Corporate Governance:  
The Long Term Impact of the Sarbanes-Oxley Act on Capital structure and Investment of Firms

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ABSTRACT
Corporate governance can have influence on the overall performance of a firm. That influence can be positive or negative, dependent on the effectiveness of corporate governance. The existence of agency issues can make corporate governance even more complicated. In the wake of numerous infamous corporate scandals, the Sarbanes-Oxley Act was set out in the US in 2002 in order to improve corporate governance and auditing practice of publicly listed companies. Although there have been studies on the impact of the adoption of the Act on corporate governance, findings are still controversial. Employing a deductive approach, quantitative methods and drawing on a sample dataset of 12,822 firms during a period of 31 years, this paper helps to shed more light on the long term impact of the Sarbanes-Oxley Act on corporate governance. We take capital structure and investment as the two measures of corporate governance. Our findings show that the adoption of the Act helps to reduce over-leverage and over-investment in the financing and investment decision making of firms. Our findings also reveal that firms tend to follow a target leverage level, which is consistent with the trade-off theory. We also examine the impact of the Act on under-leverage and under-investment of firms.

1. INTRODUCTION
Faulty oversight of corporate accounting and financial reporting practices by audit committees and corporate boards during the early 2000s resulted in the investigations of more than 20 major US corporations between 2000 and 2002 (Gamble et al., 2015). The investigations of such well-known companies as AOL Time Warner, Global Crossing, Enron, Qwest Communications and WorldCom found that upper management had employed fraudulent or unsound accounting practices to artificially inflate revenues, overstate assets, and reduce expenses. The scandals resulted in the conviction of a number of corporate executives and the passage of the Sarbanes-Oxley Act (SOX). The Act was passed by the US Congress in 2002 (US Congress, 2002). The Act is aimed to improve auditing practice and corporate governance of publicly listed companies in the US. The Act is named after the co-sponsors Senator Paul Sarbanes and Representative Michael G. Oxley.

The impact of the SOX is one of the focal research topics in corporate finance. Some studies focus on the impact of the Act on auditing work and auditing fees to firms. Ettredge et al. (2007) find that the adoption of the Act results in large increases in required audit work and corresponding audit fees. Drawing on a sample of 660 US manufacturing companies, Raghunan-dan and Rama (2006) find the mean audit fees
increase 86 percent after the adoption of the Act. For foreign companies listed in the US, the average increase in audit fees in the first year of compliance with the Act is 74 percent with large accelerated filers, 33 percent with the accelerated filers and 42 percent with the non-accelerated filers (Chan et al., 2012). Similarly, Ebrahim (2010) also finds that there is a significant increase in audit fee premium, especially for small accelerated filers. As a result, it becomes more expensive for firms to be publicly listed in the US. Solomon (2005) estimates that the total costs for a company to be publicly listed in the US is more than tripled after the adoption of the Act and the audit fees account for one third.

However, numerous studies also focus on the long term benefits of the Act. Hellwig (2007) argues that benefits of the Act exceed compliance costs. Patterson and Smith (2007) contend that the adoption of the Act leads to stronger internal control systems and less frauds. The Act also helps to increase disclosure and governance standards (Cortijo-Gallego and Yezegel, 2008). Ebrahim (2010) argues that the emergence of the Act results in higher quality of financial reporting and internal control. Rubalcava (2011) finds that the underwriting fees of seasoned equity offerings by cross-listed firms decrease significantly. In terms of firm performance, studies in the current literature show mixed results. For example, Rezaee and Jain (2006) find a positive abnormal return at the time of the Act adoption. They also argue that firms which are more compliant with the provisions of the Act receive more positive reactions from the market. On the contrary, findings in Zhang (2007) show a negative relationship between the adoption of the Act and the cumulative abnormal returns of firms. The adoption of the Act is also found to have a negative impact on operation profitability of firms (Ahmed et al., 2010).

There have been initial studies on the impact of the Act on corporate governance. Gu and Zhang (2017) provide suggestive evidence that the Act helps to increase corporate innovation in the long term. Findings in Chhaochharia et al. (2017) also show that the adoption of the Act results in improvements in internal governance of firms, especially in concentrated industries. Banerjee et al. (2015) examine if decisions which are made by overconfident CEOs could be improved through higher independent boards. Their findings show that after the adoption of the Act, overconfident CEOs tend to decrease investment and risk exposure, increase dividends and have better operation performance, consequently improve market value of firms. However, larger and more independent boards increase significantly director payments and the overall director costs, especially for smaller firms (Linck et al., 2008). Dah et al. (2014) find that about 56 percent of firms try to meet the Act requirements by adding independent directors, which reduces reaction capacity of CEO turnover performance.

Gompers et al. (2003) argue that the most difficult thing in doing research on corporate governance is determining a measure of corporate governance. In a research, Jiraporn and Gleason (2007) measure governance by leverage level and shareholders’ power and suggest that stronger ownership is significantly correlated with higher firm value. Bertus et al. (2008) examine the impact of changes on corporate governance on capital structure. Their findings show that owners of firms tend to require management teams to take higher levels of debt in order to reduce agency costs. Some researchers study the impact of the SOX on corporate governance by taking investment decision as a measure but they have different findings. Findings in Mitchell (2003) show that the adoption of the Act results in more investment decisions of firms while Zhu and Albuquerque (2012) find that there is a decrease in investment decisions of firms.

This paper contributes to the research on the long term impact of the SOX on corporate governance by taking leverage and investment as the two measures. There often exist agency problems in making financing and investment
decisions in firms. Shareholders often aim to maximise their wealth while managers tend to be more willing to take higher risks, consequently leading to over-leverage and over-investment (Grossman and Hart, 1982). Over-leverage and over-investment may be beneficial to the managers but can cause a variety of risks to firms, particularly bankruptcy risks (Kraus and Litzenberger, 1973). Drawing on a sample dataset of 12,822 firms during a period of 31 years, we find that the adoption of the Act has a positive impact on both the capital structure and the investment decisions of firms. Our findings show that there is a decrease in over-leverage and over-investment of firms after the adoption of the Act. Our findings also reveal that firms tend to keep their leverage ratios closer to an optimal leverage level which is in line with the trade-off theory in capital structure. Our research also examines the impact of the Act on under-leverage and under-investment of firms.

The rest of the paper is structured as the following. In the next part of the paper, we present our literature review and hypothesis development, which is followed by the discussion on methodology and results and discussion. The final part is conclusion and limitations of the paper.

**2. LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT**

**2.1. Capital Structure & Governance**

Capital structure decisions have been a topical issue in research on corporate finance. Modigliani and Miller introduced the irrelevance capital structure theory in their research in 1958. The theory argues that value of a firm is independent of its capital structure. However, the theory is based on some key assumptions such as a perfect capital market, no taxation, no costs of financial distress and liquidation. In practice, enterprises do have to pay taxes. Therefore, Modigliani and Miller revised the theory in 1963 and took the taxation into account. The revised version of the theory implies that taxes help to reduce cost of debt capital. As a result, a higher debt to equity ratio leads to a lower overall cost of capital and a higher firm value.

Agency cost can be one main problem in financing decisions of firms. The agency theory holds that the “agent”-the managers, might act in ways that do not support the best expectations of the “principal”-the shareholders or debt holders. Grossman and Hart (1982) argue that debt capital can possibly be a factor helping to address the agency problems. Debts can reduce the available cash to managers and increase the managers’ fractional ownership of the residual claim, consequently mitigating the agent-principal conflicts (Jensen, 1986). Some researchers such as Kraus and Litzenberger (1973) and Jensen and Meckling (1976) argue that agency problems can be addressed by the trade-off theory. The theory says that there is an optimal capital structure at which the benefits of using debts could be balanced with the costs of debt and the value of a firm could be highest. In Kraus and Litzenberger (1973), there is a balance between costs of bankruptcy and taxes saving from debts. In Jensen and Meckling (1976), there is an optimal leverage level at which the two types of “principal-agent” conflicts, shareholders-managers and equity holders-debt holders, can be both eliminated. The trade-off theory highlights the benefits of using both debt and equity in capital structure of firms.

However, Miller (1977) argues that the trade-off theory may lead to a much higher leverage level than those of firms observed in reality. Therefore, Myers (1984) proposes an alternative theory to the trade-off theory, known as the pecking order theory. The pecking order theory indicates that a firm would try to finance the potentially profitable investments by its internally generated funds first before turning to debt markets. Myers (1984) denies the construction of an optimal capital structure and classifies equity into two layers: internal equity at the top and external equity at the bottom of the pecking order of finance. The theory is supported in a wealth of
empirical studies such as Shyam-Sunder and Myers (1999), Fama and French (2002), Watson and Wilson (2002) and Booth et al. (2001). Baker and Wurgler (2002) deny the existence of an optimal capital structure and support the pecking order theory. They introduce the market timing theory which discusses the reluctance of firms in issuing equity in many cases in order to make the most out of the market opportunities. They provide evidence showing that firms issue overvalued securities and buy undervalued securities back. Hence, the fluctuation in stock price may have influence on capital structure of firms. Empirical findings in Alti (2006) support the impact of the market timing on the capital structure of firms but show that the impact is only in short term.

However, the pecking order theory is not supported in some empirical studies. Frank and Goyal (2003) test the leverage level of the US publicly traded firms from 1971 to 1998. They find that net debt issues do not affect finance deficit over time of firms. Flannery and Rangan (2006) find that the US companies tend to target an optimal debt to equity ratio. Similar findings are found in Uysal (2007) and Harford et al. (2009). In the context of acquisition, managers are found to maintain a target leverage level within five years after acquisition decisions in order to reverse the effects of acquisitions (Harford et al., 2009).

In the current literature, researchers also study the impact of corporate governance on capital structure of firms. Zingales (1998) refers corporate governance to a complicating system of control mechanism of a firm. Similarly, Gillan and Starks (1998) defines corporate governance as the system of rules, laws and factors that control the operations of a company. Corporate governance is classified into two groups: internal and external to firms. Corporate governance therefore can have influence on capital structure decisions of firms (Shleifer and Vishny, 1997). In the existence of agency issues, corporate governance would play a more important role in capital structure decisions. Gompers et al. (2003) examine the power balance between managers and shareholders in making capital structure and come to a conclusion that stronger ownership leads to higher firm value. Jiraporn and Gleason (2007) study the relationship between leverage level and power of shareholders. Their findings suggest that firms whose shareholder rights are more restricted tend to have higher debt to equity ratios.

Some more recent studies support the impact of corporate governance on capital structure. Goel and Mclver (2015) examine the effects of reforms in corporate governance policies on the capital structure of 275 companies in India during the period between 1999 and 2013. They find that when the reforms were introduced, the leverage levels decreased. Granado-Peiró and López-Gracia (2016) confirm the influence of corporate governance on deciding capital structure of Spanish firms. Bulathsinhalage and Pathirawasam (2017) find that board composition and board committee are the only variables having a significant effect on capital structure of listed companies in Sri Lanka.

One of the key objectives in the introduction of the SOX is to increase the regulations on corporate governance, which can probably affect capital structure of firms. In the current literature, there have been initial research into the impact of the Act on the capital structure. Bertus et al. (2008) find that the adoption of the Act results in higher levels of debt in US firms. In more details, findings in Carter (2011) show an increase of two to three percent in long term debt ratio of the US listed firms after the passage of the Act. Findings from some studies such as Liao et al. (2015) and Morellec et al. (2012) also show an increase trend of debts in capital structure and provide suggestive evidence about efforts of firms to maintain an optimal capital structure. This increase trend may help to decrease in the costs of capital for firms (Andrade et al., 2009; Pae, 2010).
In our study, we also hypothesise that after the adoption of the Act, the leverage levels of firms show an increase trend and become closer to an optimal level. This argument leads to our first hypothesis.

**Hypothesis 1:** The adoption of the SOX makes the practical leverage level of a firm come closer to an optimal level.

In making decisions on capital structure of firms, there may exist over-leverage and under-leverage. Both over-leverage and under-leverage are not good for a firm. Over-leverage means a firm may employ too much debt, causing high risks to the firm. Under-leverage may be not good as the firm does not take advantages of tax deductibles for interest from loans and bonds. With new frameworks on corporate governance in the SOX, we argue that the Act may have positive impact on over-leverage and under-leverage.

**Hypothesis 2:** The adoption of the SOX helps to reduce over-leverage.

**Hypothesis 3:** The adoption of the SOX helps to reduce under-leverage

**Hypothesis 1:** Success factors in traditional entrepreneurial finance can also be success factors in equity crowdfunding.

### 2.2. Capital Structure & Investment

There is a close relationship between financing decisions and investment decisions of firms (DeAngelo et al., 2011). Empirical findings in Denis and McKeon (2012) show that firms tend to adjust their capital structure to a target leverage level when investment decisions are made. These findings are in line with trade-off theory on capital structure. The theory implies that firms target an optimal capital structure at which benefits from tax could be maximised. In a recent study, Dudley (2012) examines relationship between capital structure and investments decisions of firms by using time and quantity as two measures. Findings from the research are consistent with the trade-off theory and show that firms tend to follow a target leverage level when they do investments. The research also indicates that the leverage deviation of financially constrained firms are more sensitive in terms of investment years than non-constrained firms.

The trade-off theory also has implications for investment behavior of firms. Myers (1977) finds that firms with unexercised options have lower debt-to-equity ratios. The research also argues that underinvestment may be caused by agency conflicts between bondholders and shareholders, which could be mitigated by reducing debt in the balance sheets. Jensen (1986) argues that managers are the decision makers and tend to overinvest. Therefore, low proportion of debt in capital structure could help to mitigate the over-investment tendency (Jensen, 1986). However, McConnell and Servaes (1995) find a positive relationships between leverage level and over-investment.

In terms of corporate financing behavior, Myers et al. (1984) argue that there is a tendency of using internal financing and if external funds are required, there is a preference of debt to equity. Kovenock and Phillips (1997) examine the impact of external factors on capital structure and investment decisions of firms. They find that both capital structure and investment decisions of a firm can probably be impacted by external events and the firm tends to decide to increase investments when its market share is higher.

Small firms may suffer from different problems compared to large firms, both in financing and investing decisions (Barclay et al., 2006). Small firms have limited financial flexibility, less available funds and more difficulties in raising funds from capital markets. Therefore, they may miss potentially profitable investment opportunities. Hutchinson (1995) suggests that interdependent investment and financing strategies can be used by small firms to control the costs of capital.
Mitchell (2003) is the earliest research studying the impact of the SOX on the investment behavior of firms. Their findings show that there is a positive relationship between the adoption of the Act and the investments of firms. However, more recent studies show mixed findings. Deng et al. (2012) find the Act has a negative impact on investment decisions of firms. On the contrary, Zhu and Albuquerque (2012) find no evidence showing that the adoption of the Act leads to a reduction in investments of firms.

In this research, we argue that the Act may have a positive impact on the decision making on investments of firms. We take over-investment and under-investment as the two measures to examine the impact of the Act on the investment decision making of firms. Just like over-leverage, over-investment could lead to a high risk level for a firm. Under-investment may mean a firm does not make the most out of its capital to invest in potentially profitable projects. We hypothesise that the adoption of the Act can help to reduce both the possibility of over-investment and under-investment.

**Hypothesis 4:** The adoption of the SOX helps to reduce over-investment.

**Hypothesis 5:** The adoption of the SOX helps to reduce under-investment.

We present our theoretical framework for this research in Fig. 1.

3. METHODOLOGY

3.1. Sample Data & Variables

In order to test our hypotheses, we collect financial data on an annual basis of 12,822 US manufacturing firms in a period of 31 years from 1981 to 2011. There are a total of 122,603 firm-year observations, on average 9 observations per firm. However, as the number of years is not the same for all firms, this is an unbalanced panel dataset. A summary of the sample dataset is presented in Table 1.

In order to examine the impact of the SOX on capital structure of firms, we use three dependent variables: leverage deviation, over-leverage and under-leverage. Leverage deviation is defined as the difference between the practical debt level and the target leverage of a company. Leverage level is commonly used as a dependent variable in prior empirical research on capital structure theories such as Baker and Wurgler (2002), Frank and Goyal (2003) and Alti (2006). However, in this study, we want to examine the impact on capital structure of firms by comparing the statistics on practical leverage levels to the target levels and those of before and after the adoption of the Act. In the case of examining changes during project and non-project related years, leverage deviation can be a more relevant dependent variable (Dudley, 2012). In this paper, the leverage deviation is difference between the practical end-of-year level and the target leverage level of each firm. Firms often set out their target leverage levels for each year and this information is available to collect.

Under- and Over-leverage are two dummy dependent variables which represent the possibility of leverage for a specific year of a firm. Over-leverage happens when a company holds too much debt and may be unable to pay the loan interest because of excessive costs. On the contrary, a company faces the under-leveraged situation when too little debt is used in the capital structure. Under-leverage may not be good for a firm because interest on bonds or loans
can be tax-deductible. However, there has been so far no metric in the literature to determine when a firm is over-leveraged and under-leveraged. Uysal (2011) argues that a firm can be considered as over-leveraged if its leverage deviation falls in the highest quartile and under-leveraged if its leverage deviation falls in the lowest quartile. In this paper, we follow that approach.

In order to examine the impact of the Act on investment decision making of firms, we use under-investment and over-investment as the two dummy dependent variables. Basing on the argument on the existence of an optimal level of investment, Morgado and Pindado (2003) argue that firms which invest less than the optimal level will suffer from under-investing and those invest more than the optimum will suffer from over-investing. In this paper, we follow this way of defining under-investment and over-investment. We use a set of control variables relating to key measures of corporate finance and firm-book-market value relation: Market leverage, Tangibility ratio, Market-to-book ratio, Research and development over sales, Research and development dummy, Sales, Selling expense ratio, Sales growth, z-score, Profitability and Asset growth. A full list of all variables and variable description is presented in Table 2. All control variables are used in the first time lag form. The variable correlation matrix is presented in Table 3.

Table 1: A summary of sample data

<table>
<thead>
<tr>
<th>Variable</th>
<th>Before the SOX adoption</th>
<th>After SOX adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Observations</td>
<td>Mean</td>
</tr>
<tr>
<td>Average deviation</td>
<td>121,800</td>
<td>0.0522</td>
</tr>
<tr>
<td>Under-leverage</td>
<td>121,800</td>
<td>0.2569</td>
</tr>
<tr>
<td>Over-leverage</td>
<td>121,800</td>
<td>0.2496</td>
</tr>
<tr>
<td>Optimal leverage</td>
<td>121,800</td>
<td>0.2383</td>
</tr>
<tr>
<td>Over-investment</td>
<td>121,800</td>
<td>0.3808</td>
</tr>
<tr>
<td>Market leverage</td>
<td>121,800</td>
<td>0.1297</td>
</tr>
<tr>
<td>Tangibility</td>
<td>121,800</td>
<td>0.2173</td>
</tr>
<tr>
<td>Market-to-book ratio</td>
<td>121,800</td>
<td>-0.8121</td>
</tr>
<tr>
<td>Research and development</td>
<td>121,800</td>
<td>-0.0299</td>
</tr>
<tr>
<td>Age</td>
<td>121,800</td>
<td>0.4845</td>
</tr>
<tr>
<td>Debt</td>
<td>121,800</td>
<td>2.4014</td>
</tr>
<tr>
<td>Selling efficiency</td>
<td>121,800</td>
<td>1.4933</td>
</tr>
<tr>
<td>Debt growth</td>
<td>121,800</td>
<td>0.7242</td>
</tr>
<tr>
<td>z-score</td>
<td>121,800</td>
<td>0.5132</td>
</tr>
<tr>
<td>Profitability</td>
<td>121,800</td>
<td>0.5005</td>
</tr>
<tr>
<td>Profit growth</td>
<td>121,800</td>
<td>0.5005</td>
</tr>
<tr>
<td>Tangibility ratio</td>
<td>121,800</td>
<td>0.5005</td>
</tr>
</tbody>
</table>

Table 2: Summary of statistics & variable description

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average deviation</td>
<td>0.0522</td>
<td>0.3655</td>
<td>-0.9691</td>
<td>1.9711</td>
</tr>
<tr>
<td>Under-leverage</td>
<td>0.2569</td>
<td>0.3335</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td>Over-leverage</td>
<td>0.2496</td>
<td>0.3230</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td>Optimal leverage</td>
<td>0.2383</td>
<td>0.3477</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td>Over-investment</td>
<td>0.3808</td>
<td>0.4174</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td>Market leverage</td>
<td>0.1297</td>
<td>0.1545</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td>Tangibility</td>
<td>0.2173</td>
<td>0.1970</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td>Market-to-book ratio</td>
<td>-0.8121</td>
<td>0.8680</td>
<td>-1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Research and development</td>
<td>-0.0299</td>
<td>0.8793</td>
<td>-1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Age</td>
<td>0.4845</td>
<td>0.4165</td>
<td>-1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Debt</td>
<td>2.4014</td>
<td>2.4014</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td>Selling efficiency</td>
<td>1.4933</td>
<td>1.4933</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td>Debt growth</td>
<td>0.7242</td>
<td>0.7242</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td>z-score</td>
<td>0.5132</td>
<td>0.5132</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td>Profitability</td>
<td>0.5005</td>
<td>0.5005</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td>Profit growth</td>
<td>0.5005</td>
<td>0.5005</td>
<td>0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Market leverage reflects the movements in the valuation of market-to-book ratios. Adrian et al. (2014) argue that book leverage is pro-cyclical and market leverage is counter-cyclical. Accordingly, market leverage increases when firm market value decreases. Market leverage is determined mainly by market forces. In this paper, market leverage is calculated by the following equation.

\[
\text{Market Leverage} = \frac{\text{Long term Debt} + \text{Short term Debt}}{\text{Total Assets} - \text{Book Equity} + \text{Market Equity}}
\]

Tangibility assets may give a positive signal about financial situation of a firm as the firm can sell these assets to cover debts in case of bankruptcy. There is different arguments on the relationship between tangibility and leverage. Trade-off theory indicates a positive relation while pecking order theory supports a negative relation. In this paper, tangibility ratio is calculated by using the following equation.

\[
\text{Tangibility ratio} = \frac{\text{Net properties} - \text{Plant and Equipments}}{\text{Total Assets}}
\]
Market-to-book ratio may reflect the growth potential of a firm and the confidence level of investors on the firm's future performance in comparison with its competitors in the same industry or sector (Chen and Zhao, 2006). In this paper, we calculate market to book ratio by using the following equation.

\[
\text{Market to book ratio} = \frac{\text{Market value of assets}}{\text{Total assets}}
\]

Research and development expense may play an important role in the ability to generate profits for a company. However, a company may target more profits at the expense of research and development. A low research and development ratio in return can limit innovation of a product or a project, which may cause constraint to the growth prospect of a firm. An effective ratio depends on not only sector and industry that a company belongs to but also its development stage. The equation for calculating the research and development over sales ratio is as following:

\[
\text{Research and Development over Sales ratio} = \frac{\text{Research and Development expense}}{\text{Sales}}
\]

As there is no information about the research and development over sales ratio of some companies in our sample, we use a research and development dummy variable. The variable equals 1 if research and development over sales ratio is not missing and otherwise.

Sales value can have relationship with both capital structure and investment decisions of a company. Byoun (2008) suggests a positive relation between sales and investments for large firms due to their easier access to external funds and more diversified features. In the paper, we use the logarithm function for sales value in order to see the change of sales levels of each firm over years.

Sales and selling expense can affect the financial performance of a firm. If sales revenue is high but selling expense is high, profits would be low. Selling expense ratio describes the relationship between selling expenses and sales. The equation for calculating selling expense ratio is as following:

\[
\text{Selling expense ratio} = \frac{\text{Selling expense}}{\text{Sales}}
\]

Differently from sales which represents the level of sales for each year, sales growth ratio represents the value of sales between two sequential years. The ratio may indicate the changes in the operation of a firm over a year. In this paper, it is calculated by the following equation.

\[
\text{Sales growth ratio}_t = \frac{\text{Sales}_t}{\text{Sales}_{t-1}}
\]

Z-score was first used in a publication by Altman in 1968. It has been widely used to measure the financial health and the possibility of bankruptcy of a company. It can be useful both in making financing and investment decisions. The original formula is a linear combination of five financial ratios weighted by coefficients:

\[
Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5
\]

Where:

\[
X_1 = \frac{\text{Working capital}}{\text{Total Assets}};
\]

\[
X_2 = \frac{\text{Retained Earnings}}{\text{Total Assets}};
\]

\[
X_3 = \frac{\text{EBIT}}{\text{Total Assets}};
\]

\[
X_4 = \frac{\text{Market value of Equity}}{\text{Book value of liabilities}};
\]

\[
X_5 = \frac{\text{Sales}}{\text{Total Assets}};
\]

There are many ratios can be used to measure the profitability of a firm. In this paper, we use the earnings before interest, tax, and depreciation over total assets ratio as it can capture the...
relationship between the financial performance of a company and the assets invested (Odit and Chittoo, 2008). The ratio is calculated by the following equation:

\[ \text{Profitability ratio} = \frac{\text{Earnings before Interest, Tax and Depreciation}}{\text{Total Assets}} \]

Asset growth ratio represents the growth of assets of a firm over years. Gallery et al. (2008) argue that the ratio is also a strong predictor of the growth potential of a firm. The ratio is calculated by the equation:

\[ \text{Asset growth ratio}_t = \frac{\text{Assets}_t}{\text{Assets}_{t-1}} \]

3.2. Regression Models
In order to test our hypotheses, we develop five models and run two types of regressions. Model 1 is aimed to test hypothesis 1, examining impact of the SOX on leverage deviation. We use Stata to run Ordinary Least Square equation for this model. Model 2 and Model 3 are aimed to test hypotheses 2 and 3 respectively, examining the possibility of under-leverage and over-leverage. Model 4 and Model 5 are aimed to test hypotheses 4 and 5, examining the possibility of under-investment and over-investment. We use Stata to run probit equations for Model 2 to Model 5 as the dependent variables in these models can only get a binomial value, of zero and one. All the models include sox as the key independent variable and the same set of control variables. We carry out relevant diagnostic tests and add industry and year fixed effects to each regression.

The generic form of the models is as follows:

\[ Y_{it} = \beta_0 + \beta_1 \text{sox}_i + \sum \beta_i X_{it-1} + \varepsilon_{it} \]

Where: \( Y_{it} \): Dependent variable (leverage deviation, under- and over-leverage, under- and over-investment)
\( \beta_0 \): Intercept
\( \beta_i \): Coefficients of controlled variables
\( X_{it-1} \): the first lag of controlled variables of firm i at time t (market leverage, tangibility, market-to-book ratio, research and development ratio, research and development dummy, log sales, selling expense ratio, sales growth, z-score, profitability, asset growth).
\( \varepsilon_{it} \): Error term.

We also apply the Chow test for the model 1 in order to examine structure break. The Chow test is used to test the stability of statistics, examining if there is a structure break at a determined point of time. The test is carried out following the OLS equation. We carry out the test by using a binary variable interaction regression. The generic form is as the following:

\[ Y_{it} = \beta_0 + \sum \beta_i X_{it-1} + \beta_1 \text{sox}_i + \sum \beta_i \text{sox}_i X_{it-1} + \varepsilon_{it} \]

Where: \( X_{it-1} \) = \text{sox}_i * X_{it-1}

The null hypothesis is: \( H_0: \beta_0 = \beta_1 = 0 \), there is no break at time t.
\( H_1: \) at least one of \( \beta_i \) is nonzero.

Based on the F-statistic of the test, the null hypothesis could be rejected or not. If there is a structure break, the estimating models would hold for the whole sample dataset but might not be really good models for sub-sample datasets for before and after the event of concern.

4. RESULTS & DISCUSSION

4.1. Leverage Deviation
We run three equations to examine the impact of the SOX on the leverage deviation. First, we run an OLS regression with the whole dataset in order to see the impact of the adoption of the Act. In order to compare the difference of leverage deviations before and after the adoption of the Act, we run an equation with the period before and one with the period after the event. The regression results are shown in Table 4.

The sox variable is negatively significant with the dependent variable. The significance is very strong (p<0.01). This implies that the adoption of the Act has a negatively impact on the leverage deviation of firms. The adoption of the Act reduces the deviation of practical debt level from the target leverage of a firm. This finding is in line with the trade-off theory. The theory argues that there exists an optimal capital structure and a firm tends to try to follow a target leverage level in order to maximize the benefits from the capi-
tional structure. Hypothesis 1 is supported.

### Table 4: OLS regressions for Leverage deviation

<table>
<thead>
<tr>
<th>Variable</th>
<th>Overall Sample</th>
<th>Pre-SOX</th>
<th>Post-SOX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.175***</td>
<td>-0.023***</td>
<td>0.0445***</td>
</tr>
<tr>
<td>sox</td>
<td>-0.2317***</td>
<td>(omitted)</td>
<td>(omitted)</td>
</tr>
<tr>
<td>Market leverage</td>
<td>0.793***</td>
<td>0.7804***</td>
<td>0.7466***</td>
</tr>
<tr>
<td>Tangibility ratio</td>
<td>-0.3002***</td>
<td>-0.1585***</td>
<td>-0.197***</td>
</tr>
<tr>
<td>Market-to-book ratio</td>
<td>-1.8990***</td>
<td>0.0062***</td>
<td>-0.0004***</td>
</tr>
<tr>
<td>Research and Development over Sales ratio</td>
<td>-0.4164***</td>
<td>0.1100***</td>
<td>0.0215***</td>
</tr>
<tr>
<td>Research and Development Dummy</td>
<td>0.8793</td>
<td>-0.0255***</td>
<td>-0.0355***</td>
</tr>
<tr>
<td>Sales level</td>
<td>-0.0094***</td>
<td>-0.0080***</td>
<td>-0.0127***</td>
</tr>
<tr>
<td>Selling expense ratio</td>
<td>-0.0023***</td>
<td>-0.0053***</td>
<td>-0.0032***</td>
</tr>
<tr>
<td>Sales growth ratio</td>
<td>0.0035***</td>
<td>0.0032***</td>
<td>0.0044***</td>
</tr>
<tr>
<td>z-score</td>
<td>-0.0001***</td>
<td>-0.0016***</td>
<td>-0.0009***</td>
</tr>
<tr>
<td>Profitability ratio</td>
<td>-0.0237***</td>
<td>-0.0174***</td>
<td>0.0057***</td>
</tr>
<tr>
<td>Asset growth ratio</td>
<td>0.0091***</td>
<td>0.0087***</td>
<td>0.0038***</td>
</tr>
<tr>
<td>F-statistics</td>
<td>1049.37</td>
<td>3212.86</td>
<td>2788.96</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.4264</td>
<td>0.4442</td>
<td>0.4445</td>
</tr>
<tr>
<td>Root MSE</td>
<td>0.12426</td>
<td>0.12523</td>
<td>0.11647</td>
</tr>
<tr>
<td>Year fixed effect</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Industry fixed effect</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Chow test:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- F-statistic:</td>
<td>250.06***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Adjusted R-square</td>
<td>0.4415</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<0.01, **p<0.05, *p<0.1

The results for Chow test indicate that there is a structure break in the dataset. The break is at the point of 2002 when the Act was passed and began coming into effect. This means that the Model 1 is good for the whole sample dataset but might not be good for the subsamples of the periods before and after the event.

#### 4.2. Under-leverage & Over-leverage

The results for the probit regressions for under-leverage and over-leverage are presented in Table 5.

The independent variable sox is negatively significant in the regression for over-leverage but positively significant in the regression for under-leverage. This means that the adoption of the SOX helps to reduce the possibility of over-leverage of firms. Over-leverage can be very risky to a firm, especially bankruptcy risks. The reduction in over-leverage may be the result of the stricter provisions in the Act on corporate governance. The findings imply that the Act may also help to reduce the agency problems in firms. After the Act came into effect, managers of firms might be less likely to maintain a high proportion of debts in the capital structure of firms, consequently leading to the less likelihood of over-leverage. This is consistent with the finding on under-leverage. As the managers were less likely to take risks, there is more possibility of under-leverage. These findings imply that the adoption of the Act may help managers of firms make better financing decisions. Hypothesis 2 is supported but Hypothesis 3 is rejected.

Most control variables are statistically significant in both regressions. Except for market-to-book ratio which is statistically insignificant in the regression for under-leverage and selling expense ratio which is negatively significant to...
both under- and over-leverage, all other controlled variables have opposite values between under-leverage and over-leverage regressions. In the regression for under-leverage, market leverage, Research and development dummy, Selling expense ratio, Sales growth ratio and Asset growth ratio are negatively significant while tangibility ratio, market-to-book ratio, Research and Development over Sales ratio, Sales level, z-score and profitability ratio are positively significant. In the regression for over-leverage, tangibility ratio, market-to-book ratio, Research and Development over Sales ratio, Sales level, Selling expense ratio, z-score and profitability ratio are negatively significant while market leverage, Research and Development dummy, Sales growth ratio and Asset growth ratio are positively significant.

4.3. Under-investment and Over-investment
We present the results for two probit equations examining under-investment and over-investment in Table 6.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Under-investment</th>
<th>Over-investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.2372</td>
<td>-0.0992</td>
</tr>
<tr>
<td>sox</td>
<td>0.1461</td>
<td>-3.2011**</td>
</tr>
<tr>
<td>Market leverage</td>
<td>1.0129***</td>
<td>-1.3556***</td>
</tr>
<tr>
<td>Tangibility ratio</td>
<td>-0.3402</td>
<td>-4.9875***</td>
</tr>
<tr>
<td>Market-to-book ratio</td>
<td>-12.149</td>
<td>6.9152</td>
</tr>
<tr>
<td>Research and Development over Sales ratio</td>
<td>-0.7466</td>
<td>-2.9658**</td>
</tr>
<tr>
<td>Research and Development Dummy</td>
<td>7.1634</td>
<td>55.8045***</td>
</tr>
<tr>
<td>Sales level</td>
<td>-0.1158***</td>
<td>0.0111***</td>
</tr>
<tr>
<td>Selling expense ratio</td>
<td>-0.0989***</td>
<td>0.0787***</td>
</tr>
<tr>
<td>Sales growth ratio</td>
<td>-0.0446***</td>
<td>0.0580***</td>
</tr>
<tr>
<td>z-score</td>
<td>0.0078***</td>
<td>-0.0077***</td>
</tr>
<tr>
<td>Profitability ratio</td>
<td>-0.3077***</td>
<td>0.1587***</td>
</tr>
<tr>
<td>Asset growth ratio</td>
<td>-0.0455***</td>
<td>0.0592***</td>
</tr>
<tr>
<td>Likelihood ratio chi-square</td>
<td>14636.3</td>
<td>25905.62</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-55117.694</td>
<td>-62288.732</td>
</tr>
<tr>
<td>Pseudo R-squared</td>
<td>0.1172</td>
<td>0.1497</td>
</tr>
<tr>
<td>Year fixed effect</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Industry fixed effect</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 6: Probit regressions for Under-investment and Over-investment

The independent variable sox is positively significant in the regression for over-investment but insignificant in the regression for under-investment. This means we can only examine the impact of the adoption of the Act on possibility of over-investment. The adoption of the Act has a negative impact on the possibility of over-investment. This implies that the adoption of SOX reduces the possibility of over-investment of the US firms. New frameworks created by the Act significantly reduce the possibility of investing more than an optimal investment level which might lead to over-leverage due to borrowing too much debt. This finding supports the trade-off theory in terms of a target leverage level that US firms might follow when they made investment decisions. Hypothesis 4 is supported and hypothesis 5 cannot be rejected.

Except for Tangibility ratio, Market-to-book ratio, Research and development over sales ratio and Research and development dummy in the regression of under-investment and Market-to-book ratio in the regression of over-investment, all other control variables are statistically significant. However, there is an opposite direction of the effects of the control variables to the possibility of under-investment and over-investment.
In the regression of under-investment, Market leverage and z-score are positively significant while Sales level, Selling expense ratio, Sales growth ratio, Profitability ratio and Asset growth ratio are negatively significant. In the regression of over-investment, Research and development dummy, Sales level, Selling expense ratio, Sales growth ratio, Profitability ratio and Asset growth ratio are positively significant while Market leverage, Tangibility ratio, Research and development over sales ratio and z-score are negatively significant.

5. CONCLUSION

Corporate governance is a topical realm in research on corporate finance. Corporate governance can have impact on both financing and investment decision making of firms. In the existence of agency problems, the relationship between corporate governance and financing and investment decision making of firms become even more complicated. Trade off theory argues that there exists an optimal capital structure which can make contribution to solve agency problems and help firms to make better investment decisions.

The adoption of the SOX is aimed to set out more frameworks to regulate issues relating to corporate governance. There has been research into the impact of the Act on firms. However, the findings are still mixed. This paper contributes to the current literature on the impact of the SOX on corporate governance of firms. In this paper, we use capital structure and investment as the two measures of corporate governance. Drawing on a sample of 12,822 US firms covering a long time span ranging between 1981 and 2011, our findings show that the adoption of the Act has a positive impact on both the capital structure and the investment decisions of firms. We find that there is a decrease in over-leverage and over-investment of firms after the adoption of the Act. Our findings also reveal that firms tend to keep their leverage ratios closer to an optimal leverage level which is in line with the trade-off theory in capital structure. Our research also examines that possibility of under-leverage and under-investment of firms.

However, there are some limitations in terms of empirical work and sample dataset of this paper. First, the Chow test results show that there is a break in our sample dataset. The break is at the point of 2002 when the SOX was passed and began coming into effect. Therefore, Model 1 would be good for the whole sample dataset but might not be good for the sub-sample datasets of before and after the event. Second, the R-square values for our models are not high, which may imply limited power of independent and control variables in explaining dependent variables. Third, our data are not the most updated. Although the time span of our sample ranges over a relatively long period of 31 years between 1981 and 2011, we do not have available data for the period between 2012 and 2017. Future research may examine the impact of the Act on the corporate governance of firms by using other measures of corporate governance. Studies in future can also develop better models and carry out more empirical tests in order to improve the validity of models. A more updated sample dataset would also be a possible approach.

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