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Heading towards the Tipping Point?

A Swedish study on tax-avoiding activities and future stock crash risk

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Abstract

Using a sample consisting of Sweden's most traded stocks for the period 1999-2015, this paper provides robust evidence that long-run corporate tax avoidance increases the risk of future firm-specific stock price crashes. The findings are consistent with the agency view that the complex and opaque characteristics of tax-avoiding activities provide managers with a powerful toolkit for covering and rationalising opportunistic behaviour. The tendency to mask and manipulate performance results in bad news being hoarded within the company, which sooner or later heads towards a tipping point in which it becomes unmanageable to prevent the news from seeping out to the public. When such tipping point is reached, the hoarded news are all revealed at once, causing an immediate down-adjustment in price – a stock price crash. The results are aligned with American studies, although somewhat remarkable, considering the renowned Swedish Corporate Governance Code known for its promotion of transparency.

Keywords: Agency Theory, Tax Avoidance, Crash Risk, OMXS30

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1.0 Introduction

Eight of the twenty largest Swedish firms paid no or only trivial amount of corporate tax 2014, even though profits were made[1]. Tax-avoiding activities have traditionally been viewed as a natural part of firms' attempts to retain value for their shareholders by preventing wealth from being transferred to the treasury. While tax considerations often are a constant factor in companies' decision making processes, past literature has assumed that tax-avoiding activities are conducted with the shareholders' best interest in mind. However, this view ignores potential concerns that arise when ownership and control are separated (Jensen and Meckling, 1976). From an agency perspective, recent studies have found that there is an imminent risk that tax-avoiding activities can provide opportunistic managers with a powerful toolkit to manipulate and cover bad performance (Chen and Chu, 2005; Desai and Dharmapala, 2006).

Based on the aforementioned research on corporate tax avoidance within an agency framework and the growing interest in stock price dynamics' associations to firm-specific information, this paper intends to empirically examine the relationship between long-run tax avoidance and future firm specific stock price crash risk for Sweden's largest firms. Self-interested managers have several underlying incentives to act opportunistic and to mislead shareholders, such as to receive bonuses, engage in empire building and careers concerns (Holmstrom, 1998). The complex and opaque characteristics of tax-avoiding activities provide managers with a powerful toolkit to give an impression of avoiding tax obligations when they in fact are covering bad news and opportunistic behaviour. The tendency to cover and manipulate results in bad news temporarily being hoarded within the company and hence prevents shareholders from accurately evaluate a company's operations. Furthermore, Kothari et al. (2009) argue that the hoarding of bad news sooner or later reaches a tipping point in which it becomes unmanageable for the managers to prevent the news from seeping out to the public. When such tipping point is reached, the accumulated news are all revealed at once, and the stock price crashes.

Deriving from the research on tax avoidance and the theory of managerial tendency to hide bad news, Kim et al. (2010) managed to provide strong, empirical evidence that a positive relation between future stock price crash risk and tax-avoiding activities exists, using a large sample of US-based companies. Following the theoretical framework of Kim et al. (2010), this paper constructs proxies measuring: i) the future probability of firm-specific crash risk based on

[1] Dagens Industri, Storbolagen betalar ingen skatt i Sverige, 2017-05-15

historically extreme outcomes, ii) the long-run effective tax avoidance based on the findings of Dyreng et al. (2008), in order to empirically examine wheatear the same relationship can be established for large Swedish companies. Furthermore, it should also be mentioned that this paper is not primarily interested in the tax-avoiding activities in itself, but rather the managerial opportunism and diversion associated with tax avoidance that induce bad news hoarding and future stock price crashes.

1.1 Purpose

This paper questions the traditional, somewhat simplified, view on tax avoidance as a value-enhancing activity that averts wealth from being transferred from shareholders to the government. By doing so, we intend to shed light on newer, often ignored, hidden costs carried by outside shareholders, which arise when ownership and control are separated. Motivated by recent research on corporate tax avoidance within an agency framework, this paper intends to contribute to this area of research by applying the theoretical framework of Kim et al. (2010) to the Swedish market. Since the area of study is relatively new and, to our knowledge, non-existing for the Swedish market, this paper seeks to fill an important gap in the literature and empirically examine if a relationship between corporate tax avoidance and future stock price crash risk can be established for Swedish companies.

Ultimately, this paper also empirically examines the effectiveness of Swedish corporate governance. The Swedish market is especially interesting within the agency theory framework developed by Kim et al. (2010) for three reasons. First, the Swedish corporate governance is considered to be one of the most well-established and updated regulatory frameworks in the world. Second, Swedish companies in general have a concentrated ownership structure in comparison to other countries, meaning that owners are expected to take long-term responsibility. Third, Sweden applies a self-regulatory framework in order to increase openness, which has resulted in high transparency standards, especially to remuneration of top management (Lekvall, 2009). All these factors should in theory mitigate concerns regarding a potential relationship between managerial opportunism and bad news hoarding facilitated by tax-avoiding activities, and future stock price crash risk. However, should such a relationship be established would this not only increase the credibility of past research on the subject, it would also question the standards of the Swedish corporate governance model.

1.2 Contribution

This paper contributes to the existing literature in at least three ways. First, we apply the theoretical framework of Kim et al. (2010) in a Swedish setting. In accordance with Kim et al. (2010), this paper focuses on future extreme outcomes deriving from tax-avoiding activities, rather than the current perceptions and "mean"-effects of tax avoidance. This is beneficial as extreme outcomes capture uncommon cumulative effects, which can provide powerful insights for investors, regulators and managers to identify hidden costs from tax-avoiding activities for large Swedish companies. Second, this paper also contributes to the growing literature of stock-pricing dynamics, which has received increasing amount of attention after the recent financial crisis in 2008. Examining the relationship between stock crash risk and tax avoidance might provide new evidence of publically available measurements that could have the ability to estimate future stock crash risk. Third, we distinguish ourselves from Kim et al. (2010) by applying the theories of tax avoidance outside an Anglo-Saxon regulatory framework which would increase the scope of past research and provide further empirical support to the subject.

1.3 Delimitations

The scope of this paper has been limited to examine the relationship between corporate tax avoidance and firm-specific stock price crash risk, for Swedish companies listed on OMXS30[2] for the period 1999-2015. This limitation is made to ensure validity to this paper and has at least three benefits. First, focusing on the largest companies with the knowledge, infrastructure and financial motives necessary to engage in tax-avoiding activities over a longer period of time, makes it possible to observe systematic patterns with little impact from random events. Second, company information is easy-accessible, complete and comparable for long-time series, which guarantees high quality data. Third, the stocks listed on the OMXS30 are highly liquid, which enables the bad news theory on stock crash risk to be accurately examined as stocks are assumed to be "correctly" priced based on all public information.

The primary purpose of this paper is to examine if a relationship between corporate tax avoidance and future firm-specific stock price crash risk can be established. Unlike Kim et al. (2010), we do not seek to study if managerial opportunism is mitigated through, for example, increased external monitoring. As our sample consists of a homogenous group of companies

[2] Stockholm OMX30 is a market index consisting of the 30-most traded stocks on the Stockholm stock exchange

listed on the OMXS30, we assume that the differences in external monitoring are minor and hence ought to have insignificant effects on our results.

Furthermore, even if this paper is predicating future firm-specific stock price crashes facilitated by tax-avoiding activities, we do not intend to construct a practical model that can be applicable by investors. Although, we are confident that our findings can provide powerful insights for the investment community in establishing such a model.

2.0 Background and theoretical framework

2.1 Agency theory

Ever since Jensen and Meckling (1976) published *Theory of the firm*, demonstrating the conflict of interests that arises due to the separation of ownership and control, scholars have put tremendous effort into understanding the rise of these conflicts and how they might be resolved. The agency theory is applicable in a number of different settings, and hence caught the interest of researchers studying issues ranging from regulatory policies to financing strategies and organizational behaviour etc. However, trying to give a complete overview of past research within this field would be an essay in itself and beyond the intention of this paper.

When defining agency conflicts, Jensen and Meckling (1976) use the metaphor of a contract in which one party (the principal) delegates work, and the decision-making authority needed to complete that particular work, to another party (the agent). Hence, agency problems will arise when the goals and desires of the principal and agent are not aligned and it is impossible or very expensive for the principal to observe every action of the agent (Brennan, 1995b). Furthermore, it should be mentioned that potential differences in goals and desires between the principal and agent derive from the assumption that they are both trying to maximize their own utility and that their actions reflect their own interests.

Arising from this agency issue is how the principal can ensure that the agent completes the delegated task in the way it was intended. Unfortunately for the principal, preventing the agent's opportunistic behaviour can be both expensive and time-consuming. The principal–agent relationship is often used in an organizational setting, reflecting the relationship between outside shareholders (principal) and managers (agent), and the agency costs, as with all costs,

are recognized by the financial markets and reflected in the share price. These agency costs can be thought of as the loss in efficiency caused by separating ownership and control, and are defined by Jensen and Meckling (1976) as the sum of monitoring cost, bonding costs and residual loss.

Costs associated with monitoring, controlling and measuring the manager's performance, such as internal auditing and designing manager compensation schemes, are all known as monitoring costs and are borne by shareholders. Thus, it can be argued that these costs are ultimately borne by managers as the agency costs will be reflected in their compensation (Fama and Jensen, 1983). Given that monitoring costs are borne by managers, it is reasonable to assume that they will try to look their best in front of the shareholders. Costs associated with establishing structures by managers in order to ensure that they work in the best interests of shareholders are known as bonding costs. Examples of bonding costs are managers investing their own money in the company's stock and costs of entering non-competing agreements. However, as it is nearly impossible to align the interests of the shareholders and managers fully, these additional costs are defined as residual loss.

Agency problems can take many different forms and be present to a greater or lesser degree in a company. Larger companies are not only monitored by their shareholders, but also in other instances through legislation, corporate governance and stock market regulations. However, research has found that monitoring and incentives alignment are far weaker in management-controlled compared with owner-controlled companies (Tosi and Gomez-Mejia, 1989).

2.2 Theory of corporate tax avoidance

In an attempt to reduce the risk of getting caught up in semantics, we will begin by discussing the conceptual definition of corporate tax avoidance. Although the subject arouses interest and there are concerns regarding the magnitude, elements and effects of corporate tax avoidance, there are no generally accepted definitions in this area of research. However, comparable with the research on "earnings management", the absence of a widely accepted definition should not prevent research on the topic, as a definition will be constructed and shaped over time.

In accordance with Hanlon and Heitzman (2009) and Kim, Li and Zhang (2010), we define tax avoidance as "the reduction of explicit taxes per dollar of pre-tax accounting earnings or cash flows", which includes both actual and preventative tax-avoiding activities. This broad

definition does not distinguish between technically legal and illegal tax-avoiding activities, mostly because no such distinction can be easily made (Weisbach, 2003). Furthermore, the literature we are discussing in this paper may use different terms and proxies when describing tax-avoiding activities ("sheltering", "evasion", etc.). However, for the sake of clarity, we will in most cases refer to the term "tax avoidance".

Individual tax avoidance has traditionally been a well-studied area in economics (Slemrod and Yitzhaki, 2002). In theory, individual tax avoidance is determined by tax rates, regulatory framework, control systems, penalties and risk-aversion, as well as other factors, such as social pressure (Allingham and Sandmo, 1972). Many of these factors are also valid for corporations, but the separation of ownership and control in large and widely held corporations also gives rise to additional concerns.

Corporate tax avoidance within an agency framework is a relatively new area of study, established by Slemrod (2004), Chen and Chu (2005) and Crocker and Slemrod (2005). Slemrod (2004) studied the sharp decline in the relative size of American corporations' taxable income in the 1950s, in order to explain the efficiency costs of corporations' tax-avoiding behaviour. Chen and Chu (2005) used a simple principal–agent model to conclude that corporate tax-avoiding activities increased the wealth of shareholders, not only at the risk of being disclosed but also at the cost of loss of internal efficiency. Crocker and Slemrod (2005) primarily examined the relationship between illegal corporate tax-avoiding activities and tax penalties imposed on the shareholders versus the manager. Prior to these studies, the literature on tax avoidance has paid little or no attention to agency concerns and assumed that tax-avoiding activities have been costless to shareholders.

In general, two alternative perspectives can be distinguished in the area of empirical research of corporate tax avoidance. Phillips' (2003) research and findings of an inverse relationship between a corporation's effective tax rate and the extent to which the manager is compensated on an after-tax basis represent the first perspective. This perspective states that tax avoidance is a value-creating activity that managers ought to engage in, as tax-efficient decisions increase the wealth of shareholders. Hence, it is the shareholders' responsibility to structure incentive programmes in order to compensate and motivate the manager to engage in such activities. Thus, tax-avoiding activities are also associated with potential costs of loss in efficiency, but these costs are considered to be relatively small and include directs costs, such as the risk of

being fined by tax authorities and loss of the manager's time.

The other perspective is based on the research of Desai and Dharmapala (2006) who intensify the tension between managers and shareholders by arguing that tax-avoiding activities also give rise to managerial opportunism and diversion. The authors argue that self-interested managers who structure complex tax-avoiding activities are provided with a powerful toolkit for covering and rationalizing opportunistic behaviour, such as after-tax earnings manipulation and other diverting activities. In contrast to the first perspective, Desai et al. (2007) conclude that the interests of tax authorities and outside shareholders are aligned in preventing managerial diversion that derives from tax-avoiding activities. In addition, a strong tax authority will contribute to the monitoring of managers. Furthermore, the authors argue that the risk of managerial diversion, from outside investors as well as from tax authorities, is imminent in a system where tax rates are high and law enforcement is weak. To illustrate the importance of strong tax authorities in reducing agency problems, a sample of tax-avoiding oil firms in Russia showed that the stock prices rose significantly when regulations were tightened and law enforcement were strengthened in the early 2000s. The authors also provide additional evidence consistent with their theories across a number of different countries.

As the two different agency perspectives on corporate tax-avoiding activities point out, the separation of ownership and control raises questions regarding statutory expectations of managers acting in the best interests of their shareholders' wealth. Thus, it is important to note that it is not tax avoidance itself that is an agency problem, but rather tax-avoiding decisions that might reflect the interests of managers rather than the interests of outside shareholders.

2.3 Stock market reactions to corporate tax avoidance

As the study of the area of tax-avoiding activities within an agency framework has grown, researchers have also started to interpret the stock market reactions to this behaviour. The findings of Desai and Dharmapala (2009) suggest that a positive relationship exists between firm value and tax-avoiding activities in large companies with high institutional ownership. Furthermore, their research indicates that tax-avoiding activities create value when managerial opportunism is effectively controlled and monitored by outside shareholders. However, their findings only relate to companies with high institutional ownership and no such relationship could be established for companies in general.

Stock market reactions to news and revelations about companies' tax-avoiding activities has also been examined, as well as what aggressive tax-avoiding decisions are signalling to shareholders. Hanlon and Slemrod (2009) found that, on average, the stock price of companies revealed to be involved in tax-avoiding activities declines, although the authors found that the negative effect on the stock price is mitigated through strong corporate governance. The authors argue that their findings indicate that the market perceives there is a risk that tax-avoiding activities could be linked to earnings manipulation and managerial opportunism. However, their findings have proven to be sensitive to the definition and measurement of governance.

Researchers have also been able to provide robust evidence for managers' tendency to hide bad news that is likely to impact a company's stock price negatively (Hutton et al., 2009; Jin and Myers, 2006). Research has found both financial and non-financial motives for this behaviour, such as stock-based compensation, career concerns and reputation etc. The tendency to cover and manipulate performance results in bad news temporarily being withheld within the company and hence the stock price being clearly overvalued. However, Kothari et al. (2009) argue that the withholding of bad news sooner or later reaches a point at which it becomes impossible or extremely expensive for the manager to prevent the news from seeping out to the public. This leads to a significant downward adjustment in the stock price – a crash – when such a point has been reached and all the accumulated bad news is revealed at once.

Deriving from the research on tax avoidance and the theory of managers tending to hide bad news, Kim et al. (2010) managed to provide strong, empirical evidence that a positive relationship between stock price crash risk and tax-avoiding activities exists, using a large sample of US-based companies. Their findings suggest that tax-avoiding activities are providing managers with a powerful toolkit to manipulate and cover bad performance from the stock market, that once revealed will lead the stock to crash. Their findings might, at first, sound a little contradictory, since tax avoidance forces managers to push down earnings reported to the public and tax authorities. However, the complexity and opaque characteristics of tax-avoiding activities, in combination with differences in treatment of tax-avoiding transactions in financial and tax reporting, enable managers to give an impression of avoiding tax obligations when they are, in fact, covering bad performance and opportunistic behaviour.

2.4 Enron case study

To illustrate how complex tax-avoiding activities practically can facilitate managerial opportunism and bad news hoarding, we follow the example of Kim et al. (2010) and present a brief study of Enron's collapse.

The "Wall Street darling's" fate is an infamous anecdote of how complicated tax transactions can be applied to manipulate financial reporting in order to increase the firm's stock prices. Prior to the millennial shift, Enron's executives did their best to increase the stock value by constantly manipulating the numbers to exceed the pundits' profit expectations. The desire stemmed from personal financial interests, as management held large positions in the stock, but likewise by their craving to be seen as Wall Street giants (Ball, 2009). Eventually, analysts monitoring the firm comprehended Enron's business practices, and the stock subsequently collapsed.

Reports post the breakdown revealed that Enron not only avoided to pay federal income tax 1996-1999, and only trivial amounts in other years, but it also was eligible for $382 million in tax refunds. This was accomplished by engaging in aggressive tax-avoiding activities by e.g. deferring taxes and using almost 900 offshore subsidiaries in tax-havens to keep profits from being taxed in the United States.

While Enron's fate is the one brought to the fore, many corporations before and after have quietly conducted similar strategies to avoid paying taxes. The Enron study is, however, a distinct illustration of the very core of our study: how tax avoidance facilitates managerial rent extraction and accumulation of bad news for a prolonged period, only to cross a tipping point once the market catches up with the consequence of a stock price crash.

3.0 Hypothesis

This paper questions the traditional, somewhat simplified, view on tax avoidance as a value-enhancing activity that averts wealth being transferred from shareholders to the treasury. Motivated by recent research on corporate tax avoidance within an agency framework, this paper intends to contribute to this area of research by applying the theoretical framework of Kim et al. (2010) to the Swedish market. In other words, this paper seeks to provide empirical

evidence that a positive relationship exists between corporate tax avoidance and firm-specific stock price crash risk on firms listed on the OMXS30. Our hypothesis is formulated the following:

H1: *Tax avoidance is positively correlated with future firm-specific stock price crash risk*

Our hypothesis is inspired by the theoretical framework presented in the past section, which suggests that managers, motivated by financial and non-financial incentives, are exploiting tax-avoiding activities for covering and rationalising opportunistic behaviour and bad news hoarding. The hoarding of bad news is expected to eventually reach a tipping point in which it becomes impossible or extremely expensive for the manger to prevent it from being released to the public, resulting in an immediate down-adjustment in price and thus a stock price crash.

4.0 Method

4.1 Measuring corporate tax avoidance

Tax-avoidance can be measured in a number of different ways and therefore it is important to carefully consider the intentions of the paper before establishing a suitable measurement. This paper intends to examine the tax-avoiding activities that are structured to cover and rationalise managerial diversion and bad news hoarding, and an optimal measure should therefore be able to recognise and capture complex tax-avoiding activities over a longer period of time.

To start with, we illustrate the GAAP effective tax rate which all Swedish companies are obligated to disclose in their annual accounts. The GAAP effective tax rate is calculated by dividing the total tax expense by the pre-tax income. Hence, the GAAP effective tax rate, denoted by *ETR*, in year *t* for a particular company *i* is given by:

$$ETR_{it} = \frac{Total\ tax\ expense_{it}}{Pre-tax\ income_{it}} \quad (1)$$

Although the GAAP effective tax rate is an accessible and easily calculated measure, it is not fully accurate in relation to the purpose of this paper. First, it is entirely based on annual data and it does not take into account any potential variations in the effective tax rate. Second, in

accordance with IAS 12, the total tax expense contains both current tax expenses as well as deferred tax expenses. Deferred tax arise because of temporary differences between the carrying amount and the tax base of a company's assets and liabilities, and a lot of tax-avoiding activities seek to maximise deductions and thus defer tax obligations to the future. Hence, companies who engage in tax-avoiding activities are expected to have a relative high proportion of deferred tax expenses to total tax expenses, which the *ETR* variable does not capture. The issue that *ETR* does not make any distinction between taxes owed and paid, makes it difficult to recognise to what extent firms are avoiding taxes and therefore the variable will need some modifications.

In accordance with Dyreng et al. (2008), we make two key modifications to the *ETR* variable, in order to overcome its limitation to capture tax-avoiding activities. First, we use the cash taxes paid in the numerator of the equation rather than the GAAP tax expense when measuring the total tax expense. Cash tax paid is easily found in the cash flow statement of an annual account and is preferable as it recognises, for example, employee stock option tax benefits and is not affected by potential changes in accounting principles or the tax contingency reserve. Second, we measure the effective tax rate over a five-year period of time, with a minimum requirement of three consecutive years with non-missing data to obtain a reliable pattern. We do this by calculating the sum of total cash tax paid over five years and divide it by the sum of pre-tax income, adjusted for special items, over the same period of time. The modification is done in order to measure a tax rate that better reflects a firm's real tax expense in the long run, as well as better match taxes paid and the income that the taxes should be related to. Furthermore, it should be noted that calculating the sum over a five-year period is not equal to calculating the five-year average effective tax rate, which would be overweighed by the effects from years of extreme tax expenses.

Specifically, the measurement of long-run cash effective tax rate used in this paper, hereinafter referred to as *LRETR*, is defined as:

$$LRETR_{it} = a_0 + \frac{\sum_{t=t-4}^{t} \left(CashTaxPaid_{\ it}\right)}{\sum_{t=t-4}^{t} \left(PretaxIncome_{\ it} - SpecialItems_{\ it}\right)} \qquad (2)$$

LRETR is constructed in a way that makes it possible to identify companies that are successful in avoiding taxes in the long run (Hanlon and Heitzman, 2009). This is an important feature for this paper, as managerial opportunism and bad news hoarding potentially can run for several years before leading to a stock price crash. While the variable captures all tax-avoiding transactions which is in line with the purpose of this paper, it also captures other less controversial tax planning activities, such as loss carry forwards. Our study is interested in firms hoarding bad news for a longer period by stretching the boundaries of the law by exploiting loopholes through aggressive and complex tax sheltering activities; not by using accepted and known tax planning methods with historical precedent. Finally, it should be clarified that a low *LRETR* is related to high tax avoidance.

4.2 Measuring company-specific stock crash risk

To measure the firm-specific crash risk, we start by calculating the weekly return for each company. The weekly return is calculated for a 12-month period for each company, ending three months after the firms' fiscal year-end. By doing so, we are ensuring that the financial data have been recognised and priced by the financial market, and thus circumvent the sample from being "look-ahead" biased (Kim et al., 2010).

We are defining the company-specific weekly return, *W*, as the natural log of one plus the residual return. The residual return is calculated using the expanded market model regression, see *Equation 3*, where the stock's (j) return, in week τ, is $r_{j,\tau}$, and the return on the value-weighted OMXS30 market index in week τ, is $r_{m,\tau}$. Furthermore, lead and lag terms (± 2 years) are included to capture any effects of nonsynchronous trading in the market index return (Dimson, 1979).

$$r_{j,\tau} = \alpha_j + \beta_{1j} r_{m,\tau-2} + \beta_{2j} r_{m,\tau-1} + \beta_{3j} r_{m,\tau} + \beta_{4j} r_{m,\tau+1} + \beta_{5j} r_{m,\tau+2} + \varepsilon_{j,\tau} \qquad (3)$$

Specifically, the company-specific weekly return for one particular company in one specific week, denoted as $W_{j,t}$, is measured by the natural log of one plus the residual return.

$$W_{j,t} = \ln(1 + \varepsilon_{j,\tau}) \qquad (4)$$

The company-specific stock price crash risk is calculated on a weekly basis and identified for each fiscal year. To define a stock price crash, we are following the example of Kim et al. (2010), which define it as when a company's weekly return is 3.2 standard deviations lower than the average company-specific weekly return, for the associated 12 month period defined as above. The standard deviation of 3.2 is selected to target a 0.1% frequency in the normal distribution. However, we are not assuming the company-specific weekly returns to be perfectly normal distributed and thus are expecting the probability of stock crashes to be higher than this benchmark.

We are denoting our company-specific crash risk variable as *CRASH*, which can take the value of either one or zero. When one or more crash weeks are identified in a fiscal year for a particular company, the *CRASH* variable equals the value one, and otherwise zero. Thus, it is irrelevant if a firm has more than one crash per year.

4.3 Control variables

Following the methodology of Chet et al. (2001) and Hutton et al. (2010), we include the following explanatory variables to our regression model: $RET_{t-1,}$ $SIGMA_{t-1}$, $SIZE_{t-1}$, MB_{t-1}, LEV_{t-1}, ROA_{t-1}, $DTURN_{t-1}$ and $ACCM_{t-1}$.

The variables RET_{t-1} and $SIGMA_{t-1}$ are calculated as the average weekly return and standard deviation of weekly return respectively, for each company and fiscal year defined as above. We are expecting, in line with past research, that companies with high average weekly returns and high volatility are more likely to experience a stock crash (Chen et al., 2001). The $SIZE_{t-1}$ variable is calculated as the natural log of a company's market capitalisation for each fiscal year and is included in our set of control variables as both Chen et al. (2001) and Hutton et al. (2009) have found a positive correlation between market capitalisation and stock crash risk.

The control variable MB_{t-1} is calculated as the market-to-book ratio of equity for each year. According to the previous mentioned authors, in line with the bad news hoarding theory, a high market-to-book value ought to increase the probability of experiencing future stock crashes. The variables LEV_{t-1} and ROA_{t-1} are calculated as the total interest bearing liabilities divided by total assets and earnings before interest expenses divided by the opening balance of total assets respectively, for each company and fiscal year. Financial leverage is expected to mitigate managerial opportunism and thus decrease the probability of experiencing a stock crash.

Furthermore, strong operational performance is negatively correlated with stock crash risk (Hutton et al., 2009).

We define the variable $DTURN_{t-1}$ as the de-trended average monthly share turnover, calculated by subtracting from the monthly average share turnover for the current 12-month period, the monthly average turnover over the prior 12 months. Chen et al. (2001) use the variable as a proxy for changes in the stock market's opinion about a particular company and to eliminate the share turnover that can be estimated as a fixed component. However, as our sample consists of the most liquid stocks listed on the Stockholm stock exchange, we are expecting minor yearly changes in share turnover and hence, for this paper, the variable is not of key interest.

Finally, since earnings manipulation is closely tied to managerial opportunism and diversion, which is expected to increase the stock crash risk, we also control for accruals manipulation in order to isolate the direct impact of tax-avoiding activities. Following the example of Hutton et al. (2009) we define accruals manipulation, denoted by $ACCM_{t-1}$, as the three-year moving sum of discretionary accruals derived from the modified Jones model (1991). Discretionary accruals can be calculated using absolute or non-absolute values, and the choice will influence what result is obtained. For the purpose of this paper, we are calculating the absolute discretionary accruals as it will capture any kind of earnings manipulation but it doesn't reveal in which direction. However, we are most interested in measuring the presence of earnings manipulation, even if there should be incentives to manipulate earnings in both directions. Non-absolute discretionary accruals on the other hand, reveal information on the direction of earnings manipulation but there is a risk that accruals manipulation in both directions off-set each other and thus is not detected. This control variable is considered to be one of the most important variables in our regression model and past findings suggest that accruals manipulation correlates with stock crash risk (Hutton et al. 2009).

4.4 Regression model

Since the outcome of our test is measured with a dichotomous variable, we will test *H1* by using logistic regression. Our model, presented in *Equation 5* and formulated by Kim et al. (2010), will examine our predictions of a relationship between firm-specific stock price crash risk in year *t* and our proxy for tax-avoiding activities in *t-1*.

$$CRASH_t = \alpha_0 + \alpha_1 LRETR_{t-1} + \sum_{q=2}^{m} a_q (q^{th} ControlVariables_{t-1}) + \varepsilon_t \qquad (5)$$

The firm-specific crash risk variable is denoted *CRASH* and equals the value one if a firm experience at least one crash in period *t* and zero otherwise. *LRETR* is calculated as the long-run effective tax rate, discussed in *Section 4.1*, and is used as the proxy for tax avoidance, in period *t-1*. Furthermore, we include the control variables: RET_{t-1}, $SIGMA_{t-1}$, $SIZE_{t-1}$, MB_{t-1}, LEV_{t-1}, ROA_{t-1}, $DTURN_{t-1}$ and $ACCM_{t-1}$.

The hypothesis (*H1*) forecasts a negative coefficient for $LRETR_{t-1}$.

4.5 Pseudo R-square

An R-square value is used to estimate the goodness-to-fit measure to approximate how well the model estimates future outcomes. For an OLS regression, the R-square measures how well the regression model explain the total variability. If a model's R-square is 0.75, it means that the models' variables predict 75% of the dependents variable's variability. For logistic regressions, a comparable statistic to R-square does not exist. The estimates from a logistic regression model are maximum likelihood estimates attained by an iterative process. Since they are not calculated to minimize the variance, the goodness-of-fit method used for the OLS is not applicable.

There are a range of similar measurements that have been created with the purpose to replace R-square when using logistic regression. These so-called pseudo R-squares have similarities to the regular R-square: higher values indicates better model fit. However, the pseudo values cannot be interpreted as if they were an OLS R-square, and the different pseudo R-square methods provide unalike values. Thus, there are no actual benchmark.

Hosmer and Lemeshow write in their book *Applied Logistic Regression,* that pseudo R-square values pose some problems when reported. Low pseudo R-squared are a norm, and since it is convenient to benchmark the pseudo R-square to the regular R-square, (which generally is higher) the results might be misleading. Pseudo R-squares might, however, be helpful when comparing similar models to each other.

Therefore, we will comment our pseudo R-square when comparing our different results when adjusting our model, rather than in a general manner. There is no consensus on which pseudo R-square provides the best results. We choose to use Cox & Snell's method, which is known for being a conservative measurement of the explanatory power in binary logistic regressions.

5.0 Data

5.1 Data collection

Data was collected for the period 1999 to 2015, using Compustat and Nasdaq OMX as well as the company's annual accounts.

Compusstat was used to gather the firm-specific data needed to calculate the independent tax-variable and control variables. In cases where missing values were obtained, data was hand-collected from the company's annual accounts. Furthermore, data obtained from Compustat have been cross-checked with the annual accounts and in cases were data did not match, annual accounts have been favored. Hence, no observations were dropped due to omitted data. The sample period has been set to 1999-2015. From Compustat, effective tax data only stretches back to 2005 for Swedish companies. The remaining effective tax data to 1999 is received from the Department of Accounting and Financial Management at Stockholm School of Economics and hence, sets our sample period to 1999-2015.

Nasdaq OMX database was used to obtain stock prices and information regarding the characteristics of the companies on the OMXS30-list, such as time of public listings, splits and press releases etc. The trading data obtained from Nasdaq OMX are, compared to Compustat, automatically adjusted for splits and repurchases, which is a prerequisite for comparability and accuracy over longer time periods. For this reason, Nasdaq OMX has been the preferred database for historic trading data. The trading data have later been used to self-construct the dataset of stock crashes according to the method presented in *section 4.2*.

5.2 Sample selection

As previously mention in *Section 1.3*, the scope of this paper is limited to Swedish companies listed on OMXS30. This limitation is made to ensure validity to this paper and has at least three benefits. First, focusing on the largest companies with the knowledge, infrastructure and financial motives necessary to engage in tax-avoiding activities over a longer period of time, makes it possible to observe systematic patterns with little impact from random events. Second, company information is easy-accessible, complete and comparable for long-time series, which guarantees consistency and high quality data. Third, the stocks listed on the OMXS30 are highly

liquid, which enables the bad news theory on stock crash risk to be accurately examined as stocks are assumed to be "correctly" priced based on all public information.

Furthermore, we do not adjust the OMXS30-list over the period of 1999-2015, meaning that we are holding the list fixed, as of 4 January 2016, over the sample period. A problem that often arises when examining longer periods is survivorship bias which means that the sample can be biased because, for example, only surviving firms are examined while bankrupt firms are excluded. We mitigate this concern by holding the sample fixed regardless of a company has been excluded from the OMXS30-list in the past. Furthermore, Kim et al. (2010) argue that the effect of survivorship bias in their study is unclear and could both work for or against their findings. However, after studying the OMXS30-list between the years of 1999-2015, we can only identify minor changes over the years, meaning that survivorship bias ought to have a trivial effect on our results.

Within our delimitation before adjustments, we obtain 467 observations. Following the example of Kim et al. (2010), we make four adjustments to our sample. Note that not all firms in our sample were listed at the beginning of our chosen time period.

i) Since our chosen proxies for long-run tax avoidance and accruals management require at least three years of lagging data 53 observations are dropped.

ii) We exclude observations with less than 26 weeks of stock return data in a year, in order to properly calculate the stock crash risk. One firm has less than 26 weeks of stock return data in a given year and thus one observation does not meet this requirement.

iii) We require observations to have positive total assets-to-book values. 5 observations fail to meet the requirement and are therefore excluded.

iv) Observations with fiscal year-end price of less than SEK 10 are excluded. No observation fail to meet this criteria.

In total, 59 observations are excluded, which limits the total amount of observations to 408.

5.1 Sample selection		
Criteria	**Adjustments**	**# of observations**
Within delimitation		*467*
Missing lagging data	*53*	*414*
Less than 26 weeks of stock return data	*1*	*413*
Negative book value or total assets value	*5*	*408*
Fiscal year-end price of less than SEK 10	*0*	*408*
Total	**59**	**408**

Furthermore, due to the presence of extreme *LRETR* values, we winsorize values at zero and one, instead of excluding and losing data by limiting our data to percentiles. By doing so, we mitigate the possibility of results being biased by outliers. A total of 52 observations (13 %) are substituted to either zero (48) or one (4).

6.0 Empirical results and analysis

6.1 Descriptive statistics

Our final sample consists of 408 observations, based on data for the period 1999-2015, with stock price crashes being measured only between 2002 and 2015 since we use lagging independent variables. For a complete list of companies included in the sample each year, please see *Appendix A*.

Table 6.1 presents the sample distribution and descriptive statistics for stock price crashes. As shown in the last column of Table 6.1, on average 18.3% of the companies in our sample are experiencing at least one stock crash in a given year, which is in line with the findings of Kim et al. (2010). The stock crashes are relatively evenly distributed over the period, which is expected as we are measuring company-specific crashes, adjusted from the overall market index performance. Furthermore, all 30 individual companies, except from two, are experiencing at least one stock crash during the period. However, only 17% of the companies in our sample are experiencing more than four stock crashes in total between the years of 2002-2015, indicating that a lot of crashes can be attributed to smaller group of companies. This conveys that tax avoiding activities might not be equally conducted among the OMXS30 firms. In most cases, only one stock crash can be identified for a company in a given crash year, but when a company is experiencing multiple stock crashes in a given year, the crashes all occur within a period of

eight weeks. This suggest that the accumulation of hidden bad news sometimes does not come out all at once, but rather in portions. That could, however, be contradictorily to the theory that the hoarded news are all revealed simultaneously.

Table 6.1: Sample stock price crashes for the period 2002-2015

Tabel 6.1: Stock price crashes Fiscal year	Number of firms	Number of firms with stock price crash	Percentage of firms with stock price crash
2002	28	3	0.11
2003	28	2	0.07
2004	29	3	0.10
2005	29	6	0.21
2006	29	10	0.34
2007	30	8	0.27
2008	30	7	0.23
2009	29	5	0.17
2010	29	3	0.10
2011	29	3	0.10
2012	29	6	0.21
2013	30	8	0.27
2014	30	4	0.13
2015	29	7	0.24
Total	**408**	**75**	**0.18**

Descriptive statistics and correlations for all variables used in the regression model, for the period 2002-2015 with no missing values, are presented in Table 6.2 and 6.3 respectively. As presented in Table 6.2, the average and median long-run effective tax rate are 22.3% and 23.0% respectively, which is reasonable as the Swedish statutory tax rate, between the years of 2002-2015, has been 22%-28%. In addition, the 25th percentile of long-run effective tax rate is 13.8%, indicating that approximately one-fourth of the companies in our sample are able to maintain an effective tax rate well below the current statutory tax rate of 22%, introduced in 2013. Although remarkable, the result is not surprising as both Kim et al. (2010) and Dyreng et al. (2008) have similar findings using larger samples. More interestingly, the average long-run effective tax rate for companies experiencing at least one stock crash in a given year is 16.8% versus 22.3% for the whole sample, indicating that a relationship between stock crash risk and tax avoidance exists. The distribution of the other variables are to a large extent close to what Kim et al. (2010) are reporting. As we are using a sample of larger companies, the *SIZE* and *MB* variables are consequently higher.

Table 6.2: Descriptive statistics for stock price crashes for the period 2002-2015

Tabel 6.2: Descriptive statistics								
Variable	**N**	**Mean**	**Std**	**5%**	**25%**	**Median**	**75%**	**95%**
Crash risk measure								
$CRASH_t$	408	0.183	0.417	0.000	0.000	0.000	0.000	1.000
Tax avoidance measure								
$LRETR_{t-1}$	408	0.223	0.162	0.000	0.138	0.230	0.289	0.484
Control varibles								
$SIGMA_{t-1}$	408	0.047	0.249	0.022	0.029	0.040	0.057	0.097
RET_{t-1}	408	-0.101	0.621	-1.267	-0.408	-0.054	0.275	0.788
$SIZE_{t-1}$	408	11.316	2.504	4.809	10.772	11.654	12.572	14.242
MB_{t-1}	408	9.385	21.640	0.136	2.261	4.332	9.107	31.630
LEV_{t-1}	408	0.175	0.114	0.000	0.101	0.163	0.240	0.398
ROA_{t-1}	408	0.050	0.115	-0.085	0.007	0.049	0.090	0.238
$ACCM_{t-1}$	408	0.027	0.417	-0.487	-0.084	0.027	0.221	0.542
$DTURN_{t-1}$	408	0.000	0.003	-0.002	-0.001	0.000	0.001	0.004

Table 6.3: Variable correlations of the period 2002-2015

Table 6.3: Correlations										
	$CRASH_t$	**$LRETR_{t-1}$**	**$SIGMA_{t-1}$**	**RET_{t-1}**	**$SIZE_{t-1}$**	**MB_{t-1}**	**LEV_{t-1}**	**ROA_{t-1}**	**$ACCM_{t-1}$**	**$DTURN_{t-1}$**
$CRASH_t$	1.000									
$LRETR_{t-1}$	-0.180 (0.000)	1.000								
$SIGMA_{t-1}$	-0.040 (0.207)	-0.114 (0.010)	1.000							
RET_{t-1}	0.002 (0.483)	0.067 (0.088)	-0.339 (0.000)	1.000						
$SIZE_{t-1}$	-0.071 (0.076)	0.245 (0.000)	-0.459 (0.000)	0.251 (0.000)	1.000					
MB_{t-1}	-0.037 (0.229)	0.055 (0.027)	-0.091 (0.016)	0.106 (0.016)	0.234 (0.000)	1.000				
LEV_{t-1}	-0.052 (0.145)	0.144 (0.002)	-0.097 (0.025)	0.067 (0.090)	0.178 (0.000)	0.212 (0.000)	1.000			
ROA_{t-1}	0.003 (0.472)	0.050 (0.158)	-0.399 (0.000)	0.294 (0.000)	0.327 (0.000)	0.030 (0.272)	0.099 (0.023)	1.000		
$ACCM_{t-1}$	0.084 (0.045)	0.057 (0.273)	0.064 (0.098)	-0.103 (0.019)	0.016 (0.371)	-0.228 (0.000)	-0.162 (0.000)	-0.025 (0.309)	1.000	
$DTURN_{t-1}$	0.001 (0.495)	0.014 (0.386)	0.091 (0.033)	0.072 (0.074)	0.020 (0.347)	0.090 (0.035)	-0.064 (0.098)	0.046 (0.178)	0.059 (0.118)	1.000

Table 6.3 presents the Pearson correlations for our stock crash risk variable, tax-avoidance proxy and control variables with associated p-values in parenthesis. We expected our control variables to be correlated with crash risk, meaning that the control variables contribute to the explanatory value of the stock price crashes. In addition, we assume no evident correlation between the control variables, as this could be a sign of multicollinearity.

As presented in Table 6.3, only two control variables are significantly correlated with stock price crash (*SIZE* and *ACCM)*. Our proxy for accrual management (*ACCM*), which is of key interest for our model, shows a positive correlation with stock crashes, opposite to the findings of Kim et al. (2010), but is in line with Hutton et al. (2009). This is an important finding as it indicates that firms with a high level of accrual management are less transparent in its reporting and thus more likely to be hoarding bad news, which increases the risk of a future stock price crash. In contrast to both Hutton et al. (2009) and Kim et al. (2010), our sample shows that market capitalisation (*SIZE*) is negatively correlated with stock price crash risk, however, this result is not an unusual characteristic for Swedish data.

The remaining control variables (*SIGMA, RET, MB, LEV, ROA, DTURN*) are not significantly correlated with the stock price crash risk, meaning that we cannot conclude their explanatory power in the model. However, we have identified that several control variables correlate with each other. This give rise to the presence of multicollinearity, which will be examined in a later section.

Most interestingly, Table 6.3 shows that long-run effective tax rate (*LRETR)* is negatively correlated (-0.18) with our stock crash risk measure *CRASH*. This is in line with our hypothesis, indicating that firms with a high level of tax-avoidance (low *LRETR*) are more likely to experience future stock price crashes.

6.2 Test of Tax avoidance-hypothesis

In our hypothesis (*H1*) we predict that tax avoidance is positively correlated with future stock price crash risk, because it gives rise to managerial opportunism and bad news hoarding. To test the hypothesis (*H1*) we use a logistic regression model with all control variables included. In table 6.4, the coefficient estimates for *equation 5* is presented, for all variables in our logistic regression, holding the stock crash proxy ($CRASH_{t)}$ as the dependent variable. Furthermore, the

z-values are presented in the parenthesis for each variable, to mitigate potential concerns regarding time-series and cross-sectional dependence in the sample.

Table 6.4: Logistic regression based on $CRASH_t$ *as the dependent variable. (Z-values)*

Tabel 6.4: Logistic Regression	
$LREIR_{t-1}$	-3.573*** (-3.48)
$SIGMA_{t-1}$	-13.453** (-1.95)
RET_{t-1}	0.034 (0.16)
$SIZE_{t-1}$	-0.069 (-1.19)
MB_{t-1}	0.001 (0.17)
LEV_{t-1}	-0.164 (-0.14)
ROA_{t-1}	0.08 (0.06)
$ACCM_{t-1}$	0.591* (1.67)
$DTURN_{t-1}$	12.712 (0.33)
Intercept	0.867***
No. Of observation	408
Pseudo R^2	0.06

As seen in the Table 6.4, the *LRETR* is negatively correlated (-3.573) with stock crash risk at a 1% significance level, which is consistent with the prediction of *H1*. This suggests that companies who engage in tax-avoiding activities, and hence lowering its effective tax rate, are more likely to experience a future stock price crash. In statistical terms, the findings of our sample based on the current OMXS30 – firms, between the years of 2002-2015, indicates that the probability of a future stock crash is significantly higher for companies who in the long-run are successful in lowering the amount of cash taxes paid.

Furthermore, the estimated coefficients of our control variables in our regression model follow, to a large extent, the same patterns as past research have found. However, as presented in Table 6.4, only two control variables (*SIGMA*, *ACCM*) show a significant relationship with stock

crash risk. The estimated coefficient for accruals manipulation, which is the control variable of greatest interest in this paper as earnings manipulation is expected to contribute to bad news hoarding, shows a significant positive relationship with crash risk. This indicates that companies which manipulates accruals are more likely to experience future stock crashes and confirms our predictions of bad news hoarding. *SIGMA* has a negative correlation, which is remarkable since it is assumed that high standard deviation should increase the risk of a stock crash. The result also is contrary to previous results on U.S. data. We find no significant relation for the other control variables (*RET, SIZE, MB, LEV, ROA, DTURN*) and hence, no further conclusions on their potential contributions to the stock price crash risk can be made. The absence of statistical significances are probably due to the relative small sample size, as past research with similar findings as this paper and larger samples, have found significant relationships for their control variables.

Our finding is in contrast to the established, and previously seldom questioned, view on tax avoidance as a value-enhancing activity that averts wealth being transferred away from shareholders. Based on the theoretical framework and findings presented in Table 6.4, there is a fundamental risk that opportunistic managers utilise complex tax schemes with the intentions to hide poor performance, mislead and shift attention when appearing to avoid corporate taxes for the benefit of the shareholders. There are several underlying incentives for mangers to act opportunistic and to mislead, such as to receive bonuses, career concerns and even to hide indulgence and criminal activity. This opportunistic behaviour results in bad news hoarding, causing in the firm's stock price to be mispriced. The accumulation of bad news later reaches a tipping point in which it becomes impossible or at least extremely expensive for the manger to prevent it from being released to the public, causing an immediate down-adjustment in price, and thereby linking stock price crashes to long run tax avoidance. The finding presented in Table 6.4 should, not least, be of interest to investors and other stakeholders; a low effective tax rate ought to raise concerns about whether or not the firm is operating efficiently.

As previous mentioned, tax-avoiding activities are related to stock crash risk as it provides managers with a powerful toolkit for covering and rationalising opportunistic behaviour over a longer period of time. In general, managers can use tax-avoiding activities to hoard bad news in at least two different ways. First, through unsustainable or fictional transactions with an external party or special-purpose vehicles in order to modify earnings and operating cash flows

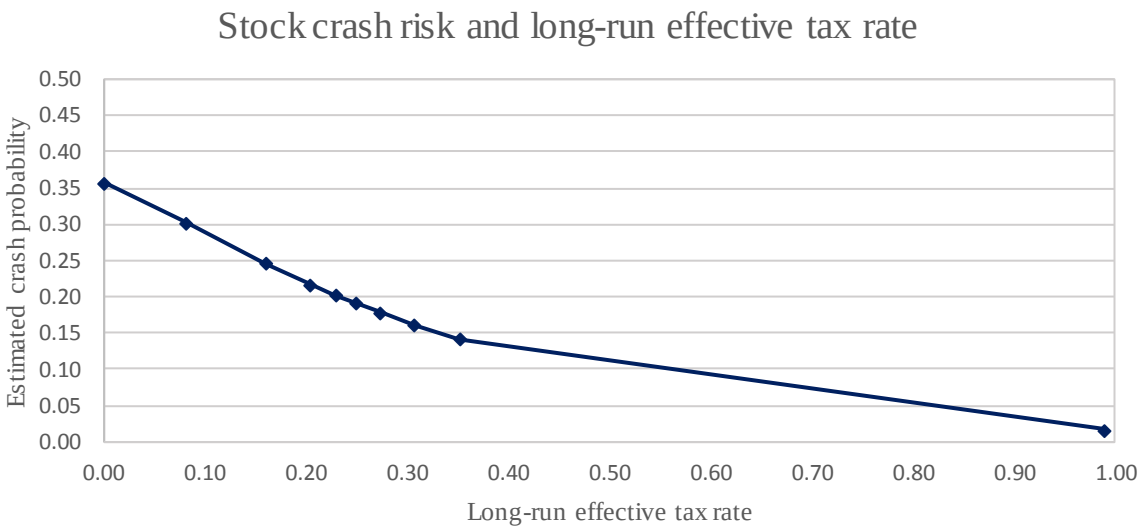
to cover bad performance. This strategy is in many senses similar to real earnings management, although tax-avoiding transactions in most cases are more opaque (Roychowdhury, 2009). Second, complex tax schemes can be established in order to decrease transparency and prevent outside shareholders from detecting accrual earnings manipulation. Therefore, in our main regression model we control for accruals management to observe the direct effect on stock crash risk, a part from the indirect effect through tax-avoiding activities. In the best of worlds, we would like to separate and measure the direct effect of bad news hoarding from tax-avoiding activities versus earnings management, on stock crash risk. However, limitations in how to empirically measure earnings manipulations make it hard to do this kind of separation in a reliable way. Thus, even if we are convinced that the indirect effect of earnings management on bad news hoarding from tax-avoiding activities are not a driving force for the findings in this paper, we argue that it ought to play a part in a wider story of stock pricing dynamics. Furthermore, we find that the ACCM-variable, which Hutton et al. (2009) use as a proxy for opaque, has a strong statistical relation with crash risk.

The regression model's explanatory power is 0.06, measured as pseudo R-squared, and it doesn't provide much information in itself. In comparison, Kim et al. (2010) reports a pseudo R-square of 0.03 for its main regression, but unfortunately they don't define their measurement. This paper is using the Cox-Snell method for its residuals, which is known as a reliable and conservative way of determining a logistic regression model's explanatory power, compared to, for example, the commonly used Nagelkerke measurement. Hence, we can conclude that explanatory power of our model at least is not overestimated, although we can't perfectly compare it with the findings of Kim et al. (2010).

To present the relationship between stock crash risk and corporate tax avoidance in a clearer way, we estimate the probability of a stock crash at each decile in our sample of long-run effective tax rate *(LRETR)*, holding the control variables at their average value. The result is presented in Figure 6.1, based on the estimated coefficients from Table 6.4. The figure shows a significant relationship between how the probability of a stock crash risk increases when lowering the long-run effective tax rate. For example, the estimated probability of a stock crash in our model for the sample mean long-run effective tax rate of 22.3%, is 20.7%.

Finally, our findings support the hypothesis *(H1)*, that a significant relationship can be established for future stock crash risk and long-run tax avoidance, after controlling for several factors that are expected to influence negative extreme outcomes.

Figure 6.1: Estimated relationship between stock crash risk and long-run effective tax rate



6.3 Additional test and robustness

6.3.1 Re-winsorizing

In our logistic regression, we winsorized the *LRETR* values at zero and one. That led to the adjustment of 52 observations. To examine how sensitive our main regression model is to the extreme values that were adjusted, we will re-do the logistic regression twice. First without winsorizing the extreme values at all, thus adjusting zero observations. Next, we winsorize at the 1st and 99th percentile's values, which will adjust a total of eight observations. By comparing our new results, we will be able to examine to what extent our methodology of winsorizing the values at zero and one in our main regression model has affected our previously presented results.

As presented in Table 6.5, our logistic regression model is very sensitive to *LRETR*'s outliers. Only *SIZE* shows significance and the model's pseudo R-square has decreased to 0.02. The model no longer supports *H1*. To further examine how sensitive our model is to the particular extreme values, we examine our results by winsorizing data at the 1st and 99th percentile's values.

As presented in Table 6.5 the results are significantly are improved. *LRETR* and *SIGMA* are once again significant and the pseudo R-square has increased to 0.03. The results suggest that our model is most sensitive to the particularly extreme values, rather than *LRETR* values slightly below zero, or those just above one that the initial winsorizing captures. However, it should be emphasized that our initial results had higher significant for *LRETR* and a higher pseudo R-square value.

In conclusion, with no winsorizing, our regression model does not support our hypothesis that tax-avoding activites are associated with future stock crash risk. However, by winsorizing at the 1st and 99th percentile, the model once again supports our hypothesis, implying that the model is sensitive to the particularly extreme values, rather than all values below zero, or those just above one, which initially was winsorized at zero and one.

Table 6.5: Logistic regression based on $CRASH_t$ *as the dependent variable. (Z-values)*

6.5 Logistic regression	No winsorizing	Winsorized at 1st and 99th percentile
$LREIR_{t-1}$	-0.085 (-0.51)	-0.980** (-2.02)
RET_{t-1}	0.053 (0.25)	0.042 (0.20)
$SIGMA_{t-1}$	-10.736 (-1.63)	-12.252** (-1.81)
LEV_{t-1}	-0.611 (-0.54)	-0.506 (-0.44)
$SIZE_{t-1}$	-0.107* (-1.88)	-0.101** (-1.77)
MB_{t-1}	0.001 (0.14)	0.001 (0.14)
ROA_{t-1}	-0.053 (-0.05)	0.039 (0.03)
$DTURN_{t-1}$	5.745 (0.15)	8.873 (0.22)
$ACCM_{t-1}$	0.574 (1.63)	0.552 (1.57)
Intercept	0.536	0.675
No. of Observation	408	408
Pseudo R^2	0.02	0.03

6.3.2 Longer Forecast Window

Until now, our logistic regression model for predicting stock price crashes has forecasted future crash events in a one-year-forward window. As previously shown, tax avoidance as a proxy for future stock price crash risk is negative and significant. To gain further support for our tax avoidance proxy's ability to predict future crash risk, we expand our crash window to two years.

We estimate stock price crashes using firm-specific weekly returns for two year periods, beginning three months after the end of the current fiscal year. Similar to Kim et al. (2010), for each firm, we require at least 100 weekly returns so as to properly by sufficient data measure

crashes. As previously, we start measuring crashes from 2002, with a 2002-2003 forward window. Since we use two-year-forward windows, our last observation is in 2014. Hence, less observations are obtained. Furthermore, we apply the same data requirements as previously for our observations. As seem in Table 1B in Appendix B, an observation is twice as likely to be defined as a crash. That indicates consistency with previous findings, since every observation from the two-year-window forward model have twice the amount of weekly returns. It also conveys that the firm-specific weekly returns for two year periods provides equally amount of crashes.

Table 6.6 presents the re-estimated results from our logistic regression with two-year-forward windows. Tax avoidance is significantly and negatively correlated to the crash risk measurement for two-year-forward window, and the pseudo R-square value is alike. In brief, the results supports to the predictive ability of our chosen tax avoidance proxy with regards to crashes in a two-year-forward window.

Table 6.6: Logistic regression based on $CRASH_t$ *as the dependent variable. (Z-values)*

6.6 Logistic regression (Two Year Forward Window)	
$LRETR_{t-1}$	-2.092* (-1.86)
RET_{t-1}	-0.057 (-0.27)
$SIGMA_{t-1}$	-7.290 (-1.17)
LEV_{t-1}	-1.695 (-1.57)
$SIZE_{t-1}$	-0.099* (-1.68)
MB_{t-1}	-0.002 (-0.29)
ROA_{t-1}	-0.003 (-0.00)
$DTURN_{t-1}$	9.323** (0.20)
$ACCM_{t-1}$	0.416 (1.40)
Intercept	1.472*
No. Of observation	408
Pseudo R^2	0.06

6.3.3 One year lagging effective tax rate

Our tax avoidance proxy, *LRETR*, has been constructed to capture the avoidance of taxes in the long-run by calculating the paid taxes for up to a five-year moving sum. The rational to use lagging data is to capture bad news hoarding for several years, since it potentially can be going on for several years before leading to a stock price crash. To examine the notion, we will test the impact of using lagging data, by re-estimate the regression with the same tax avoidance proxy, but a *LRETR* with only one year of data (t-1), hence, not a long run effective tax rate, but rather solely the effective tax rate from the previous year.

As observed, the logistical regression model with one year of tax data shows no significant results for the adjusted *LRETR* proxy and the pseudo R-square is significantly lower (0.02). The poor outcome reinforces the notion of this paper: it is the accumulation and hoarding of bad news for a prolonged period that leads to stock price crashes and not the immediate doing of

so. By using the adjusted *LRETR*, with only one year of tax data, we do not capture the accumulation of bad news for an extended period – but only for a year.

Table 6.7: Logistic regression based on $CRASH_t$ *as the dependent variable. (Z-values)*

Tabel 6.7: Regression (One year LRETR)	
$LRETR_{t-1}$	0.517 (0.89)
RET_{t-1}	0.05 (0.23)
$SIGMA_{t-1}$	-10.878 (-1.65)
LEV_{t-1}	-0.642 (-0.56)
$SIZE_{t-1}$	-0.104* (-1.82)
MB_{t-1}	0.001 (0.14)
ROA_{t-1}	-0.13 (-0.11)
$DTURN_{t-1}$	5.403 (0.14)
$ACCM_{t-1}$	0.575 (1.62)
Intercept	0.404
No. Of observation	408
Pseudo R^2	0.02

6.3.4 Multicollinearity

When the independent variables correlate with each other, rather than with the dependent variable, CRASH, the regression model can be subjected to multicollinearity. Low or modest degrees of correlations between the independent variables are very common, thus, some level of collinearity is acceptable. However, high multicollinearity results to complications when interpreting outcomes from the test, since the explained variance potentially is randomly distributed between inter-correlated variables (Farrar & Glauber, 1967).

By examining the VIF (variance inflation factors) and Tolerance for our independent variables, a multicollinearity test can be conducted. The VIF is simply the reciprocal of Tolerance. There is no formal rule regarding an accepted VIF value. Yoo et al (2015) argue that values greater than 10 are considered to indicate that the independent variables are subjected to multicollinearity. Other, such as O'Brian (2007) claims that the cut-off value for multicollinearity starts at 4. As presented in Table 6.8, all our variables show a VIF value far below any cut-off point argued by aforementioned. This implies that our model is not subject for any multicollinearity issues, and no further actions are needed.

Tabel 6.8: Multicollinearity Test

	VIF	1/VIF
$LREIR_{t-1}$	1.08	0.93
$SIGMA_{t-1}$	1.47	0.68
RET_{t-1}	1.19	0.84
$SIZE_{t-1}$	1.49	0.67
MB_{t-1}	1.16	0.86
LEV_{t-1}	1.14	0.88
ROA_{t-1}	1.32	0.76
$DTURN_{t-1}$	1.05	0.95
$ACCM_{t-1}$	1.10	0.91

7.0 Future research

Our study intended to examine whether a relationship between corporate tax avoidance and future stock crash risk could be established for Sweden's most traded companies. When doing so, we have identified several areas connected to our study that could be of interest for further research.

The Swedish Code of Corporate Governance was introduced in 2005 with the purpose to ensure that firms were managed aligned with the interest of the shareholders. Since then, the Code has been revised to make it more effective. By comparing corporate tax avoidance's relation to firm-specific stock price crash risk for OMXS30 firms pre and post 2005, one could examine the outcome on the Swedish Code Corporate Governance and if it has increased the transparency. Is it nowadays harder for managers to accumulate bad news for a period of time in order to hide misbehaviors, or has the globalisation made it easier to prevail complex tax structures with the intention of hiding bad news?

Our study focused on a capitalization-weighted index that comprises of the 30 most-traded stock classes on the Swedish stock exchange. By widening the study by including all listed Swedish firms, one could study the effect on firm size, and the attributes that follows. Could it be that bigger firms, that most often are more scrutinized, engage less in extraction and bad news hoarding activities? Or perhaps smaller firms engage less in tax avoiding activities since they do not have the time or money to spend on complex tax schemes?

By increasing the scope, comparisons can be made between firms with concentrated and diluted ownership. Imaginably, firms with diluted ownership structure suffer from a governance free-rider problem: if your stakes are low, the effort required to monitor the board will exceed the expected benefits from an efficiently operated firm. If that is true, firms with strong owners, should be less effected by tax avoiding activities.

8.0 Conclusion

In this paper, we have studied the association between tax avoidance and future crash risk for OMXS30 firms. We find strong evidence that tax avoidance is positively correlated with future firm-specific stock price crash risk. The results are robust and alternative measures and variety of sensitivity checks are conducted to reinforce our results. Our proxy for measuring tax-avoidance is a long-run cash effective tax rate measure. Managerial opportunism and bad news hoarding potentially run for several years before leading to a stock price crash Therefore, the proxy is constructed to identify companies that are successful in avoiding taxes in the long run. Following the practice of Kim et al. (2010) a firm-specific crash is calculated on a weekly basis, and is defined as when a firm's weekly return is 3.2 standard deviations lower than the average firm-specific weekly return.

The results are consistent with the agency perspective on tax avoidance by Kim et al. (2010): tax avoidance activities provide managers with a powerful toolkit to manipulate and cover bad performance from the stock market, which once revealed, leads to the stock to crash. To the best of our knowledge, our paper is the first study that identifies the correlation on Swedish data. That is of particular interest for three reasons:

First, since the Swedish corporate governance is considered to be one of the most well-established and updated regulatory frameworks in the world. Second, since Swedish firms in general have a concentrated ownership structure in comparison to other countries, implying that owners are expected to take long-term responsibility. Third, Sweden applies a self-regulatory framework in order to increase openness which has resulted in high transparency standards, especially when it comes to remuneration of top management (Lekvall, 2009). Despite this, similar patterns regarding tax avoidance and stock price crash risk is recorded for Swedish data. This provides an interesting contribution that even though a lot of effort has been placed to increase the transparency in the Swedish stock market, this particular agency conflict still appears to exist for larger Swedish firms.

We hope that our findings contribute to a wider perspective regarding tax avoidance strategies to challenge the historical view that tax-avoidance per se retains value to the firm's shareholders. At times, complex tax schemes that momentarily increases the profits are only methods for managers to hide news from shareholders. Negative news and bad performance are stockpiled, and once the tipping pint is reached, the stock crashes.

"Say you have a dog, but you need to create a duck on the financial statements. Fortunately, there are specific accounting rules for what constitutes a duck: yellow feet, white covering, orange beak. So you take the dog and paint its feet yellow and its fur white and you paste an orange plastic beak on its nose, and then you say to your accountants, 'This is a duck! Don't you agree that it's a duck?' And the accountants say, 'Yes, according to the rules, this is a duck.' Everybody knows that it's a dog, not a duck, but that doesn't matter, because you've met the rules for calling it a duck." - Former Enron Employee

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Appendix A.

Firms on OMX30 as of 2016-01-04

- ABB Ltd
- Alfa Laval
- Assa Abloy B
- AstraZeneca
- Atlas Copco A
- Atlas Copco B
- Boliden
- Electrolux B
- Ericsson B
- Fingerprint Cards B
- Getinge B
- Hennes & Mauritz B
- Investor B
- Lundin Petroleum
- Kinnevik B
- Nokia Oyj
- Nordea Bank
- Sandvik
- SEB A
- Securitas B
- Skanska B
- SKF B
- SCA B
- SSAB A
- Svenska Handelsbanken A
- Swedbank A
- Swedish Match
- Tele2 B
- Telia Company
- Volvo B

Appendix B.

Tabel 1B: Stock price crashes (two-year-forward window)

Fiscal years	Number of firms	Number of firms with stock price crash	Percentage of firms with stock price crash
2002-2003	28	4	0.14
2003-2004	28	4	0.14
2004-2005	29	11	0.38
2005-2006	29	16	0.55
2006-2007	29	15	0.52
2007-2008	30	19	0.63
2008-2009	30	13	0.43
2009-2010	30	9	0.30
2010-2011	29	5	0.17
2011-2012	29	4	0.14
2012-2013	29	13	0.45
2013-2014	29	12	0.41
2014-2015	28	15	0.54
Total	**377**	**140**	**0.37**