ. Though this test is not enough to exclude that external factors do not have an influence on the outcome, yet we interpret this as a fail in attaining better results. As for other factors possible to affect AQ, we can mention trends in the industries and further macroeconomics. Another explanation for joint audit firms to have lower degree of AQ is due to the fact that the sample group of joint audit has a negative mean of $\Delta NI/A$. According to the reverse causality issue it is difficult to determine which variable causes which when measuring correlations in statistical models. We cannot say for sure that joint audit actually causes a lower degree of AQ; we can only see that joint audit firms have a lower AQ. The motive for employing joint audit is for this study unknown, however, the negative $\Delta NI/A$ for joint audit firm indicates that these firms are not performing as well as the non-joint audit firms. One interpretation of this is that they are preparing for a better future with a more scrutinized and hopefully better accounting developed by two audit teams.

As explained earlier in this study, there is a number of ways to measure AQ and our proxy for determining the level of income smoothing is highlighting one aspect of income smoothing. Measuring net income scaled by total assets gives an overall recital of the profitability adjusted by the size of the firm. An increase in net income should result in an increase in total assets and should be consistent, but if net income is more or less volatile, this could indicate that earnings are not being fairly compiled and attention should be paid to accuracy. A limitation of this test is the one-sidedness of it compared to prior research that has investigated two or three variables for the income smoothing proxy (Ahmed, et al., 2013, Barth et al., 2008; Lang et. al., 2003). Moreover, we do not analyze cash flows as a variable to play a role in the calculations of net income. There are a variety of ways a manager is able to adjust net income in order to fulfill various goals. Incentives for the managers can for example be exposing their best side, if not better than the truth, to investors and other stakeholders.

5.2 SPOS

Similarly, to the previous section this analysis commences with the hypothesis formulated in section 2.6 to test for SPOS in joint audit firms and ends in a discussion of the effect of the variables.

***H2₀**: There is no relationship between voluntary joint audit and SPOS*

The results reached in the previous chapter were that SPOS is statistically significant with joint audit to the .05 level of significance. Thus, it is more likely for voluntary joint audit firms to have SPOS in their net income, resulting in the rejection of the null hypothesis $H2_0$. The indication of this is that the alternative null hypothesis is accepted, confirming a relationship between voluntary joint audit and SPOS. A negative relationship would indicate that joint audit is less inclined to SPOS, but the results reached the opposite, a positive sign. This means in our case, that joint audit does not have a positive effect on AQ, because a positive relationship signifies that joint audit firms are more inclined to have small positive earnings, and thus a lower degree

of AQ. The occurrence of SPOS suggests an earnings manipulation performed by the management; our findings suggest this behavior from firms which voluntarily employs joint audit.

With the study of Burgstahler and Dichev (1997) in mind, this means that more joint audit employed firms are placed in the region just above breakeven. A jointly audited firm is more inclined to force their earnings to stay in positive numbers than a non-joint audit firm according to this study. The reason for this is difficult to identify within the scope of this research but a possible explanation could be in line with Beaver et al. (2007). That is, due to tax asymmetries that would be further explained by the tax-driven accounting in Sweden. Nevertheless, the earnings manipulation of SPOS works in both ways, to alter a negative result or to decrease the tax burden income. By this, the SPOS does not necessarily mean moving from a negative result to a meagre positive result, but could also indicate a reduction of a positive result to lower the tax burden or save profits for future difficult periods, yet still staying above zero.

5.2.1 Effects of the variables

In the methodology we expected a sign of “-” for JOINT (1,0) for indicating higher AQ, in the measure of this proxy. However, our results contradict the prediction and hence show a positive sign. The assumption in the methodology for joint audit would have led to higher AQ, and thus allocated the negative sign. From our result we hereby establish that joint audit does not lead to higher AQ. Moreover, the control variable of SIZE, as the logarithm of the value of total assets, suggests a minor negative relationship, by the odds ratio below 1, although not statistically significant. The lack of statistical significance together with a low correlation would lead us to the interpretation that SIZE is not a variable aiding to explain the correlation. Stating that SIZE does not influence the AQ would be the most likely of results, however the possibility of influence still exists, and the interpretation of the result would contradict previous study in the field. Cameran and Prencipe (2011) stated that a larger firm ought to be more inclined to indulge in earnings manipulation due to their assumed higher need for obtaining financial resources from external subjects. Our results, although not significant, contradict this statement and propose that size does not influence the AQ. Furthermore, this result also indicates that neither smaller firms are more or less inclined to earnings manipulation due to being less scrutinized and having less external pressures to meet certain financial goals.

Moreover, the control variable GROWTH also did not live up to the expectations. Similarly to how the expectations from Bisogno and De Luca, (2016) were wrong we reached the same result. It suggests that firms with higher growth projections are not subjected to higher likelihood of earnings management. However, our results were not statistically significant and the odds ratio is close to 1, the conclusion drawn is that GROWTH cannot explain AQ in our model.

D/E, the proxy for leverage shows a positive sign, as expected, although not statistically significant. D/E, the proxy for financial leverage shows a positive sign, as expected, although not statistically significant. The results suggest that firms with higher degree of financial leverage are more inclined to violate debt covenants, as suggested in Press et al. (1990), but due to the statistical insignificance we cannot state that a higher financial leveraged firm is more apt to earnings management such as SPOS.

The last two variables LISTED and 2BIG4 also show non-significant results. The likelihood of saying they are valid therefore diminishes, however the trend of the variables leads us to some interpretations. LISTED shows a positive correlation and an odds ratio above 1 which are against our expectations, if it were to be true, ignoring its high p-value, this would indicate that a listed firm has lower AQ than a non-listed firm. To draw this conclusion from the very high p-value is however inconclusive, the result concluded is that LISTED does not explain whether the AQ increases or not. Moreover, 2BIG4 shows one of the strongest coefficients in our model and a low odds ratio, however as previously stated, it is not a significant result. To a degree of 73.8 percent confidence, the presence of two Big 4 auditors is negatively correlated with SPOS, which means that they improve the AQ for the firm. The variable 2BIG4 showed a high correlation with JOINT in the correlation matrix, meaning that it does not further explain the occurrence of SPOS. This is due to the many joint audit firms using two Big 4 firms in the joint audit. The choice to keep this variable is to further emphasize the effect the Big 4 firms can induce on the AQ.

The criticism of SPOS is that it can be explained by other factors. Dechow et al. (2010) presented the idea that discretionary accruals are not differentiated between small profit and small loss firms as an explanation of the occurrence of small profits, and Beaver et al. (2007) suggested that the SPOS can be explained by tax asymmetries. For this study, the proxy of SPOS is used to strengthen and explain the AQ together with the other proxy used, income smoothing. With the two proxies showing the same results we consider it reasonable to trust both and state that the AQ does not increase in a jointly audited firm.

5.3 Joint Audit

Of all the variables used in our model for SPOS, the only one showing a significant result is JOINT. Therefore, JOINT is the only variable we can statistically claim explains the measurement of AQ using the proxy SPOS. The results show that a firm employing joint audit is exposed to lower AQ than one with only one auditor. In the same line as Deng et al. (2014), we reach the conclusion that joint audits will have a negative effect. The arguments used by them suggest that a joint audit increases the risk for free rider problems. Despite the insignificant result, the control variable 2BIG4 would strengthen this argument. Our findings indicate that two Big 4 firms perform better AQ than otherwise, and according to Francis et al. (2009), the risk for free-riding is higher in an audit pair consisting of one Big 4 and one non-Big 4. It is challenging to prove that the shortcomings of the odd pair are due to free-riding, but it is one possible reason in line with previous findings. Other explanations for the lower AQ from joint audit could be the difficulty in cooperating between competitors, like Neveling (2007) states, the less productive interaction between two firms who are intended to collaborate but instead rely on the other, in line with Marmousez (2008), or further supporting the arguments of Velte and Azibi (2015): that in fact the joint audit is not better suited to stand up against managerial pressure. Nevertheless, we could have reached another result with a larger sample. Since the probability that the sample reflects the population is higher and therefore it is reliable to a higher degree. Also, the reliability on extracting significant results increases and the level of certainty increases with a larger sample.

In the literature review, several positive effects of joint audit were presented, however from the results reached in this study; these positive effects cannot be identified. We see no indication of an improvement from both the auditor needing to accept every decision, we see nothing suggesting the occurrence of avoiding both auditors to fail at the same time, and we see no sign of increased opposition against managerial pressure. Neither is any increased market competition identified, considering the high amount of two Big 4 auditor pairs in the Swedish context. The results showed that 84.38 percent of the Swedish firms employing joint audit used two Big 4 firms, not a suggestion of an increased market competition. On the contrary, our results suggest that jointly auditing involves a higher risk for free riding and that one of the auditors neglects its responsibility and relies on the other for doing all the work resulting in an overall worse AQ.

Nevertheless, we cannot exclude the risk for reverse causality in the relationship between AQ and joint audit. From the example of Mankiw (2011) in the method we can draw the parallel with the variables in this study. The assumed upward slope between poorer AQ and the incidence of joint audit might lead one to conclude that the joint audit causes lower AQ, when in fact it might as well be the other way around. Joint audit could cause lower AQ; it could also be that lower AQ causes the need for joint audit. Mankiw (2011) described that the easy way to determine the course of causality is the examination of which variable move first. If we see an adoption to joint audit and then a decrease in AQ, we reach one conclusion. If we see a decrease in AQ and then the adoption to joint audit, we reach another. There is however a flaw with this approach, the change in behavior could be governed by expectations. A firm expecting a decrease in AQ could adopt joint audit to mitigate these anticipations. In this study no consideration is taken as to which type of firm has chosen joint audit or when. The results showed in chapter 4 do not explain why the joint audit is employed, thus it may not be true that a joint audit firm causes a lower variable change in net income nor is more inclined to produce a small profit earning.

This study, on the contrary to many other studies (Lesage et al., 2012; El Assy, 2015; Bisogno and De Luca, 2016) investigating joint audits, has used more than one proxy for measuring accounting quality to try to fortify the analysis. But in the aim for identifying accounting quality, many obstacles appear. In this study the AQ has been measured in a relatively indirect manner, first using a proxy for earnings quality to later connect this with the AQ. Despite the flaws in previous studies using only one proxy, the use of two proxies in our study will not necessarily increase the accuracy of recognizing high quality accounting. As stated earlier in the analysis, there are flaws with the proxies in their natural form. To later accept the results from these to be a perfect measure of earnings quality would be rash, even worse would be to accept the measured earnings quality as a perfect indication for AQ. This adds to the quotation of Lang et al. (2003, p. 385): *“Our conclusions are only as good as our methods.”* The argumentation is however that these results are as good as it can be, using similar methods as previous studies in the field.

6 Conclusions

First of all, *“our conclusions are only as good as our methods.”* (Lang et al., 2003, p. 385). AQ in terms of earnings management (income smoothing and SPOS) is particularly difficult to quantify and our attempt to control for external conditions may not surely show the best reflecting outcomes. Hence, AQ has been measured in a relatively indirect manner. From the proxies income smoothing and SPOS measuring earnings quality, this study provides measurements of accounting quality (AQ). The most important aspect in the measure of AQ has been joint audit and its effect on the quality, and attempt to answer the research question *“How is accounting quality linked to joint audit?”*

This study has found that joint audit is negatively linked to AQ through a more frequent use of income smoothing and a higher tendency to manipulate earnings by the statistically positive significant correlation with SPOS. This concludes the study by establishing that joint audit has a negative connection to AQ.

Swedish firms choosing to voluntarily apply joint audit do not seem to display a major improvement concerning AQ. In the proxy income smoothing we have discovered a higher variance among non-joint audit firms indicating that they are subjected to a higher degree of AQ, and thus a lower AQ among joint audit firms. We have found that a jointly audited firm smooths their earnings and despite being in line with the demand from the stock market for persistent earnings, this contradicts the main purpose of this study, measuring the AQ. A smoothed earning is a manipulated earning which from the accounting point of view decreases the quality.

Additionally, the proxy SPOS presented the same results. The findings indicate a strongly positive correlation between SPOS and the variable for joint audit at a level of certainty of 95 percent, meaning that more joint audit firms have produced small positive earnings. Besides joint audit, none of the control variables showed statistical significance indicating that they pose little to no effect on the model. When speculating the cause of the positive correlation between SPOS and joint audit, the Swedish tax context plays a possibly large role. SPOS does not have to indicate a loss being moved up to show a positive result, although being the most obvious, it can also signify a company reducing its earnings to save them for the future and hence alleviate tax expenses. The SPOS is a perilous measure of AQ, the occurrence can be due to many different factors, and however it does not remove the possibility of earnings manipulation. Nevertheless, all proxies for AQ possess an uncertain aspect being used in its indirect manner. In this study we have endeavored to mitigate other factors that affect AQ by using two proxies and reached the same conclusion for both, a negative link between joint audit and AQ.

When studying the correlation between variables, other issues come across. We argue that the negative link between AQ and joint audit does not necessarily mean that joint audit decreases the AQ, other reasons for this can arise. The negative correlation does not represent that joint audit causes a lower AQ. As with the reverse causality issue it might as well be the other way around; that low AQ causes the need for joint audit. Firms could have employed the joint audit after being subject to low AQ for several years and attempt to remove this problem.

This study adds to the research results showing implications that the employment of joint audit does not induce a positive value to the financial reports. Previous studies declining the benefits of joint audit presents mainly the risk for jeopardized collaboration between the two firms, either if it is free rider problems, the competitive position, or reliance on the partner firm for doing all the work. Our study supports these findings, suggesting that the ordinary accounting of non-joint kind produces higher AQ. Especially the free rider problem is presented as a larger risk in a joint audit. Although not being statistically significant, the 2BIG4 variable resulted in a strongly negative correlation with SPOS, suggesting they would produce a higher AQ and not be subjected to free riding. This further adds to the findings of Francis et al. (2009) that an audit pair consisting of one Big 4 and one non-Big 4 imposes a higher risk for free riding.

6.1 Future research

As for future areas to research there are some propositions that have crossed our minds while realizing this study. Firstly, since our results show that joint audit does not contribute to higher AQ, is it of no use to apply joint audits or is the case simple that the firms with lower quality accounting try to improve the quality by hiring an additional audit team? Maybe our primary perceptions of the topic joint audit are applied by other reasons that we first perceived. This leads onto a second question focusing more profoundly on the reason for choosing to apply joint audit. Are there other factors that provoke the need for an additional audit team?

Another reason for research on the topic is the more basic question, who does apply joint audit? Since the requirement for joint audit was suspended in Denmark, why do firms still apply joint audit? Is the employment of joint audit more widespread in a certain industry? Also, regarding reverse causality issue, is it possible that the relationship between joint audit and accounting quality is reversed?

Furthermore, we have discovered that some other studies have applied both a wider range of proxies and a larger sample of joint audit firms. So, we want to encourage to perform our test but with a wider range of proxies and a larger sample in order to confirm our results.

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Appendix

Figure 1
Burgstahler and Dichev (1997)

D. Burgstahler, I. Dichev / Journal of Accounting and Economics 24 (1997) 99–126 109

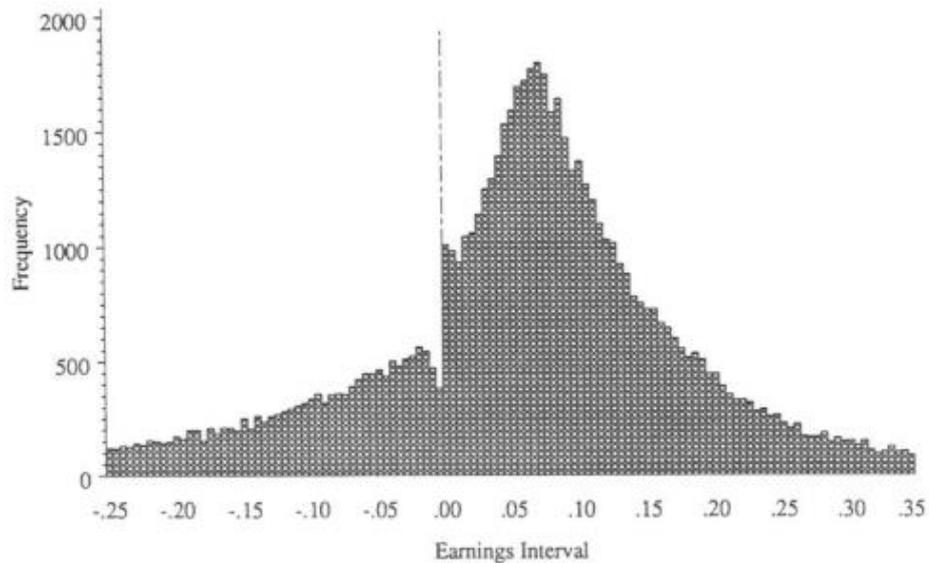


Fig. 3. The distribution of annual net income (Compustat item # 172) scaled by beginning of the year market value (Compustat item # 25 \times Compustat item # 199). The distribution interval widths are 0.005 and the location of zero on the horizontal axis is marked by the dashed line. When the interval width is 0.005, the first interval to the right of zero contains all observations in the interval [0.000, 0.005), the second interval contains [0.005, 0.010), and so on. 'Frequency' is the number of observations in a given earnings interval.

Figure 2
Mankiw (2011)

