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The impact of the Global Financial Crisis on the capital structure of JSE listed companies in South Africa

A research report submitted by

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Abstract:

The aim of this thesis is to determine whether the Global Financial Crisis had an impact on the capital structure choices of South African firms listed on the Johannesburg Stock Exchange (JSE) as well as to investigate whether their capital structure determinants differed before, during and after the crisis. 171 firms listed on the JSE across 9 different sectors were chosen for this study. The study used panel data over a 9-year period. Data for the three-year period 2004 to 2006 constituted the 'before the Global Financial Crisis period'; data for the three-year period 2007 to 2009 constituted the 'Global Financial Crisis period' and data for the three-year period 2010 to 2012 constituted the 'after the Global Financial Crisis period'. A panel regression model was used, and three different measures of leverage were tested. The findings indicate that the crisis had a significant impact on the capital structure of JSE listed firms. Firms were found to have lower levels of debt in the period before the crisis when compared with the crisis period. Furthermore, no significant change was found in firm leverage after the crisis, meaning that debt levels remained at similar levels after the crisis when compared with the period during the crisis. When looking at the determinants of the sampled firm's capital structures, profitability, firm size and asset tangibility were found to have increased in significance in either the during, after-crisis period or both these periods, when compared with the before period. Growth opportunities were also found to be insignificant during the crisis but significant in both the before and after periods. Thus, it was these determinants that provided the mechanism through which JSE listed firms increased their leverage during the crisis. Ultimately, the results of this study point towards firms increasing leverage levels in times of economic crisis and financial distress.

Keywords

Leverage, Johannesburg Stock Exchange, Capital Structure, The Global Financial Crisis and Deleveraging.

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Chapter 1- Introduction

1.1 Context of the study

This thesis aims to investigate the effect, if any, that the Global Financial Crisis had on the capital structure of South African firms. Capital structure refers to the balance between debt and equity that a firm uses to finance their operations (Correia, Wormald, Dillon, Flynn, & Uliana, 2015). This is relevant due to its knock-on effect on other issues, such as economic growth as a result of the impact of capital structure on firm value (Piaw & Jais, 2014; Modigliani & Miller, 1958). Furthermore, it could be argued that South Africa is still, to some degree, experiencing an economic crisis today as can be seen from diminishing levels in economic growth (Businesslive 2017)

As a developing country, negative economic growth can have even further reaching effects including unemployment, dependence on state subsidies, political pressures and policy uncertainty as the government tries to stimulate growth and stability (Alesina & Perotti, 1994). Finally, due to South Africa's past Apartheid regime's effects still lingering and causing additional political instability these factors may, altogether, be disastrous (Fielding, 2002; Kingdon & Knight, 2007). Moreover, South Africa's recent downgrade to junk status could be seen as an additional indication that the economic crisis currently being experienced could continue to worsen.

1.2 The downgrade

In April 2017, the fears of corporate South Africa were realised when South Africa was downgraded to 'junk status' (HPSA, 2017, A). 'Junk status' refers to a sub-investment grade credit rating (Accountancy SA, 2017). This downgrade was accompanied by a downgrade of the country's banks by prominent rating agencies (HPSA, 2017, B).

What does this downgrade mean for South Africa? Currently, South Africa is experiencing minimal economic growth (Businesslive 2017). Firms require sufficient financing in order to grow (Lemma & Negash, 2011). However, firms may find it difficult to obtain additional debt financing as the downgrade is expected to lead to an increase in interest rates as a result of an increase in the risk

premium, caused by the higher perceived risk of default (Businesslive, 2017). This increase in the cost of debt may lead to changes in the capital structure choices of firms (Dang, Kim, & Shin, 2014).

It is in these times of crises and increased risk that firms face the possibility of bankruptcy (Hidayat & Abduh, 2012). In response to these crises, firms may alter their capital structure choices in order to survive (Dang et al., 2014; Mouton & Smith, 2016). The Global Financial Crisis, which begun in 2007, provides us with the opportunity to research how firms may alter their capital structure in times of economic crisis.

1.3 The Global Financial Crisis

The Global Financial Crisis originated in the United States (Maredza & Ikhide, 2013). It was the end result of a chain of events that began with banks being pressured by the Clinton administration to lend to poorer households. The reason for this political pressure was to enable an expansion in the access to housing of poorer households (Baxter, 2009). However, by lending to poorer households, these financial institutions were taking on far greater levels of risk. Moreover, this risk was influenced by housing prices (Baxter, 2009).

Should property prices continuously be on the rise, then the risk faced by banks would be reduced. The reason being that should the poorer households default, then the properties would simply be sold with little or no actual loss to the banks (Baxter, 2009). However, should property prices be on the rise, then the supply of houses would become enhanced and the resulting forces of supply and demand would decrease prices significantly (Baxter, 2009).

As a result of the potential fall in housing prices and increased risk; financial institutions were desperate to minimise exposure (Maredza & Ikhide, 2013). This was done by bundling up all these mortgages into securitised mortgages and on-sold to various investors (assuming the risk-reward was enhanced due to diversification). Through this process, banks were able to take these loans off the balance sheets in order to remain within legislation requirements (Baxter, 2009).

During the period of 2004 to 2006, interest rates in the United States began to increase. This increase in interest rates led to these poorer households defaulting on mortgage repayments and thus caused the

housing market to take strain (Baxter, 2009). This led to investors making losses on the securitised mortgages, meaning investors were no longer willing to take on securitised mortgages. This resulted in banks (with large exposures to risky lending) facing solvency and liquidity problems (Maredza & Ikhide, 2013). This ultimately lead to the closures of banks, the slowdown in global markets and specific rescue packages being put in place by numerous countries. Additionally, an economic recession ensued for the United States and many European countries (Baxter, 2009). Ultimately, the financial crisis started in the United States, but the effects were felt on a global scale.

1.4 The Global Financial Crisis and South Africa

South Africa is an open economy that relies on foreign trade and foreign savings in order to boost local investment (Baxter, 2009; Mnyande, 2012). Therefore, South Africa was not immune to the crisis. It caused a decrease in economic growth rates with rates reaching as low as negative 6% in 2009, as can be seen in Figure 1 (Trading Economics, 2017). Furthermore, the crisis caused a decrease in commodity prices (key South African exports) as well as a reduction in capital flows to developing countries. South Africa's major export markets along with the local automotive, retail and mining sectors entered recession (Mnyande, 2012). This was the first recession in South Africa in seventeen years (Treasury, 2017). The figure below shows the changes in the South African economic growth rate over time:

Figure 1: South African GDP growth rates over time



(Source: TradingEconomics.com/Statistics South Africa)

1.5 The impact of the financial crisis on the cost of financing in South Africa

The effects of the crisis led to a surge in inflation levels and a rise in bond yields over 2007 and 2008 (Mnyande, 2012; Padayachee, 2012). The reserve bank was forced to almost double interest rates from 7% to a peak of 12% during the crisis period as can be seen in Figure 2 (Trading Economics, 2017). Figure 2 below shows the change in the South African repo rate[1]. South African banks began to tighten their lending policies with a decrease in domestic credit provided to both the private and public sector. This had been on a strong upward trend prior to the crisis (Mnyande, 2012; Padayachee, 2012). This increased cost of debt as well as banks having stricter lending conditions impacts a firm's ability to obtain debt financing (Dang et al., 2014) and therefore, influences a firm's capital structure decision.

[1] The repo rate is the rate at which the South African reserve bank lends money to other banks.

Figure 2: South African repo rate over time



(Source: TradingEconomics.com/South African Reserve Bank)

1.6 Capital structure

A firm's capital structure refers to the balance of debt and equity that is used to finance their operations and therefore, represents the financing decision (Correia et al., 2015). This decision impacts firm value, which is why capital structure theories have been prominent research topics (Jensen & Meckling, 1976; Miller, 1977; Modigliani & Miller, 1958; Myers & Majluf, 1984). However, no consensus has been reached across these theories as to the ultimate capital structure. This has led to a focus on identifying empirical evidence in support of, or against these theories (Harris & Raviv, 1991). This body of research has created a long list of determinants of capital structure that vary across countries (Rajan & Zingales, 1995).

1.7 Capital structure in South Africa

Studies on the determinants of capital structure in South Africa have mostly been focused on large firms listed on the Johannesburg Stock exchange (JSE) (Correia & Cramer, 2008; Lemma & Negash, 2011). However, minimal studies have been carried out in a South African context on the variability of capital structure and its antecedents over time. There is significant international evidence to show that firms alter their capital structures as a result of changing macroeconomic conditions (Dang et al., 2014; Piaw

& Jais, 2014). This raises the question as to whether the antecedents of the capital structure of South African firms have changed as a result of the Global Financial Crisis.

1.8 Statement of the problem

Other than the work done by Mouton and Smith (2016), the impact of the Global Financial Crisis on the capital structure of South African firms is relatively unknown. Firms may have increased their leverage as they were in distress and required financing or firms may have deleveraged in response to the increased cost of debt (Gertler & Gilchrist, 1993). Internationally, changing macroeconomic conditions have caused firms to alter their capital structure choices (Dang et al., 2014). Malaysian firms were found to have deleveraged in the aftermath of the 1997 East Asian crisis (Piaw & Jais, 2014). Deleveraging has been found to negatively impact economic growth (Greenlaw, Hatzius, Kashyap, & Shin, 2008). With South Africa currently experiencing low economic growth and significant unemployment (Statssa, 2017) firms deleveraging could be disastrous for the economy.

1.9 Purpose of the research

The purpose of this study was to determine whether the Global Financial Crisis had an impact on the capital structure of JSE listed companies in South Africa. Following this, the study attempted to determine whether the determinants of the capital structure of these companies were different before, during and after the crisis.

1.10 Contribution of the study

Limited research has been carried out on the impact of the Global Financial Crisis on the capital structure of South African firms (Mouton & Smith, 2016). It is unknown whether the determinants of the capital structure of South African firms have changed in response to the crisis. This study built on the work carried out by Mouton and Smith (2016) by making use of a three-period study (before, during and after the financial crisis) as opposed to their two-period approach to further isolate the effect of the financial crisis. The study also increased the number and heterogeneity of firms investigated to determine whether for example, factors such as firm size influenced the impact of the crisis.

Large South African listed companies have been found to use sub-optimal levels of debt in their capital structures (Correia & Cramer, 2008). This study can provide further insight into the usage of debt by firms. If the study finds that South African firms decrease their debt levels in times of crisis, then this could lead to deleveraging which to reiterate, has an impact on economic growth (Greenlaw et al., 2008).

In addition to the above, the results of this study could provide further guidance as to how South African firms alter their financing decisions in times of crisis and financial distress. This knowledge on the impact of the Global Financial Crisis on the capital structure of firms would be useful to policy makers and the Reserve bank. They can use this understanding to create tools that can be used to assist firms in times of financial distress as well as to limit the economic damage of another crisis, such as the current downgrade.

1.11 Research question

The research question can be split into two components:

- Did the Global Financial Crisis have an impact on the capital structure of South African companies listed on the JSE?
- Was there any change in the determinants of the capital structure of South African companies listed on the JSE when looking at the periods before, during and after the financial crisis?

1.12 Assumptions

This study assumes that the financial crisis period in South Africa would have mirrored the financial crisis period in foreign countries. The reason for this is that South Africa is an open economy that relies heavily on foreign trade and foreign investment (Baxter, 2009). A global study looking at firm corporate governance defined the financial crisis period as January 2007 to September 2008 (Erkens, Hung, & Matos, 2012). Therefore, this study assumes that the financial crisis occurred in South Africa during the same period.

Moreover, impacts of the global recession were still felt in South Africa throughout 2009 (Padayachee, 2012). Therefore, this study will incorporate 2009 as part of the crisis meaning that the crisis period

will be defined as January 2007 to December 2009. The reason for this assumption is due to the fact that there is no research that clearly identifies the exact period during which the Global Financial Crisis occurred in South Africa. In addition to this, the determination of this specific period is beyond the scope of this study.

1.13 Limitations

In a study by Letsoenya and Negash (2013), ownership was found to have a positive correlation with the leverage of firms listed on the JSE. However, this study did not consider the impact of ownership structure on capital structure of the sampled firms as this data was not readily available.

Making use of a five year average in terms of the measurement of variables has been found to reduce the measurement error that is caused by random year-to-year fluctuations in the variables (Lemma & Negash, 2011). A five-year average will not be used in this study for the period of the crisis as this period only lasted three years.

The way in which leverage is defined has been found to have an impact on the results of studies focusing on capital structure theories (Harris & Raviv, 1991; Lemma & Negash, 2011; Rajan & Zingales, 1995). There are various categories of leverage measures namely:

- Measures based on either book values or market values (Lemma & Negash, 2011).
- Measures based on total, long- term or short- term financial figures (Lemma & Negash, 2011).
- Stock- measures and flow- measures (Titman & Wessels, 1988).

This study will only be looking at the following leverage measures:

- Total debt to total assets.
- Long-term debt to total assets.
- Short-term debt to total assets.

The above measures are based on book values as the market value of debt of all the companies listed on the JSE is not widely available.

An unbalanced panel will be used in this study. The disadvantage of using an unbalanced panel is that the independent variables forming part of this study will not be observed for each company for every time period in question. However, this type of panel is superior to a balanced panel as a balanced panel includes survivorship bias (Fitzgerald, Gottschalk, & Moffitt, 1998).

1.14 Delimitations

One could argue that due to South Africa's more conservative credit extension policies as well as their appropriate fiscal and monetary policies, the Global Financial Crisis did not directly impact the South African economy, but rather had an indirect effect (Baxter, 2009; Maredza & Ikhide, 2013; Ncube, 2009). This indirect effect is seen in terms of foreign investors becoming weary and reducing their investments overall, due to them having been affected the Global Financial Crisis directly. There is also the fact that no banks in South Africa were forced to close as a result of the Global Financial Crisis which was not the case in the United States (Baxter, 2009; Maredza & Ikhide, 2013; Ncube, 2009). However, a study to specifically address this concern is beyond the scope of this study.

1.15 Definitions

Table 1

Term:	**Definition:**
Leverage	The use of debt in a firm's capital structure (Correia et al., 2015).
Johannesburg Stock Exchange	The Johannesburg stock exchange is the largest stock exchange in Africa (JSE, 2017). It provides a platform for companies to make their shares available for trading on a regulated market (JSE, 2017).
Capital structure	The balance between debt and equity that a firm uses to finance their operations (Correia et al., 2015)
The Global Financial Crisis	Global economic recession mostly caused by mortgage defaults in the United States of America (Dang et al., 2014). The crisis had severe impacts on financial and non-financial

	firms leading to significant declines in global stock and credit markets (Baxter, 2009; Dang et al., 2014).
Deleveraging	When firms reduce the amount of debt forming part of their capital structure by reducing expenses and selling assets (Correiaet al., 2015).

Chapter 2 – Literature Review

Introduction

The capital structure of firms has been a contested area of finance research for many years. Initially, using the assumptions of perfect market conditions, it was proposed that there was no optimal capital structure as it had no impact on the value of a firm (Modigliani & Miller, 1958). However, relaxing these assumptions resulted in a completely different conclusion: the financing decision was found to significantly impact firm value (Modigliani & Miller, 1963). Consequently, trade-off theories were developed to determine the optimal capital structure (Kraus & Litzenberger, 1973; Modigliani & Miller, 1963).

This thinking was more recently rejected by the pecking order theory, which proposed a hierarchy when deciding on sources of finance (Myers, 1984; Myers & Majluf, 1984). Consequently, there is no single theory that explains a firm's capital structure choice completely (Harris & Raviv, 1991). However, the theories do provide insight as to the likely determinants of a firm's financing decision (Lemma & Negash, 2011).

A large body of empirical evidence has been developed across the globe in support of these various theoretical arguments about the determinants of capital structure. Although the results of these studies vary and differ across countries, it has generally been established that profitability, taxation, asset tangibility, firm size, growth opportunities and industry sector , are the most significant determinants of capital structure (de Jong, Kabir, & Nguyen, 2008; Vatavu, 2013).

However, these factors are not consistent over time and their significance is influenced by macroeconomic conditions. As financial crises are examples of acute macroeconomic stress, they are likely to have a larger impact on capital structure and its determinants. Dang, Kim and Shin (2014) for example found that the Global Financial Crisis slowed down the speed of adjustment of firms in the United States towards an optimal capital structure. Similarly, in a developing market context, Malaysian firms, were found to have reduced their debt levels in the aftermath of the 1997 Asian crisis (Piaw & Jais, 2014).

The major determinants of capital structure and the potential impact on these factors will now be considered.

2.1 Profitability

In terms of pecking order theory, profitability is expected to have a negative correlation with leverage (Myers, 1984; Myers & Majluf, 1984). Trade-off theory predicts a positive correlation between profitability and leverage (Barclay & Smith, 1999; Titman & Wessels, 1988). The majority of empirical evidence shows that profitability has a negative correlation with leverage (Bevan & Danbolt, 2002; Rajan & Zingales, 1995). This negative correlation has been found in South African studies (Lemma & Negash, 2011). However, depending on how leverage is defined and the country of study, a positive correlation has been seen (Titman & Wessels, 1988). One would expect the effects of the financial crisis to reduce the profitability of South African firms and would therefore lead to an increase in leverage.

2.2 Taxation

As interest expense is tax deductible in South Africa (Correia et al., 2015), trade-off theory would predict a positive correlation between taxation and leverage (Modigliani & Miller, 1963). However, empirical evidence mostly depicts either a negative correlation between taxation and leverage or no correlation (Barclay & Smith, 1999; Deesomsak, Paudyal, & Pescetto, 2004). This negative correlation has been found in South African studies, (Mouton & Smith, 2016; Negash, 2002) raising the question as to whether the taxation variable has been appropriately defined (Lemma & Negash, 2011). One would expect the financial crisis to have reduced the significance of tax shields for firms as lower profitability reduces the amount of tax payable.

2.3 Asset tangibility

Trade-off theory predicts a positive correlation between asset tangibility and leverage but pecking order theory's prediction is indeterminate as valid arguments exist for both a positive and negative correlation (Frank & Goyal, 2009). Empirical evidence has found mostly a positive correlation but a negative correlation has been observed depending on how leverage is defined and the country of study (Bevan

& Danbolt, 2002; de Jong et al., 2008; Mouton & Smith, 2016; Rajan & Zingales, 1995). Prior South African studies have been inconclusive as both no correlation and a positive correlation have been found (Lemma & Negash, 2011; Mouton & Smith, 2016).

One would expect banks to tighten their lending as a result of the increased risk of default caused by the financial crisis. Firms with a larger tangible asset base have a higher probability of being able to obtain debt financing. The reason being that tangible assets can be provided as collateral in exchange for the financing making the arrangement less risky for debt lenders (de Jong et al., 2008).

2.4 Firm size

The trade-off theory predicts a positive correlation between firm size and leverage (Barclay & Smith, 1999). However, in terms of pecking order theory, a negative correlation between leverage and firm size is expected (Rajan & Zingales, 1995; Titman & Wessels, 1988). Empirical evidence has mostly found a positive relationship between leverage and firm size (Barclay & Smith, 1999; Deesomsak et al., 2004). However, a positive and negative correlation has been seen depending on how leverage is defined and the country of study (Bevan & Danbolt, 2002; de Jong et al., 2008; Rajan & Zingales, 1995; Titman & Wessels, 1988). However, prior South African studies have not found firm size to be a significant determinant of capital structure (Lemma & Negash, 2011; Mouton & Smith, 2016).

One would expect banks to tighten their lending as a result of the increased risk of default brought on by the financial crisis. Banks would view larger firms as less risky since larger firms are usually diversified and fail less often (Rajan & Zingales, 1995). Therefore, the size of the firm would influence the likelihood of that firm obtaining debt financing[2].

[2] It is interesting to note that no prior literature considers, or controls for, the possibility that no changes in firm leverage levels arise simply due to all of the firm's financing needs having been met by a single, large loan in a prior period. This is beyond the scope of this thesis but may be an interesting area for future research.

2.5 Growth opportunities

Based on trade-off theory, growth and leverage are expected to exhibit a negative correlation; whereas pecking order predicts a positive correlation (Barclay & Smith, 1999; Jensen & Meckling, 1976; Myers, 1984; Myers & Majluf, 1984; Titman & Wessels, 1988). Empirical evidence has found both a positive correlation (Bevan & Danbolt, 2002) and negative correlation (Barclay & Smith, 1999). The empirical results have also been found to be sensitive to the definition of leverage and the country of study (Bevan & Danbolt, 2002; de Jong et al., 2008; Deesomsak et al., 2004; Rajan & Zingales, 1995). However, prior South African studies did not find growth opportunities to be a significant determinant of capital structure (Lemma & Negash, 2011; Mouton & Smith, 2016). One would expect the financial crisis to reduce growth opportunities for firms in South Africa as expectations about future economic growth deteriorated (Baxter, 2009).

2.6 Industry sector

A further determinant of capital structure is the industry sector that a firm operates within. Firms operating in the same industry face similar pressures and challenges (Brander & Lewis, 1986). These pressures could ultimately influence their financing decisions. As a result of these pressures, a firm's leverage level has been found to be a function of the average median leverage of the applicable industry in which the firm operates (Lemma & Negash, 2011). Depending on the industry, there could be either a positive or a negative correlation between leverage and the industry sector.

The financial crisis had varying impacts across different industries. Some industries were affected far worse than others (Baxter, 2009; Padayachee, 2012). In particular, South African industries such as mining and financial services were more severely impacted by the crisis (Baxter, 2009; Padayachee, 2012). However, the adverse macroeconomic impacts of the crisis would be expected to impact all industry sectors in South Africa to some degree[3].

[3] While there is no specific theory in the finance literature explaining this, organisational studies may have a possible answer in isomorphism. This theory considers the mimetic behaviour of one entity copying another to, for example, appear legitimate (Lieberman & Asaba, 2006). This could potentially be applicable by analogy in this circumstance. This is an area for future research

The above information relating to the determinants, their relationship with leverage as well as the potential impact of the crisis on the determinants is summarised in the table below:

Table 2: Summary of the determinants of capital structure

Capital structure determinants	**Predicated correlation between the determinants and leverage**	**Correlation supported by empirical evidence**	**Implications of the financial crisis**
Profitability	Pecking order theory predicts a negative correlation whereas trade-off theory predicts a positive correlation.	The vast majority of empirical evidence supports a negative correlation.	Reduced firm profitability leading to an increase in leverage.
Taxation	A positive correlation is predicted by trade-off theory.	Empirical evidence finds either a negative correlation or no correlation.	Tax shields may lose significance due to lower firm profits. Moreover, firms may operate at an assessed loss due to a crisis and thus, the tax shield will lose significance.
Asset tangibility	A positive correlation is predicted by trade-off theory.	Empirical evidence points towards a positive correlation.	Since tangible assets can be provided as collateral in exchange for debt, their significance is expected to

			increase as a result of tighter bank lending conditions.
Firm size	Trade-off theory predicts a positive correlation whereas pecking order theory predicts a negative correlation.	Empirical evidence points towards a positive correlation.	Due to tighter lending conditions and a higher risk of default, banks would be more inclined to provide financing to larger firms.
Growth opportunities	Trade-off theory predicts a negative correlation whereas pecking order theory predicts a positive correlation.	Empirical evidence exists that supports both predictions.	To reduce future growth opportunities for firms.
Industry sector	Both a positive and negative correlation.	Empirical evidence points towards firms operating at the average median level of leverage of their industry.	Some industries may be worse off than others but ultimately, every industry will be affected to some degree.

2.7 The financial crisis and capital structure

There has been limited research on the impact of the financial crisis on firm's capital structure choices. Five major studies have been identified that specifically look at the potential impact of the financial crisis on the firm's financing decision. These studies were undertaken in the United States of America (Harrison, Widjaja, & others, 2014), The United Kingdom, France and Germany (Iqbal & Kume, 2015),

Vietnam (Trinh & Phuong, 2015), Romania (Vatavu, 2013) and South Africa (Mouton & Smith, 2016). The results of these five studies will be discussed below.

2.8 The United States of America: Harrison, Widjaja, and others, 2014

The United States of America was used as the country of study since the country is seen as the epicentre of the crisis (Harrison et al., 2014). The study focused on those firms that are listed on the S&P 500 index. However, any firms forming part of the financial or utilities sector were excluded due to the various legislative requirements which impact their financing decisions (Harrison et al., 2014).

This study focused on the potential impact of the crisis on the determinants of capital structure and whether these determinants differ when comparing the pre-and post-crisis periods. Should there be any changes in the determinants across the two periods, then these changes could potentially be linked to the impact of the crisis.

The study found that there were differing levels of significance across determinants when comparing the pre- and post-crisis periods. Asset tangibility and growth opportunities were found to exhibit a far greater level of significance in the post-crisis period than compared to the pre-crisis period (Harrison et al., 2014). The stronger influence of growth opportunities in the post-crisis period was attributed to the preference of firms towards the use of debt financing (Harrison et al., 2014).

This preference towards debt financing would also explain why asset tangibility exhibited a greater level of significance in the post-crisis period. Tangible assets can be used as collateral in exchange for debt financing. Therefore, if firms have a larger tangible asset base, then these firms would be expected to raise more debt finance easily and the results of this study support this claim (de Jong et al., 2008; Harrison et al., 2014).

The study also found that profitability exhibited a greater level of significance in the pre-crisis period when compared with the post-crisis period. This loss in significance could be linked to the fact that firms tend to experience a decline in profits during periods of economic crises. These lower profits would mean that the use of profitability as an internal source of finance would be greatly reduced. This further validates the claim that firms appeared to favour debt financing in the post crisis period (Harrison

et al., 2014). Thus, it appears that the crisis had an impact on the determinants of capital structures of firms listed on the S&P 500 index.

2.9 Germany, France and The United Kingdom: Iqbal and Kume, 2015

This study incorporated firms from three different countries namely France, The United Kingdom and Germany. The firms forming part of the sample were those firms that were listed, the London Stock Exchange, Euronext Paris and the Frankfurt Stock Exchange along with the exclusion of any firms operating in the financial or utility sector as was the case in Harrison et al. (2014).

In order to assess the impact of the crisis on the capital structure of the sampled firms, a dummy variable was used to control for the effects of the crisis and the significance of the dummy variable was analysed (Iqbal & Kume, 2015). Additionally, this study did not look at the change in capital structure determinants across the pre-crisis, crisis and post-crisis periods as was the case in Harrison et al. (2014).

The results of this study found the crisis to have had a significant impact on the capital structures of firms in Germany and the United Kingdom whereas the crisis was not found to significantly impact French firms (Iqbal & Kume, 2015). Firms in Germany and the United Kingdom were found to have higher levels of leverage during the crisis period when compared to the period before the crisis (Iqbal & Kume, 2015). These leverage levels were also found to have decreased in the post-crisis period when compared with the crisis period (Iqbal & Kume, 2015). This further validates the apparent trend of firms turning to debt financing in times of economic crisis.

2.10 Vietnam: Trinh and Phuong, 2015

Vietnam (a developing country) firms listed on either the Hanoi Stock Exchange or the Ho Chi Minh Stock Exchange were used in this study (Trinh & Phuong, 2015). However, firms operating in the financial services sector were excluded from the sample as was the case in Harrison et al. (2014) as well as Iqbal and Kume (2015).

Following precedent with Iqbal and Kume (2015), a dummy variable was used to control for the effects of the Global Financial Crisis. Therefore, the significance of this dummy variable was assessed in order

to determine whether the crisis had a significant impact on the capital structures of Vietnam firms (Trinh & Phuong, 2015). Furthermore, this study did not compare the determinants of capital structure before, during and after the crisis as was the case in Harrison et al. (2014).

The results of this study show that the levels of leverage of Vietnam firms did not change significantly over the Global Financial Crisis period implying that the crisis was insignificant in relation to the capital structure of Vietnam firms.

2.11 Romania: Vatavu, 2013

Vatavu (2013) explored the potential impact of the financial crisis on the capital structure choices of firms in Romania (a developing country). The study focussed on a variety of firms across differing sectors that are listed on the Bucharest Stock Exchange (Vatavu, 2013).

As was the case in Harrison et al. (2014), this study analysed the capital structure determinants across the pre- and post-crisis periods. The determinants were then compared across the periods to identify whether any determinants experienced changes in significance across the periods. Any changes could potentially be linked to the impact of the crisis.

A dummy variable was used to control for the effects of the financial crisis (Vatavu, 2013). Should the dummy variable be found to be significant, then this would mean that there has been a significant change in the capital structure levels (dependent variable) of Romanian companies over the period of study. Therefore, to investigate the potential impact of the crisis on firms financing decisions, two approaches were followed.

The results of the study found that the dummy variable representing the financial crisis was insignificant (Vatavu, 2013). It was also found that although the significant capital structure determinants differed across industry sectors, the level of significance of the various determinants did not differ across the pre- and post-crisis periods (Vatavu, 2013). However, it was found that when Romanian firms experienced lower profitability in the post-crisis period, debt financing was obtained in order to meet the financing requirements of these firms (Vatavu, 2013). This trend of firms leaning towards debt

financing in the face of lower profitability being experienced in periods of crises was also seen in Harrison et al. (2014).

2.12 South Africa: Mouton and Smith, 2016

This study, focusing on the top 40 JSE listed firms in South Africa, mirrored the approaches in Vatavu (2013) when investigating the impact of the financial crisis on capital structure. The first approach involved the use of a dummy variable to represent the financial crisis (Mouton & Smith, 2016). Should the variable be found to be significant, then this would mean that there was a significant change in the capital structure of the top 40 JSE listed firms in the periods prior to, during and after the crisis[4]. This change in leverage levels would illustrate the impact of the crisis on the firm's financing decision.

The results of the study found the dummy variable representing the crisis to be insignificant (Mouton & Smith, 2016). This lack of significance meant that the top 40 JSE listed companies did not alter their capital structures in the periods prior to, during and after the crisis (Mouton & Smith, 2016). Thus, as a result of the lack of change in the capital structures of the firms that formed part of the study, it was concluded that the crisis was insignificant in relation to the firms financing decision (Mouton & Smith, 2016).

However, the crisis may have impacted the determinants of the sample firm's capital structure. Therefore, the second approach focused on identifying the significant capital structure determinants and ascertaining as to whether these determinants lost their significance during and after the crisis when compared with their significance before the crisis (Mouton & Smith, 2016). Any changes in significance could potentially be seen as an indirect impact of the financial crisis on the financing decision of the sampled firms.

The results of this approach showed that profitability exhibited significance before the crisis but this significance was lost during and after the crisis (Mouton & Smith, 2016). This change in significance

[4] Note: this study did not specify what, nor how, they defined their respective periods of pre-, during and, post-crisis.

was linked to the fact that firms profits usually decline in periods of economic crises. As a result of this decline in profits, the ability of a firm to use profits as an internal source of finance diminishes which explains the loss of significance (Mouton & Smith, 2016).

Moreover, asset tangibility was found to have increased in significance during and after the financial crisis when compared to before the crisis (Mouton & Smith, 2016). This increase in significance can be linked to the fact that tangible assets can serve as collateral in exchange for debt financing (Mouton & Smith, 2016). This importance increases considering that profits are usually lower in periods of crises meaning debt financing may become essential due to a lack of internal funds.

2.13 Common factors across the five studies

When looking at the change in determinants across the periods, Mouton and Smith (2016) as well as Harrison et al. (2014), found similar results in terms of profitability and asset tangibility. Profitability was found to have lost significance in the post-crisis period whereas asset tangibility was found to exhibit increased significance in the same period. The loss of significance in profitability was linked to the decrease in profits caused by the crisis and thus, the decrease in firm reliance on internal financing sources. This would mean that firms may need to take on additional debt to meet their financing requirements. Thus, asset tangibility would be expected to increase in significance since tangible assets can be provided as collateral in exchange for debt. The increase in the significance of asset tangibility was seen in the results and thus, validates this claim. Furthermore, three of the studies discussed above have seen some sort of decrease in the level of profits in the post-crisis period even though the studies may have shown differing levels of significance.

Additionally, the significance of the Global Financial Crisis was seen in the form of an increase in firms leverage levels during the crisis period. This can potentially be linked to firm profitability which can potentially be reduced in times of economic crisis.

The results of the five major studies have been summarised in the table below.

Table 3: Summary of results of the impact of the Global Financial Crisis on capital structure

Study:	Country:	Significance of the Global Financial Crisis in relation to capital structure:	Whether the significant determinants of capital structure before and after the crisis were different:
(Harrison et al. 2014)	United States of America	The crisis appeared to be significant as firms were found to have higher levels of debt after the crisis.	Asset tangibility and growth opportunities were of greater significance after the crisis than before. Profitability was far less significant after the crisis.
(Iqbal & Kume, 2015)	Germany, France and the United Kingdom	The crisis was significant in relation to the capital structures of firms in Germany and the United Kingdom but not French firms.	Not tested for. The study focused on assessing the impact of the crisis on leverage and not the determinants.
(Trinh & Phuong, 2015)	Vietnam	The crisis was insignificant in relation to capital structure.	Not tested for. The study focused on assessing the impact of the crisis on leverage and not the determinants.
(Vatavu, 2013)	Romania	The crisis was insignificant in relation to capital structure.	The significant determinants differed across sectors and remained the same before and after the crisis.
(Mouton & Smith, 2016)	South Africa	The crisis was insignificant in relation to capital structure.	Profitability was a significant determinant before the crisis, but this was not the case during and after the crisis. Furthermore, asset tangibility was found to be more significant during and after the crisis than compared to before the crisis.

2.14 Conclusion

Although finance theory has been inconclusive and often contradictory on capital structure, empirical studies point to some key determinants. The financial crisis had a significant impact on economic growth, interest rates, perceived financial risk and bank lending in South Africa and is therefore likely to have impacted capital structure. Moreover, the significance of key determinants of capital structure such as profitability, asset tangibility and size are also likely to have increased as a result.

Previous empirical studies on the impact of the financial crisis on the firm's financing decision have not been conclusive. However, the previous studies appear to point towards a trend. This trend being that if firms are experiencing a reduction in their profit levels, these firms will turn to debt to meet their financing requirements. Thus, the trend points towards firms having higher levels of debt during or after the crisis when compared to their debt levels before the crisis.

Since prior literature point towards South African firms experiencing lower profits as a result of the crisis (Baxter, 2009; Padayachee, 2012), we would expect this study to unearth a similar trend in terms of an increase in firm debt levels.

Chapter 3 – Methodology

3.1 Sample and data

This study made use of panel data over a 9-year period. Data for the three-year period 2004 to 2006 constituted the 'before the Global Financial Crisis period'; data for the three-year period 2007 to 2009 constituted the 'Global Financial Crisis period' and data for the three-year period 2010 to 2012 constituted the 'after the Global Financial Crisis period'.

Originally, the after- crisis period included the years 2013 to 2016. However, during the analysis, it was noted that the results were distorted over this period as a result of another potential economic crisis as indicated by South Africa's structural decline in economic growth (see Figure 1, section 1.1). This structural decline in economic growth cannot be specifically linked to the Global Financial Crisis and therefore, to ensure focus on the research question, this period was excluded from the study. However, this period was still considered under the robustness tests in order to incorporate the potential lag effects of the Global Financial Crisis. For further details, see section 4.2.15.

For this study, the sample was made up of all the firms listed on the main board of the JSE. However, prior literature usually excludes mining firms and firms within the financial services sector from their samples. The reason for this is that their borrowing capacity, capital adequacy requirements and asset base valuation (mineral deposits and their respective rights), are subject to regulation which impacts their capital structure (Lemma & Negash, 2011). However, this study did not follow precedent by excluding mining firms and firms within financial services. The reason for this is that the financial crisis significantly impacted those firms within mining and financial services in South Africa (Baxter, 2009; Padayachee, 2012). As this study focuses on the impact of the financial crisis on a firm's capital structure, excluding those firms that were greatly impacted by the crisis would be unreasonable.

Any firms that were missing data for any year over the 9-year period were excluded for that year. Therefore, an unbalanced panel was used to carry out this study. An unbalanced panel has been used in

prior capital structure related studies (Bevan & Danbolt, 2002; Rajan & Zingales, 1995). One advantage of using an unbalanced panel is, to reiterate, the elimination of survivorship bias (Fitzgerald et al., 1998).

Prior to any statistical analysis, the final sample was made up of 171 firms across 9 different sectors, resulting in a total of 867 observations for each variable. The tables below summarise the observations in terms of sector classification and further splits this analysis across the three periods of study.

Table 4: Sample observations in terms of sector classification

Sector	**Number of observations**	**Percentage (%)**
Oil and gas	2	0.23
Basic materials	132	15.2
Industrials	249	28.7
Consumer goods	68	7.84
Healthcare	28	3.22
Consumer services	148	17.07
Financial services	161	18.6
Telecommunications	29	3.34
Technology	50	5.8
Total	**867**	**100**

Table 5: Sample observations in terms of sector classification split across the three periods of study

Sector	Number of observations during the pre-crisis period	Number of observations during the crisis period	Number of observations during the after-crisis period	Number of observations in total
Oil and gas	2	0	0	**2**
Basic materials	30	47	55	**132**
Industrials	54	92	103	**249**
Consumer goods	19	22	27	**68**
Healthcare	6	8	14	**28**
Consumer services	41	49	58	**148**
Financial services	24	54	83	**161**
Telecommunications	5	12	12	**29**
Technology	7	21	22	**50**
Total	**188**	**305**	**374**	**867**

The data required for this study was obtained from the Bloomberg database. Data was obtained to calculate certain financial ratios over the years 2004 to 2012, for the firms forming part of the sample. These ratios were used as proxies for capital structure determinants. These determinants are firm size, profitability, growth, asset tangibility as well as taxation. Financial ratios have been used in previous studies to represent capital structure determinants in order to determine the impact of those determinants on capital structure (de Jong et al., 2008; Lemma & Negash, 2011; Mouton & Smith, 2016; Vatavu, 2013).

The data obtained from this database was stored in a Microsoft Excel 2010 spreadsheet in order to calculate the required ratios. Additionally, the statistical analysis was carried out using Stata.

Prior to any statistical analysis, the data underwent the process of winsorisation. Winsorisation is a process that reduces the influence of outliers in the dataset (Martins & Persson & Idris & Czygan & Vothihong, 2017). This is done by weighting the outliers differently from the remaining data points or by eliminating the outliers entirely, should they be found to disturb the normality of the dataset (Martins & Persson & Idris & Czygan & Vothihong, 2017). Upon the completion of winsorisation, it was found that the number of observations had declined to 862 meaning that the dataset was free from substantial outliers.

3.2 Model and data analysis

The sample is made up of panel data and thus, a panel regression model was used to perform this study (Baltagi, 2005). This model was chosen as it can simultaneously account for time-series data and cross-sectional data (Baltagi, 2005). Therefore, as has been eluded to in the discussions above relating to the model, sample and data, this study followed a quantitative research approach in order to address the research question. These types of panel regression models as well as a quantitative research approach are common in previous South African capital structure studies (Lemma & Negash, 2011; Letsoenya & Negash, 2013; Mouton & Smith, 2016) and thus, a similar approach was followed in this thesis.For the analysis, the Random effects model was used along with clusters in order to create standard error estimates that take into account disturbances that exhibit autocorrelation and heteroscedasticity. (see sections 4.2 to 4.2.6 for further details as to how this model was chosen as the final model for the analysis).

The variables used for this study were the financial ratios that were discussed in the previous section (3.1). Three ratios were used as proxies for the capital structure of firms and were defined as the dependent variables. Prior literature has found that results change depending on how leverage is defined and thus, leverage requires multiple measures (Lemma & Negash, 2011). These measures of capital structure are namely total debt/total assets, long-term debt/total assets as well as short-term debt/total assets. Thus, both equations (equation one which measured the impact of the financial crisis and equation two which analysed the determinants) were run separately for each of the three leverage measures.

Financial ratios were used to represent capital structure determinants such as firm size, profitability, growth opportunities, tangibility and taxation. These determinants were defined as the independent variables or control variables for this study (de Jong et al., 2008; Vatavu, 2013).

To control for the Global Financial Crisis period (2007-2009), a coded dummy variable was used. A similar approach was carried out in previous studies that controlled for the effects of the financial crisis (Mouton & Smith, 2016; Vatavu, 2013).

However, this study differs from these previous studies as three periods are used instead of two. The 'before the Global Financial Crisis period' of 2004 to 2006 was represented by D1 (Any observation within this period was coded with a 1 whereas the remaining observations falling outside this period were coded with a 0). The 'Global Financial Crisis period' of 2007 to 2009 was represented by D2 (Any observation within this period was coded with a 1 whereas the remaining observations falling outside this period were coded with a 0). The 'after the Global Financial Crisis period' of 2010 to 2012 was represented by D3 (Any observation within this period was coded with a 1 whereas the remaining observations falling outside this period were coded with a 0).

When working with coded dummy variables, one of these dummies must be excluded from the model in order to act as comparable for the analysis of the results (Baltagi, 2005). In this case, D2 has been left as the comparable. Therefore, the results of D1 and D3 will be interpreted in comparison to D2.

The table below summarises the applicable variables:

Table 6: Variables

Variable:	**Abbreviation:**	**Proxy:**	**References:**
Leverage	LS_1-3	Total debt to total assets (LS_1), Long-term debt/Total Assets (LS_2), Short-term debt/Total assets (LS_3)	(Abor, 2005; Lemma & Negash, 2011; Mouton & Smith, 2016; Rajan & Zingales, 1995).
Before the crisis (2004-2006)	D1	Coded dummy variable	(Hidayat & Abduh, 2012; Iqbal & Kume, 2015; Mouton & Smith, 2016; Trinh & Phuong, 2015; Vatavu, 2013).

Global Financial Crisis (2007 – 2009)	D2	Coded dummy variable	(Hidayat & Abduh, 2012; Iqbal & Kume, 2015; Mouton & Smith, 2016; Trinh & Phuong, 2015; Vatavu, 2013).
After the crisis (2010-2012)	D3	Coded dummy variable	(Hidayat & Abduh, 2012; Iqbal & Kume, 2015; Mouton & Smith, 2016; Trinh & Phuong, 2015; Vatavu, 2013).
Profitability	PROF	Return on total assets (Earnings before interest and tax divided by average total assets).	(Bevan & Danbolt, 2002; Gwatidzo, Ntuli, & Mlilo, 2016; Mouton & Smith, 2016; Sogorb-Mira, 2005).
Asset tangibility	ATANG	Tangible to Total assets (where tangible assets plus intangible assets = total assets)	(Bevan & Danbolt, 2002; Lemma & Negash, 2011; Sogorb-Mira, 2005).
Firm size	SIZE	Natural logarithm of total turnover	(Bevan & Danbolt, 2002; Lemma & Negash, 2011).
Growth opportunities	GROWTH	Market to book ratio (market value of equity to book value of equity)	(Lemma & Negash, 2011; Letsoenya and Negash, 2013; Titman & Wessels, 1988) .
Taxation	TAX	Effective tax rate (ratio of taxation paid, per the cash flow statement, to EBIT)	(Lemma & Negash, 2011; Sebastian & Kransdorff, 2017).

In addition to the above variables, coded dummy variables were used to control for the influence of industry sector. Any observations falling under the applicable industry were coded with a 1 whereas the remaining observations were coded by a 0. This process was repeated for each of the nine applicable industries.

As was the case with the coded dummy variables controlling for the effects of the Global Financial Crisis, one of the sector dummy variables has been left out to act as a comparison. Consumer services

(CS) has been left out as the comparable. Therefore, the results of the Coded sector dummies will be interpreted in comparison to CS.

The table below summarises the coded sector dummy variables:

Table 7: Coded sector dummy variables

Sector:	**Coded dummy variable:**
Oil and gas	OG
Basic materials	BM
Industrials	I
Consumer goods	CG
Healthcare	HC
Consumer services	CS
Financial services	FS
Telecommunications	TE
Technology	TN

Equation 1: The impact of the Global Financial Crisis

$$\text{LEVERAGE (LS)}_{it} = \alpha + \beta 1*(\ln(\text{SIZE})) + \beta_2*(\text{TAX}) + \beta_3*(\text{ATANG}) + \beta_4*(\text{PROF}) + \beta_5*(\text{GROWTH}) + \beta_6*(\text{D1}) + \beta_7*(\text{D3}) + \beta_8\,(\text{Coded Sector dummy variables}_n) + \varepsilon_{it}$$

Where:

- i denotes the cross-sections and t denotes the time-period with i = 1...171 and t = 1...9 the yearly observations are from 2004 to 2012
- LEVERAGE (LS) represents the leverage measures (Total debt/total assets (LS_1), Long-term debt/Total assets (LS_2), Short-term debt/Total assets (LS_3)) LS = 1, 2 and 3.
- ε_{it} is the normal error term.
- D1 and D3 represent the before and after the crisis periods respectively. D2 represents the financial crisis period. D2 has been left out as the comparable as is required when working

with coded dummy variables. Therefore, the results of D1 and D3 will be interpreted in comparison to D2.

- α is the constant
- Coded Sector dummy variables representing the various industry sectors. These variables are OG, BM, I, CG, HC, FS, TE, TN. CS has been left out as the comparable as is required when working with coded dummy variables. Therefore, the results of the Coded sector dummies will be interpreted in comparison to CS.

The first equation was used to determine if the Global Financial Crisis (by making reference to D1 and D3 in comparison to D2) was statistically significant and therefore, determine whether the crisis had a significant impact on the capital structure of firms, whilst controlling for all the other major determinants of capital structure. Therefore, the following were control variables: Firm size, Taxation, Asset tangibility Profitability, Growth and Sector.

This equation was run three times in order to account for each of the three leverage measures separately.

Equation 2: Determinants of capital structure

$$\text{LEVERAGE (LS)}_{it} = \alpha + \beta_1*(\ln(\text{SIZE})) + \beta_2*(\text{TAX}) + \beta_3*(\text{ATANG}) + \beta_4*(\text{PROF}) + \beta_5*(\text{GROWTH}) + \beta 6*(\text{Coded Sector dummy variables}_n) + \varepsilon_{it}$$

Where:

- i denotes the cross-sections and t denotes the time- period with i = 1...171 and t = 1...9 the yearly observations are from 2004 to 2012.
- LEVERAGE (LS) represents the leverage measures (Total debt/total assets (LS_1), Long-term debt/Total Assets (LS_2), Short-term debt/Total assets (LS_3) LS = 1, 2 and 3.
- ε_{it} is the normal error term.
- α is the constant
- Coded Sector dummy variables representing the various industry sectors. These variables are OG, BM, I, CG, HC, FS, TE, TN. CS has been left out as the comparable as is required when

working with coded dummy variables. Therefore, the results of the Coded sector dummies will be interpreted in comparison to CS.

The second equation was used to determine which of the capital structure determinants were significant. Therefore, the independent variables were as follows: Firm size, Taxation, Asset tangibility Profitability, Growth and Sector.

This equation was run separately for each of the three periods. These three periods being the "before, during and after the financial crisis" periods. This allowed the researcher to compare the significance and magnitude of the different capital structure determinants over the three periods. This equation was run three times in order to account for each of the three leverage measures separately.

3.3 Validity and reliability

This study involves the use of panel data over the periods before, during and after the financial crisis. Panel data consists of data over a period of time and thus, provides multiple observations for the same individuals included in the sample (Hsiao, 2007). Panel data has distinct advantages over cross section data as the latter restricts observations to a single point in time (Baltagi, 2005). Panel data also allows for a more accurate inference of model parameters as a result of increased sample variability and higher degrees of freedom, which is not seen in cross section data (Hsiao, 2007). In addition to this, panel data also allows for reduced collinearity across explanatory variables (Hsiao, 2007).

A linear regression model relies on certain assumptions in order for the results of the respective models to be valid (Gujarati & Porter, 2010). The presence of heteroscedasticity, multicollinearity, autocorrelation or model residuals which are not normally distributed will violate the assumptions underlying linear regression models causing the results to be misleading. Therefore heteroscedasticity, multicollinearity, autocorrelation and the normality of the dataset needs to be considered.

In order to do so, diagnostic tests were carried out as well as robustness tests in order to further confirm the validity of the results.

Chapter 4: Results

4.1 Descriptive statistics

Prior to discussing the results of the various regression models, the characteristics of the data making up this study must first be discussed. This can be done by looking at the descriptive statistics of both the dependent and independent variables. These descriptive statistics can be calculated separately for the before, during and after crisis periods to allow comparisons across the three periods forming part of this study. The descriptive statistics were calculated after the process of winsorisation (see section 3.1 above).

4.1.1 Descriptive statistics for the dependent and independent variables for the total period of study

The descriptive statistics for the dependent variables and independent variables over the entire period of study are presented in Table 8. Firstly, one can see that the descriptive statistics across the three measures of leverage vary depending on the way in which leverage is defined. This is in line with what has been found under prior research (Harris & Raviv, 1991; Lemma & Negash, 2011; Rajan & Zingales, 1995).

Looking at all three measures of leverage, it appears that the level of debt used by JSE listed companies to finance their operations is low, which is consistent with previous studies on South African firms (Correia & Cramer, 2008). Additionally, the level of total debt (0.182) on average, has decreased when compared with total debt levels in prior research (Lemma & Negash, 2011)[5].

It appears that companies listed on the JSE on average, make use of more long-term debt than short-term debt. This is in conflict with prior research which indicates that JSE companies appear to primarily make use of short-term liabilities (Lemma & Negash, 2011; Negash, 2002). The reasons for this

[5] Lemma & Negash (2011) found South African firms to have an average total debt to total assets ratio of 0.275.

difference could be due to the difference in the sample of companies as well as the difference in the period of study.

The standard deviations of all three leverage measures are relatively high. However, the standard deviation of total debt (0.142) seems to have decreased along with the lower leverage levels of JSE listed firms when compared to a prior South African study (0.239) carried out by Lemma and Negash (2011).

The standard deviation for both total debt (0.142) and long-term debt (0.106) is higher than the standard deviation of short-term debt (0.0605). Therefore, JSE firms have a much higher variation in their total and long-term debt levels when compared to their short-term debt levels. This claim is further supported by the larger range of each of these measures.

The descriptive statistics of the control variables (although some have changed since prior studies) seem reasonable. Profitability, on average (9.661), is found to be lower than what was found previously (16.7) (Gwatidzo et al., 2016). This is likely due to the poor state of the South African economy during the majority of the period under review (Baxter, 2009; Padayachee, 2012). Moreover, the standard deviation is quite large (6.87) indicating variation in firm performance over the period. This same trend is found for firm size. On average, (8.290) firms are smaller than compared to prior South African empirical evidence (14.006) (Gwatidzo et al., 2016). Again, the period of study is likely driving this.

Growth opportunities and taxation, on average, (2.445 and 28.56) are similar to prior South African empirical studies (2.206 and 21.2) (Lemma & Negash, 2011). On average, asset tangibility, (0.911) is in line with prior South African empirical evidence as well (0.887) (Sebastian & Kransdorff, 2017). It is interesting to note that this variable exhibits far less variation than the others.

Table 8: Descriptive statistics of the dependent and independent variables for the total period

Variables	Mean	Standard deviation	Minimum value	Maximum value	Number of observations
Total Debt/Total Assets (LS_1)	0.182	0.142	0.00263	0.590	862
Long-term Debt/Total Assets (LS_2)	0.106	0.106	0.000964	0.442	862
Short-term Debt/Total Assets (LS_3)	0.0688	0.0605	0.000423	0.257	862
Profitability	9.661	6.872	0.541	34.96	862
Growth opportunities	2.445	1.840	0.447	9.234	862
Asset tangibility	0.911	0.0999	0.602	1	862
Size	8.290	1.766	3.419	11.40	862
Taxation	28.56	8.726	8.063	56.59	862

4.1.2 Descriptive statistics for the dependent variables when looking at before, during and after the crisis

The descriptive statistics of the dependent variables over the entire period of study may not tell the full story in terms of debt usage by JSE listed companies. Therefore, the descriptive statistics for the before, during and after crisis periods have also been analysed. The descriptive statistics for the dependent variables split between the three periods of study are presented in Table 9.

Once again, it can be seen that JSE listed companies have a higher level of long-term debt compared to short-term debt across the three periods. It is interesting to note that the total debt level of JSE listed companies has increased across the three periods. This means that on average, JSE listed companies have taken on more debt after the financial crisis when compared with their debt levels prior to the crisis. The reason for this could be that these firms needed additional financing and were forced to make use of debt due to the negative impact of the financial crisis on equity markets and firm profitability (Baxter, 2009; Padayachee, 2012).

This increase in total debt (LS_1) is mostly as a result of firms increasing their long-term debt levels (LS_2). This is seen in the descriptive statistics. As on average, long-term debt levels have increased from 0.0859 before the crisis to 0.111 after the crisis whereas on average, short-term debt (LS_3) has decreased from 0.0698 before the crisis, slightly increasing to 0.0717 during the crisis, and then falling to 0.0659 after the crisis.

The reason for this could be that firms were reacting to increased refinancing risk and liquidity risk. The financial services sector was greatly affected by the crisis and many financial firms tightened lending standards as a result (Baxter, 2009; Padayachee, 2012). Therefore, firms may have substituted short term debt for longer term debt in order to avoid being at the mercy of financial firms calling in their short- term loans.

Moreover, companies listed on the JSE are usually larger firms, which are viewed by banks as being less risky as they are diversified and fail less often (Rajan & Zingales, 1995). This means that even

though banks were tightening their lending terms (Padayachee, 2012), JSE listed companies were likely to still have access to long-term sources of debt.

In line with this increase in debt levels, the standard deviation of long-term debt (LS_2) has increased from 0.0858 before the crisis to 0.109 after the crisis, but this is lower than the standard deviation of 0.113 during the crisis. This means that the variation of long-term debt levels across firms has widened when compared with the period before the crisis and furthermore, this level of variation was at its highest during the crisis. A potential explanation for this could be that not all the firms in the sample enjoy the same access to credit, despite their relatively large size and leverage conducive asset structure.

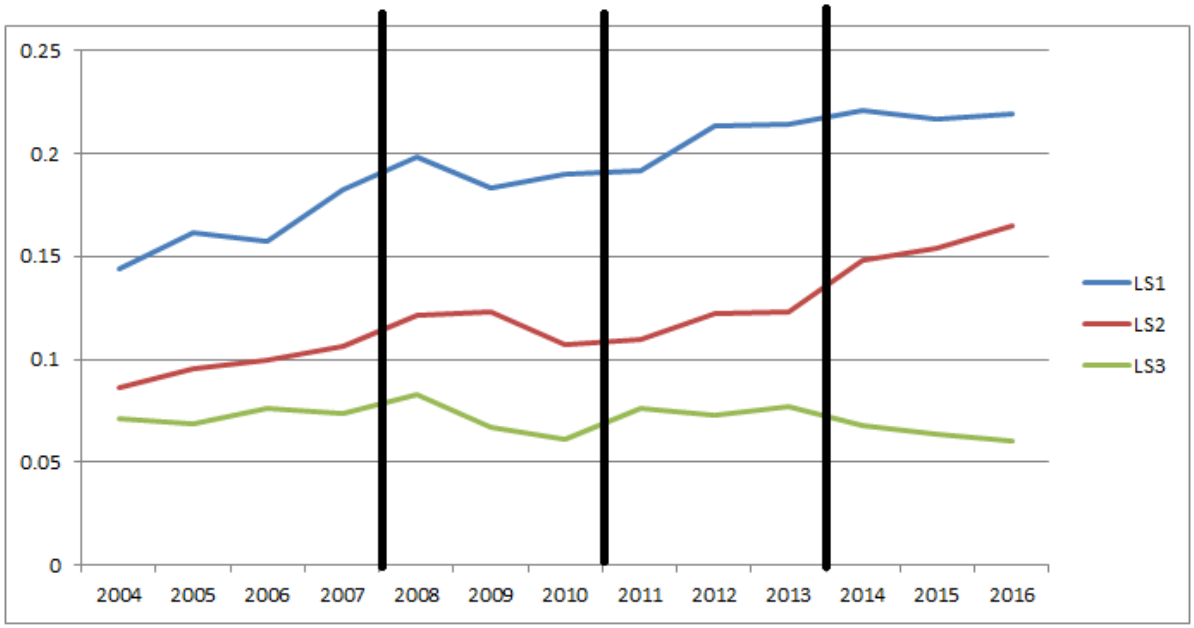
Table 9: Descriptive statistics of the dependent variables split between the three periods of study

Dependent variable	**Time period:**	**Mean**	**Standard deviation**	**Minimum value**	**Maximum value**	**Number of observations**
Total Debt/Total Assets (LS_1)	Before the crisis (2004-2006)	0.151	0.123	0.00263	0.532	203
Total Debt/Total Assets (LS_1)	During the crisis (2007-2009)	0.183	0.134	0.00708	0.512	302
Total Debt/Total Assets (LS_1)	After the crisis (2010-2012)	0.198	0.155	0.0123	0.590	357

Long-term Debt/Total Assets (LS_2)	Before the crisis (2004-2006)	0.0859	0.0858	0.000964	0.351	203
Long-term Debt/Total Assets (LS_2)	During the crisis (2007-2009)	0.114	0.113	0.00217	0.442	302
Long-term Debt/Total Assets (LS_2)	After the crisis (2010-2012)	0.111	0.109	0.00195	0.420	0.111
Short-term Debt/Total Assets (LS_3)	Before the crisis (2004-2006)	0.0698	0.0606	0.000423	0.241	203
Short-term Debt/Total Assets (LS_3)	During the crisis (2007-2009)	0.0717	0.0639	0.000741	0.257	302
Short-term Debt/Total Assets (LS_3)	After the crisis (2010-2012)	0.0659	0.0574	0.00100	0.223	357

Graph 1 below (split between the three periods) supports the analysis undertaken from the descriptive statistics across the three periods. Prior to and during the first half of the crisis period, total, long-term and short-term debt increase. Towards the end of the crisis period, total debt levels decrease, stagnate and slowly start to increase again as a result of the decline in South African economic growth rates.

The majority of the decrease in total debt levels is attributable to the decline in short-term debt. This can be seen, as long-term debt decreases at a slower rate than short-term debt towards the end of the crisis period. Long-term debt increases once more in the post-crisis period whereas short-term debt does not exhibit an increasing trend. This suggests that firms appear to be holding less short-term debt in order to manage their refinancing risk.



Graph 1: Average total, long-term and short-term debt over time

4.1.3 Descriptive statistics for the independent variables when looking at before, during and after the crisis

Descriptive statistics for the independent variables (Profitability, growth, asset tangibility, firm size and taxation) across the three periods of study are presented in five separate tables as can be seen in Appendix A. Coded variables were used to represent the dummy variables for both sector and the financial crisis. As these represent dummy variables, they have not been included in the descriptive

statistics and also, the variation of sampled firms across each sector was already discussed in section 3.1 above.

4.1.4 Profitability

It appears that the profitability of JSE listed firms has greatly declined over the period of study. Firms, on average, experienced higher levels of profitability before the crisis (11.36) whereas both during (9.962) and after the crisis (8.441), profitability was lower. This would be expected as the crisis left South Africa in recession negatively impacting major South African economic industries (Baxter, 2009). However, one would have expected a rebound in profits in the period after the crisis, but this was not the case (Although, this rebound may have been delayed. Refer to 4.2.15 robustness tests where this potential delay was explored)

Moreover, the standard deviation of profitability in the period after the crisis is 5.988. This was lower than the standard deviation in the crisis period (7.585) and the standard deviation in the pre-crisis period of 6.835. This decrease in variation means that this lower profitability was relatively widespread.

This decline in profitability further supports the fact that companies would have had to turn to debt as a source of finance to continue to finance and grow their operations (Myers, 1984; Myers & Majluf, 1984).

4.1.5 Growth opportunities

It appears that on average, growth opportunities have greatly decreased during (2.353) and after the crisis (2.294) when compared to before the crisis (2.849). This decline would once again be expected as to reiterate, the crisis left South Africa in recession negatively impacting major South African economic industries (Baxter, 2009). Furthermore, most firms were simply looking to survive the crisis meaning that growth opportunities would be expected to be limited (Baxter, 2009). In addition, there has been no rebound in growth opportunities in the period after the crisis.

4.1.6 Asset tangibility, firm size and taxation

It appears that on average, these variables have not changed drastically over the three periods. The decline in taxation could be linked to the lower profitability levels being experienced by JSE firms as discussed earlier. It must also be noted that the majority of the asset base of JSE listed firms appears to be made up of tangible assets. This could potentially explain the increase in debt levels over the three periods. With banks tightening their lending policies (Padayachee, 2012) during and after the crisis periods, one would expect firms with tangible assets that can be provided as collateral to be more likely to have access to debt financing (de Jong et al., 2008).

4.2 Regression results

4.2.1 Normality of the residuals

For a linear regression model to be used, the model residuals need to be normally distributed (Gujarati & Porter, 2010). Diagnostic tests were carried out to determine whether the residuals are normally distributed. This can be done by inspecting normal probability plots (Julie, 2013). A normality plot for each measure of leverage across both equations (a total of 6 plots) was generated in Stata. On analysis of these plots, which are presented in appendix B, it was found that the residuals approximated a normal distribution.

The skewness-kurtosis test is another way in which the assumption of normality can be tested (Gujarati & Porter, 2010). The results of the skewness-kurtosis test are presented in appendix B. The results show that the null hypothesis of normality can be accepted. This further shows that the assumption of normality, as required by a linear regression model, has been met (Gujarati & Porter, 2010).

4.2.2 Testing for multicollinearity

One of the assumptions underlying a linear regression model is that the independent variables should not exhibit correlation with one another (Gujarati & Porter, 2010). In order to test for multicollinearity amongst the independent variables, a variance inflation factor test was used. The results of this test are presented in appendix C.

As can be seen from the results, none of the independent variables realised a variance inflation factor greater than five with the mean variance inflation factor being 1.47 (Gujarati & Porter, 2010). This means that there is no multicollinearity across the independent variables.

A further diagnostic that can be used to test for multicollinearity is the use of a correlation matrix (Gujarati & Porter, 2010). Should a correlation of 0.7 or greater be realised, then this will indicate the presence of multicollinearity (Julie, 2013). The results of this test are presented in appendix C.

As no correlation of 0.7 or greater was realised, it can be concluded that multicollinearity is not present amongst the explanatory variables (Julie, 2013).

4.2.3 Testing for autocorrelation

A further assumption underlying a linear regression model is that autocorrelation amongst the disturbances should not be present (Gujarati & Porter, 2010). Autocorrelation can be defined as a mathematical representation of the degree of similarity between a given times series and a lagged version of itself over successive time periods (Gujarati & Porter, 2010). If present, autocorrelation will appear in the error terms (Gujarati & Porter, 2010).

This study makes use of the Wooldridge test, which is commonly used to detect autocorrelation in panel data (Wooldridge, 2010). The results are presented in appendix D.

The null hypothesis of the Wooldridge test is that no autocorrelation is present (Wooldridge, 2010). If the F statistic is found to be less than 0.05, then the null hypothesis will be rejected and the alternative hypothesis will be accepted (Wooldridge, 2010). The alternative hypothesis in this case is that autocorrelation is present.

The results of the Wooldridge test showed that the F statistic was less than 0.05 and thus, the null hypothesis was rejected, and the alternative hypothesis was accepted. This means that autocorrelation is present and one of the assumptions underlying a linear regression model has been violated. Therefore, it appears that the pooled ordinary least squares regression model may not be appropriate.

The Durbin Wu Hausman test is an additional method to test the appropriateness of OLS model (Chmelarova, 2007). This test looks at the coefficient of the residual. If this coefficient is significantly different from zero, then the pooled ordinary least squares regression model is not consistent and should not be used (Chmelarova, 2007).

The results of this test are presented in appendix E. As can be seen from the results, the P-value is less than 5%. This means that the pooled ordinary least squares model is not consistent (Chmelarova, 2007). Therefore, this provides further evidence suggesting that the pooled ordinary least squares model is not appropriate for this study and that a different model must be considered.

4.2.4 Fixed effects model and the random effects model

As a result of the above-discussed problems experienced with the pooled ordinary least squares regression model, both the fixed effects model and the random effects model were explored as alternative solutions. Both these models are superior in terms of dealing with panel data when compared with the pooled ordinary least squares regression model since both models address the endogeneity bias that is often present under pooled ordinary least squares (Baltagi, 2005; Hidayat & Abduh, 2012). When comparing the two models, the difference relates to the assumptions made regarding the error term (Baltagi, 2005). The fixed effects model does not take the uniqueness of the individuals forming part of the data population into account whereas the random effects model captures this individual heterogeneity within the error term (Ojah & Gwatidzo, 2009).

In order to determine whether the fixed effects model or the random effects is appropriate, the Hausman test can be used (Baltagi, 2005). When carrying out this test, reference must be made to the P-value realised from the test. Should the P-value be greater than 0.05, then the random effects model is appropriate. However, if the P-value is less than 0.05, then the fixed effects model is appropriate.

The results of the Hausman test are presented in appendix F. As can be seen from the results, P-value realised is greater than 0.05 meaning the random effects model is appropriate.

A further test that can be run to confirm the use of a random effects model instead of the pooled ordinary least squares regression model is the Breusch-Pagan Lagrange Multiplier (Baltagi, 2005). Under this

test, the null hypothesis states that the variance across entities is zero (Baltagi, 2005). Should the null hypothesis be accepted, then the pooled ordinary least squares regression model will be deemed to be appropriate (Baltagi, 2005). However, should the null hypothesis be rejected and the alternative hypothesis be accepted, then the random effects model is appropriate (Baltagi, 2005). If the prob > chi2 is less than 5 %, then the null hypothesis will be rejected (Baltagi, 2005).

This test was run for each measure of leverage and the results of this test are presented in appendix F. As can be seen from the results, the prob>chi2 is less than 5% meaning that the null hypothesis is rejected and that the random effects model is appropriate. This further shows the validity of the use of the random effects model for this study. Thus, the random effects model was run for both equations across each measure of leverage and the results are presented in appendix G.

4.2.5 Testing for heteroscedasticity

One of the assumptions underlying linear regression models, heteroscedasticity, still needs to be tested for (Gujarati & Porter, 2010). Heteroscedasticity arises when the variance of a variable is not constant from observation to observation over a period of time (Gujarati & Porter, 2010). Therefore, the random effects model cannot be confirmed as our final model until heteroscedasticity has been tested. Should heteroscedasticity be present, then this will have to be addressed.

In order to test for heteroscedasticity, the Breusch-Pagan / Cook-Weisberg test was used. Under this test, the null hypothesis states that the variance of each variable remains constant over time meaning the data is homoscedastic (Gujarati & Porter, 2010). If the Prob > chi2 is less than 5%, then the null hypothesis will be rejected meaning that heteroscedasticity is present (Gujarati & Porter, 2010). This test was run for each measure of leverage and the results are presented in appendix H.

As can be seen from the results, all the tests reported a probability of less than 5% meaning that heteroscedasticity is present. The presence of heteroscedasticity will negatively impact the validity of the results of the random effects model. Therefore, a remedy for this issue needs to be explored.

4.2.6 Final model

As autocorrelation and heteroscedasticity have been identified, they need to be addressed. In order to control for these issues, clusters can be used in order to create robust standard error estimates (Baltagi, 2005;Hoechle, 2007). Using clusters allows for standard error estimates that account for disturbances that are auto-correlated as well as heteroscedastic and therefore, controls for these anomalies (Baltagi, 2005;Hoechle, 2007). Thus, the final model used was the Random effects model together with clustered standard error estimates.

4.2.7 Results for equation 1

The purpose of equation one (refer to section 3.2) is to determine whether the financial crisis had an impact on the capital structures of JSE listed firms. Coded dummy variables have been used to represent the periods before and after the financial crisis (D1 and D3). The constant represents the period during the crisis. The results of equation one under the final model are presented in table ten below:

Table 10: Results of equation one

VARIABLES	(1) RE_LS1 (Total debt/Total Assets)	(2) RE_LS2 (Long-term debt/Total Assets)	(3) RE_LS3 (Short-term debt/Total Assets)
PROF	-0.002	-0.004***	-0.001
	(1.45067e-03)	(5.92008e-04)	(9.83301e-04)
GROWTH	0.009**	0.009***	0.004***
	(3.77694e-03)	(2.82294e-03)	(1.45018e-03)
TAX	-0.001**	-0.002***	-0.000
	(4.74804e-04)	(4.28227e-04)	(2.81675e-04)
ATANG	-0.057	-0.004	-0.008
	(3.96189e-02)	(2.62508e-02)	(1.65869e-02)
SIZE	-0.016***	-0.004***	-0.003**
	(3.80308e-03)	(1.09189e-03)	(1.54874e-03)
D1	-0.027***	-0.024***	-0.002
	(8.53308e-03)	(5.60736e-03)	(5.30021e-03)
D3	0.013	-0.011	-0.007
	(9.87881e-03)	(7.15677e-03)	(5.86748e-03)
OG	-0.197***	-0.072*	0.101**
	(2.13541e-02)	(4.15677e-02)	(4.24320e-02)
BM	0.018**	0.004	0.000
	(8.18361e-03)	(4.09513e-03)	(4.40841e-03)
I	0.055***	0.014**	0.024***
	(6.01718e-03)	(7.04581e-03)	(5.53263e-03)
CG	-0.031***	-0.036***	0.011
	(1.03310e-02)	(6.69130e-03)	(6.76734e-03)
HC	0.098***	0.058***	0.028*
	(2.47473e-02)	(2.15955e-02)	(1.58315e-02)
TE	0.112***	0.034***	-0.001
	(1.85854e-02)	(9.23709e-03)	(3.27273e-03)
FS	-0.008	-0.008	0.008
	(1.34941e-02)	(5.56111e-03)	(1.04027e-02)
TN	0.025	-0.002	0.011
	(2.71644e-02)	(2.02620e-02)	(1.15041e-02)
Constant	0.370***	0.215***	0.097***
	(3.50368e-02)	(3.08911e-02)	(2.84620e-02)
Observations	862	862	862

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

(Source:Stata)

4.2.8 The Global Financial Crisis

As has been seen in previous capital structure studies, the results vary across different measures of leverage (Harris & Raviv, 1991; Lemma & Negash, 2011; Rajan & Zingales, 1995). D1 is found to be significant at the 1% level of significance under leverage measures one and two but this significance is lost under leverage measure three. Therefore, when leverage is defined as either total debt as a

percentage of total assets or long-term debt as a percentage of total assets, a significant change in the capital structures of JSE listed firms is found to have occurred when comparing the periods before and during the crisis.

The coefficients of D1 for both measures of leverage, where significance occurs, are negative. This means that both total debt as a percentage of total assets and long-term debt as a percentage of total assets were lower in the period before the financial crisis. The reason for this could be that firms were experiencing higher profits before the crisis and had less need for debt financing (Baxter, 2009; Padayachee, 2012). This claim is supported by the descriptive statistics which showed a decrease in profits as well as an increase in both total and long-term debt over the periods of study.

D3, on the other hand, is found to be statistically insignificant. Thus, there has been no significant change in leverage in the periods during and after the crisis and firms continued to have higher debt levels than before the crisis. The reason for this could be that profitability was still under pressure after the crisis, as seen in the descriptive statistics.

Based on the regression model, the Global Financial Crisis had a significant impact on the capital structures of JSE listed firms forming part of this study. This is in line with prior empirical evidence on firms in the United Kingdom and Germany (Iqbal & Kume, 2015). However, these results contradict the results of the study carried out by Mouton and Smith (2016). Their study only looked at the top 40 firms listed on the JSE and found that the Global Financial Crisis was insignificant in relation to the capital structures of top 40 JSE listed firms. Finally, their study did not incorporate sophisticated statistical techniques to control for anomalies such as heteroscedasticity. However, as already mentioned above, the increase in debt levels during and after the crisis as a result of lower profitability is a trend that is in line with other prior international studies (Harrison et al., 2014; Vatavu, 2013).

4.2.9 Profitability

Profitability was found to be significant at the 1% level of significance under long-term debt. The coefficient for profitability with the long-term debt measure is negative. A negative coefficient indicates that the more profitable the firm, the lower the level of leverage. The impact however is quite small. For example, a 1% increase in return on assets only decreases the total debt to asset ratio by 0.4%. This

relationship is in line with what is expected under pecking order theory (Myers, 1984; Myers & Majluf, 1984). Additionally, profitability being a significant negative determinant of capital structure is in line with prior empirical findings in South Africa (Lemma & Negash, 2011; Mouton & Smith, 2016).

4.2.10 Growth opportunities

Growth opportunities were found to be significant at the 1% level of significance except under total debt where significance was found at the 5% level of significance. Additionally, the coefficients across all three measures of leverage were all positive.

The positive coefficient indicates that if a firm has an increase in opportunities for growth, then there will be an increase in the firm's level of leverage. This means that these firms will make use of debt financing to take advantage of these growth opportunities. However, the impact is found to be small. For example, an increase in the market to book ratio of 1 (a large move), will on average, only result in a 0.9% increase in the ratio of total debt to assets. This positive coefficient provides evidence in support of pecking order theories (Myers, 1984; Myers & Majluf, 1984). However, this is not in line with prior empirical studies in South Africa (Lemma & Negash, 2011; Mouton & Smith, 2016). These prior studies do not find growth to be a statistically significant determinant of capital structure.

4.2.11 Firm Size

All the size coefficients across all three measures were found to be negative. The negative coefficient indicates that the larger the firm, the lower the level of debt usage. This provides further evidence in support of pecking order theories as larger firms are expected to have higher profit levels and thus, will make use of profits instead of debt financing (Rajan & Zingales, 1995; Titman & Wessels, 1988).

However, size functioning as a significant negative determinant of capital structure is not in line with the results of prior South African studies which do not find size to be a statistically significant determinant of capital structure (Lemma & Negash, 2011; Mouton & Smith, 2016).

4.2.12 Asset tangibility

Asset tangibility was found to be insignificant across all three measures of leverage. The fact that this study finds asset tangibility to be an insignificant determinant of capital structure is in line with prior

literature (Lemma & Negash, 2011) but contradicts the findings of (Mouton & Smith, 2016) which found asset tangibility to be a statistically significant positive determinant of capital structure.

4.2.13 Taxation

Tax was found to exhibit significance at the 1% level of significance under long-term debt as well as at the 5% level under total debt. Furthermore, the coefficients exhibited a negative relationship with leverage. This negative relationship means that a firm with a higher effective tax rate will make use of less debt. The impact however is quite small. For example, increasing the effective tax rate by 1% would on average result in a 0.2% fall in the long-term debt to total assets ratio.

This negative relationship is not in line with what is predicted under trade-off theories (Modigliani & Miller, 1963). However, this negative relationship is in line with what has been found under past empirical studies (Barclay & Smith, 1999; Mouton & Smith, 2016; Negash, 2002). The reason for this negative relationship could potentially mean that the tax variable is not being defined appropriately (Lemma & Negash, 2011). This negative coefficient could also suggest that either, JSE listed firms are not taking advantage of tax shields associated with debt or these firms could instead be making use of tax shields unrelated to debt (Negash, 2001).

4.2.13 Industry sectors

Seven of the various coded dummy variables representing the industry sectors were found to exhibit significance varying from 1% to a 10% level of significance across the measures of leverage. The significance of industry sectors is not surprising. It has been found that firm leverage is a function of the average median leverage of the applicable industry that the firm operates in (Lemma & Negash, 2011). Firms operating in the same industry face the same pressures which can ultimately influence their capital structure decisions. Therefore, it is expected that the sector dummy variables exhibit some level of significance.

Moreover, the range in leverage levels across industries can be large. For example, the telecommunications (TE) sector appears to have 11.2% more total debt than the comparable consumer services (CS), while the Oil and Gas (OG) sector appears to have 19.7% less total debt than the comparable (CS).

4.2.14 Summary of the findings under equation 1

Firms were found to have lower levels of leverage in the period before the crisis when compared with the crisis period. This is correlated with reduced firm profitability implying that firms may have been forced to make use of more debt during the financial crisis to meet their financing needs. Thus, it would seem that the financial crisis had a significant impact on the capital structures of JSE listed firms.

The results for the control variables indicate that the impact of other major determinants of capital structure is largely minimal and for the most part, appear to be in line with prior studies. In order to further test the validity of the results and show that the crisis had a significant impact on the capital structures of JSE listed firms, robustness tests have been carried out.

4.2.15 Robustness tests

As was highlighted in chapter 1, the exact timing of the financial crisis impacting South Africa is uncertain and based on other international studies. The financial crisis period for the purpose of this study was designated as the period 2007 to 2009. However, the impact on South Africa may have been delayed. Moreover, it can take time for the effects of financial shocks to filter through to the real economy (Dang et al., 2014).

In order to consider the potential lag effects of the financial crisis, the time periods were shifted by one year to three years. Table eleven below summarises the years that the coded dummy variables D1, D2 and D3 will represent across the further three robustness tests:

Table 11: The time periods represented by the coded dummy variables for Robustness tests two, three and four

Coded dummy variable	**D1 (before the crisis)**	**D2(during the crisis)**	**D3(after the crisis)**	**Years excluded**
Robustness test one, years	2005,2006 and 2007	2008,2009 and 2010	2011,2012 and 2013	2004, 2014, 2015 and 2016
Robustness test two, years	2006,2007 and 2008	2009,2010 and 2011	2012,2013 and 2014	2004, 2005, 2015 and 2016
Robustness test three, years	2007,2008 and 2009	2010,2011 and 2012	2013,2014 and 2015	2004, 2005, 2006 and 2016

4.2.16 Robustness test one

Table 12: One-year lag

VARIABLES	(1) RE_1 (Total debt/Total Assets)	(2) RE_2 (Long-term debt/Total Assets)	(3) RE_3 (Short-term debt/Total Assets)
PROF	-0.002	-0.003***	-0.000
	(1.06612e-03)	(9.65322e-04)	(5.90840e-04)
GROWTH	0.005	0.004	0.004**
	(3.52901e-03)	(2.84564e-03)	(1.68553e-03)
TAX	-0.000	-0.000	-0.000
	(5.18347e-04)	(3.92013e-04)	(2.51749e-04)
ATANG	-0.226**	-0.156**	0.024
	(9.57322e-02)	(7.41068e-02)	(3.31083e-02)
SIZE	-0.004	0.006	-0.003
	(5.96970e-03)	(4.36872e-03)	(2.17923e-03)
D1	-0.021*	-0.012*	0.001
	(1.05789e-02)	(7.16794e-03)	(4.43342e-03)
D3	0.000	-0.013**	0.002
	(6.68648e-03)	(6.01027e-03)	(4.06363e-03)
OG	-0.171***	-0.088***	0.038***
	(2.92881e-02)	(2.21480e-02)	(1.22659e-02)
BM	-0.013	-0.028	-0.006
	(2.72904e-02)	(2.14262e-02)	(1.19867e-02)
I	0.019	-0.024	0.020*
	(3.11779e-02)	(2.25671e-02)	(1.09801e-02)
CG	-0.061**	-0.063***	-0.003
	(2.84817e-02)	(2.04001e-02)	(1.25030e-02)
HC	0.019	0.002	0.018
	(4.68126e-02)	(3.62715e-02)	(2.04029e-02)
CS	-0.022	-0.027	-0.018
	(3.45972e-02)	(2.23364e-02)	(1.17135e-02)
TE	0.006	-0.053	-0.017
	(8.39882e-02)	(3.48864e-02)	(1.41047e-02)
FS	0.003	-0.007	0.002
	(1.10712e-02)	(9.44227e-03)	(7.19073e-03)
TN	0.019	0.000	0.006
	(1.51094e-02)	(1.41267e-02)	(9.32069e-03)
Constant	0.449***	0.259***	0.064*
	(9.34104e-02)	(6.99758e-02)	(3.28543e-02)
Observations	928	928	928

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

(Source:Stata)

This section addresses the results of robustness test one.

Once again, D1 was found to be significant when leverage is defined in terms of total and long-term debt. However, the significance is now at 10% compared to the 1% level of significance originally found under equation 1.

The coefficients of D1 remained negative but the size of the coefficients decreased when compared with the coefficients of equation one, meaning that the impact is slightly smaller when the crisis is lagged by one year. Furthermore, the negative coefficients mean that debt levels are lower in 2005 to 2007 than in 2008 to 2010. This mirrors the result of the original model.

However, D3 was found to be significant at the 5% level under leverage measure two and the coefficient was found to be negative meaning that firms held less long-term debt in the period after the crisis than compared to the period during the crisis. This finding supports the fact that there was a rebound in South African economic growth, as can be seen in the figure 1 under section 1.4, indicating the potential for an improvement in firm profitability.

The results of robustness test one show that even if the effects of the crisis were felt one year later than originally expected, D1 still exhibits significance, but to a lesser degree and D3 becomes significant but the negative coefficient indicates deleveraging.

4.2.17 Robustness test two

Table 13: Two-year lag

VARIABLES	(1) RE_1 (Total debt/Total Assets)	(2) RE_2 (Long-term debt/Total Assets)	(3) RE_3 (Short-term debt/Total Assets)
PROF	-0.002**	-0.004***	-0.001
	(1.04278e-03)	(9.57498e-04)	(6.39834e-04)
GROWTH	0.003	0.002	0.004**
	(3.14754e-03)	(2.39019e-03)	(1.60817e-03)
TAX	-0.001*	-0.001	-0.000
	(5.35162e-04)	(4.15967e-04)	(2.41627e-04)
ATANG	-0.265***	-0.128**	-0.002
	(7.51439e-02)	(5.86204e-02)	(3.08692e-02)
SIZE	0.003	0.006	-0.000
	(5.62950e-03)	(3.93788e-03)	(2.05879e-03)
D1	0.001	0.007	0.009**
	(7.79970e-03)	(6.08448e-03)	(4.51167e-03)
D3	0.007	0.001	0.002
	(6.53552e-03)	(5.65900e-03)	(3.77415e-03)
o.OG[6]	-	-	-
BM	-0.022	-0.040*	-0.004
	(2.71472e-02)	(2.14340e-02)	(1.11293e-02)
I	0.009	-0.037*	0.018*
	(2.94927e-02)	(2.13047e-02)	(1.01584e-02)
CG	-0.043	-0.053**	0.004
	(3.16212e-02)	(2.37140e-02)	(1.20595e-02)
HC	-0.016	-0.002	0.004
	(4.33143e-02)	(3.47730e-02)	(1.69722e-02)
CS	-0.024	-0.032	-0.017
	(3.26259e-02)	(2.13359e-02)	(1.11575e-02)
TE	-0.001	-0.056	-0.016
	(8.95047e-02)	(3.61919e-02)	(1.25960e-02)
FS	0.005	-0.010	0.003
	(1.00417e-02)	(9.14649e-03)	(6.82071e-03)
TN	0.028*	0.007	0.008
	(1.44546e-02)	(1.46208e-02)	(8.86540e-03)
Constant	0.453***	0.249***	0.069**
	(7.64917e-02)	(6.18568e-02)	(3.19793e-02)
Observations	999	999	999

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

(Source:Stata)

[6] There were no observations for OG over the period 2006-2014 and thus, the sector dummy has been excluded.

4.2.18 Robustness test three

Table 14: Three-year lag

VARIABLES	(1) RE_1 (Total debt/Total Assets)	(2) RE_2 (Long-term debt/Total Assets)	(3) RE_3 (Short-term debt/Total Assets)
PROF	-0.002**	-0.004***	-0.001
	(1.02815e-03)	(9.00668e-04)	(6.61852e-04)
GROWTH	0.005*	0.003	0.004**
	(2.91125e-03)	(2.25000e-03)	(1.55665e-03)
TAX	-0.001**	-0.001*	-0.000
	(4.26676e-04)	(3.34872e-04)	(2.13898e-04)
ATANG	-0.217***	-0.125*	0.008
	(7.25756e-02)	(6.54654e-02)	(2.54947e-02)
SIZE	0.001	0.005	-0.000
	(5.10241e-03)	(4.00735e-03)	(1.94947e-03)
D1	0.003	0.017***	0.005
	(6.88963e-03)	(6.20731e-03)	(4.35178e-03)
D3	0.003	0.006	-0.000
	(7.72732e-03)	(6.03645e-03)	(4.00761e-03)
OG[7]	0.094***	0.149***	-0.046***
	(2.65970e-02)	(2.14599e-02)	(1.00804e-02)
BM	-0.029	-0.051**	-0.005
	(2.69996e-02)	(2.22107e-02)	(1.08014e-02)
I	0.002	-0.047**	0.017*
	(2.80705e-02)	(2.06974e-02)	(9.54391e-03)
CG	-0.031	-0.046	0.005
	(3.21929e-02)	(2.97069e-02)	(1.16766e-02)
HC	-0.008	-0.012	0.008
	(4.57086e-02)	(3.33964e-02)	(1.92326e-02)
CS	-0.028	-0.046**	-0.014
	(3.02687e-02)	(2.09591e-02)	(1.05576e-02)
TE	-0.008	-0.071*	-0.017
	(8.49368e-02)	(3.84861e-02)	(1.22655e-02)
FS	0.001	-0.008	0.003
	(1.04519e-02)	(8.60426e-03)	(6.03604e-03)
TN	0.032**	0.012	0.005
	(1.60567e-02)	(1.48404e-02)	(8.61448e-03)
Constant	0.426***	0.264***	0.059**
	(7.66352e-02)	(6.87601e-02)	(2.89016e-02)
Observations	1,072	1,072	1,072

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

(Source:Stata)

[7] There was an observation for OG in the dataset for 2015 and thus, the sector dummy has been included once again.

This section addresses the results of robustness tests two and three.

Under robustness test two and three, the results change dramatically. For robustness test two, D1 is only significant under short-term debt at the 5% level of significance and positive. D3 has lost significance altogether. Robustness test three finds D1 to be significant at the 1% level of significance under long-term debt and positive, along with D3 being insignificant.

This means that the original results which indicate that debt increased during the crisis are period specific. The dummy variables representing the crisis period only exhibit significance and the expected sign under the original crisis period and when the effects of the crisis are lagged by one year. Therefore, this robustness tests further shows the validity of the original results.

4.2.19 Additional robustness test (stationarity test)

As was discussed under section 1.10, the results of this study could be used to create policies and tools to assist firm in times of financial distress. Therefore, in order to determine whether the data is stable and thus, able to be used for policy making, a stationarity test was performed (Baltagi, 2005). The results of the stationarity test are presented in appendix I.

The null hypothesis of the stationarity test is that all the panels contain a unit root and thus, the data is non-stationary (Baltagi, 2005). As can be seen from the results, the P-values are all less than 0.01. Therefore, we can reject the null hypothesis at the 1% level of significance and accept the alternative hypothesis that the panel is free from unit roots (Baltagi, 2005). Thus, the data is stationary and can be used for policy making (Baltagi, 2005). Coded dummy variables cannot be tested for unit roots and thus, were not included in the stationarity test (Baltagi, 2005).

4.2.20 Concluding on the results of equation 1

Based on the results of equation one as well as the robustness tests, it can be seen that the crisis had a significant impact on the capital structures of JSE listed firms. The impact of the crisis points towards an increase in the use of debt by firms to meet their financing needs and fill the gap caused by lower levels of profitability. Also, the one-year lag indicates that after the crisis period, firms started to deleverage as the economy started to rebound meaning the need for debt financing was reduced.

However, the crisis may have had an indirect impact on leverage as well. Under equation one, it was assumed that the determinants of capital structure stay the same across the entire time series. Perhaps the crisis altered the determinants that influence the firm's financing decision.

The purpose of equation two is to investigate this potential change in capital structure determinants in order to provide additional insight as to the mechanism through which leverage increased during the crisis.

4.2.21 Results for equation 2

The potential indirect impact of the crisis is explored by looking at the significant determinants of capital structure to see if there was any change in these determinants across the three periods. If the determinants are found to differ after the crisis when compared to those that were significant before and during the crisis, one could potentially link this change in determinants to the impact of the financial crisis thus, further showing the significant impact of the financial crisis on capital structure.

As explained in chapter three, the second equation drops the coded dummy variable representing the financial crisis as the purpose of this equation is to look at the determinants of capital structure as highlighted in prior literature. The equation is run separately for each of the three, time periods which are 2004 to 2006 (before the crisis), 2007to 2009 (during the crisis) and 2010 to 2012 (after the crisis). The results for the three periods are presented in Appendix K with the discussion on the results presented below:

4.2.22 Profitability

In the periods before and during the crisis, profitability was significant at the 1% level under long-term debt. However, in the 'after the crisis' period, profitability was significant at the 1 % level for all three measures of leverage. Moreover, the coefficient has become more negative during and after the crisis.

The results indicate that profitability became even more significant and a larger driver of capital structure after the crisis than it was before the crisis. This result is not in line with prior literature which found profitability to lose significance after the crisis (Harrison et al., 2014; Mouton & Smith, 2016). This confirms the finding of the previous section that the decrease in profitability had a large impact on the increase in leverage during the crisis.

4.2.23 Firm Size

Size became more significant in the periods during and after the crisis than compared to the period before the crisis. Before the crisis, size was only significant at the 1% level under short-term debt. However, during and after the crisis, size was significant at the 1% level under both total debt and long-term debt. Moreover, the coefficients remained negative across all three periods. Under total debt, the coefficient became more negative (-0.004 to -0.010 to -0.027) as the periods changed whereas the coefficients across the other two leverage measures remained fairly constant over the three periods. In prior literature, size was not found to be a statistically significant meaning this result is not in line with prior literature (Harrison et al., 2014; Mouton & Smith, 2016).

The negative coefficient could be explained by the fact that larger firms are more likely to generate more free cash flow (through economies of scale and maturity) and therefore, require less debt (Killi, Rapp, & Schmid, 2011). This could indicate that larger firms weathered the crisis better and did not need to resort to debt financing.

4.2.24 Asset tangibility

Asset tangibility is found to be significant before and after the crisis, but this significance is lost during the crisis. Before the crisis, asset tangibility was significant at the 5% level under both total and short-term debt. After the crisis, asset tangibility was found to exhibit significance at the 1% level under long-term debt as well as at the 5% level under short-term debt. However, in the period after the crisis, asset tangibility exhibited a positive coefficient under long-term debt whereas the coefficients remained negative whenever asset tangibility was found to be significant.

The significance of asset tangibility in the period after the crisis as well as the positive coefficient under long-term debt is in line with prior literature (Harrison et al., 2014; Mouton & Smith, 2016). However, the negative coefficients are not in line with prior literature (Harrison et al., 2014; Mouton & Smith, 2016).

The positive coefficient found in the after- crisis period indicates that the higher the level of tangible assets, the higher the level of long-term debt. The explanation for this could be that tangible assets were used as collateral in exchange for long-term debt (de Jong et al., 2008).

The negative coefficient means that the higher the level of tangible assets, the lower the level of debt. This is not anticipated as one would expect that asset tangibility would exhibit a positive coefficient since tangible assets can be provided as collateral in exchange for debt (de Jong et al., 2008). A potential explanation could be that the firms forming part of this study are large JSE listed firms. This could mean that these firms are viewed as a less risky investment by banks meaning, providing collateral in exchange for debt may not be as important. Moreover, a large percentage of the assets of these firms are tangible meaning there is limited variability in terms of this measure.

4.2.25 Taxation

The tax variable becomes far more significant in the period after the crisis than when compared with the before and during periods. Previously, the tax variable was significant but in the after-crisis period, significance was found across all three leverage measures ranging from the 5% to the 1% level. This significance is not in line with prior literature (Harrison et al., 2014; Mouton & Smith, 2016). As the tax variable may not be appropriately defined (Lemma & Negash, 2011), this makes it difficult to comment on the implications of the increase in the significance of this variable.

4.2.26 Growth opportunities

The growth variable was initially significant in the period before the crisis, but this significance was lost during the crisis. Before the crisis, growth was to be significant at the 1% level under both long-term and short-term debt. The reason for this loss of significance during the crisis could be that the crisis left the economy in recession meaning there would likely have been minimal opportunities for growth (Baxter, 2009; Padayachee, 2012).

However, the growth variable became significant once again in the period after the crisis. After the crisis, growth was significant at the 1% level for all three measures of leverage. The potential reason for this could be that after the crisis, as markets started to recover as was indicated by the rebound in the South African economic growth rate (figure 1, section 1.4), there were further opportunities for growth. The coefficient of growth opportunities became more positive in the period after the crisis than when compared to the period before the crisis. Growth opportunities being identified as a significant

determinant of capital structure is not in line with prior literature (Harrison et al., 2014; Mouton & Smith, 2016).

4.2.27 Industry sectors

The various coded dummy variables representing the industry sectors were found to exhibit significance varying from 1% to a 10% level across the measures of leverage. The significance of industry sectors is not surprising. It has been found that firm leverage is a function of the average median leverage of the applicable industry that the firm operates in (Lemma & Negash, 2011). Firms operating in the same industry face the same pressures which can ultimately influence their capital structure decisions.

Furthermore, different sectors would have been affected differently by the consequences of the crisis. Financial services and mining in particular were greatly affected by the crisis (Baxter, 2009). This is further supported by the results of equation two as both basic materials and financial services had higher levels of leverage (as indicated by the change in coefficients) in the crisis period than compared to both the before and after periods. Therefore, it is expected that the sector dummy variables exhibit some level of significance across the three periods as different industries faced different challenges as a result of the crisis.

4.2.28 Summary of the results of equation 2

Profitability was found to become even more significant in the aftermath of the crisis period. Another notable change was that growth opportunities were significant before and after the crisis but were not significant during the crisis. Size was also found to become more significant during and after the crisis than before the crisis. Additionally, asset tangibility became more significant after the crisis with the coefficient under long-term debt becoming positive. The positive coefficient may indicate that tangible assets were provided as collateral in exchange for long-term debt in the period after the crisis.

Therefore, it appears that profitability, growth, size and asset tangibility are the determinants that form part of the mechanism through which leverage increased during crisis.

Chapter 5: Conclusion and recommendations for future research

The purpose of this study was to determine whether the Global Financial Crisis had an impact on the capital structure choices of JSE listed firms as well as to investigate whether their capital structure determinants differed before, during and after the crisis. Therefore, the research question consisted of two separate components.

Did the Global Financial Crisis have an impact on the capital structure of South African companies listed on the JSE? (Equation one)

When controlling for the other determinants of capital structure, the results indicated that the crisis had a significant impact on the capital structure of JSE listed firms. Firms were found to have lower levels of debt in the period before the crisis when compared with the crisis period. Furthermore, no significant change was found in firm leverage after the crisis, meaning that debt levels remained at similar levels after the crisis when compared with the period during the crisis.

This increase in debt levels during the crisis indicates that firms favoured debt financing when internal profits were insufficient to meet their financing requirements and thus, were facing financial distress. Moreover, debt levels remained at similar levels after the crisis when compared with the crisis period, meaning that firm profitability remained under pressure in the aftermath of the crisis and thus debt was still needed to meet firm financing requirements. However, in order to maintain debt at a similar level in the after-crisis period, firms appear to have substituted long-term debt in place of short-term debt in order to manage their own refinancing and liquidity risk. This substitution shows that lessons have been learnt from the crisis. The robustness tests further confirmed the validity of the above result as the tests showed that the results were specific to the financial crisis period as well as a one-year lag of the financial crisis period.

Since it was found that firms increased their leverage levels as a result of the financial crisis, the next objective of this study was to provide additional insight as to the mechanism through which leverage increased. This was done by looking at whether the capital structure determinants differed before, during and after the crisis.

Was there any change in the determinants of the capital structure of South African companies listed on the JSE when looking at the periods before, during and after the financial crisis? (Equation two)

Profitability, firm size and asset tangibility were found to have increased in significance in either the during, after-crisis period or both these periods, when compared with the before period. Growth opportunities were also found to be insignificant during the crisis but significant in both the before and after periods. Thus, it was these determinants that provided the mechanism through which JSE listed firms increased their leverage during the crisis.

However, taxation was also found to have become more significant in the after-crisis period but the negative coefficient contradicts the expectation of trade-off theory (Modigliani & Miller, 1963). Therefore, this result highlights the need for additional research on the relationship between capital structure and taxation. Prior empirical evidence appears to contradict trade-off theory predictions raising the question as to whether alternative measures of the taxation variable would alleviate this contradiction.

Final conclusion and recommendations for future research

The results of this study point towards firms increasing leverage levels when facing financial distress. This information could potentially be useful to both the reserve bank and policy makers. In order to assist firms in times of financial distress and to limit the economic damage of another crisis, such as the current downgrade, policy makers can focus on creating tools that allow firms access to sufficient debt financing to meet their financing requirements. Additionally, the results of the stationarity test, as seen in section 4.2.19, validate the stability of the data meaning that these results can be used for policy making.

The results highlight an additional area of research in terms of access to credit. This study incorporates large JSE listed firms which would likely have equal access to debt financing, and thus, when facing lower profitability, were able to obtain additional debt to meet their financing requirements. Thus, future research could look at the impact of the Global Financial Crisis on smaller firms, such as those listed

on the AltX. Perhaps, these smaller firms did not enjoy the same access to credit during the crisis period and thus, may not have been able to obtain additional debt to mitigate the consequences of financial distress. Without this access to credit, how would these smaller firms have survived the crisis?

In addition to the above recommendation, further research could take place in the form of surveys of managers, with regards to both large JSE listed firms and their smaller, AltX companions. These surveys could provide further insight as to how these firms survived with a reduction in profits during crisis period and whether the survival mechanism consisted of an increase in leverage levels.

Finally, the period of this study could be expanded in order to incorporate the structural decline in the South African economic growth rate from 2013 onwards as well as the current downgrade of 2017. This could provide further insight as to how South African firms react in times of economic crises and whether these firms, once again, increase their leverage levels in times of crises and declining profitability.

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Appendix A: Descriptive statistics for the independent variables across the three periods of study

Descriptive statistics of profitability split between the three periods of study

Time period	Mean	Standard deviation	Minimum value	Maximum value	Number of observations
Before the crisis (2004-2006)	11.36	6.835	0.541	30.34	203
During the crisis (2007-2009)	9.962	7.585	0.825	34.96	302
After the crisis (2010-2012)	8.441	5.988	0.751	24.07	357

Descriptive statistics of growth opportunities split between the three periods of study

Time period	Mean	Standard deviation	Minimum value	Maximum value	Number of observations
Before the crisis (2004-2006)	2.849	1.705	0.599	8.847	203
During the crisis (2007-2009)	2.353	1.742	0.447	9.234	302
After the crisis (2010-2012)	2.294	1.961	0.509	8.870	357

Descriptive statistics of firm size split between the three periods of study

Time period	Mean	Standard deviation	Minimum value	Maximum value	Number of observations
Before the crisis (2004-2006)	8.234	1.714	3.419	11.03	203
During the crisis (2007-2009)	8.338	1.724	4.936	11.20	302
After the crisis (2010-2012)	8.282	1.834	4.614	11.40	357

Descriptive statistics of asset tangibility split between the three periods of study

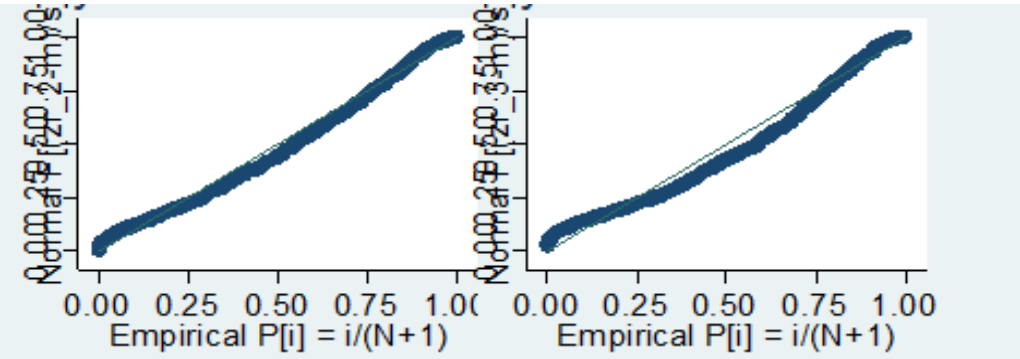
Time period	Mean	Standard deviation	Minimum value	Maximum value	Number of observations
Before the crisis (2004-2006)	0.932	0.0803	0.668	1	203
During the crisis (2007-2009)	0.905	0.107	0.602	1	302
After the crisis (2010-2012)	0.904	0.102	0.602	1	357

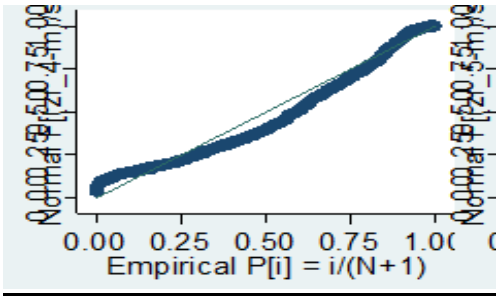
Descriptive statistics of taxation split between the three periods of study

Time period	Mean	Standard deviation	Minimum value	Maximum value	Number of observations
Before the crisis (2004-2006)	28.96	8.667	8.063	54.03	203
During the crisis (2007-2009)	28.95	8.004	10.68	46.79	302
After the crisis (2010-2012)	28.01	9.318	8.725	56.59	357

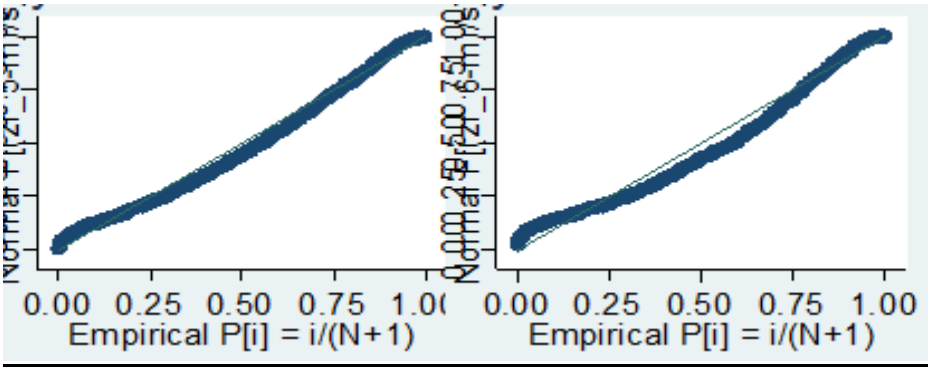
Appendix B: Normality plots and the Skewness-kurtosis test

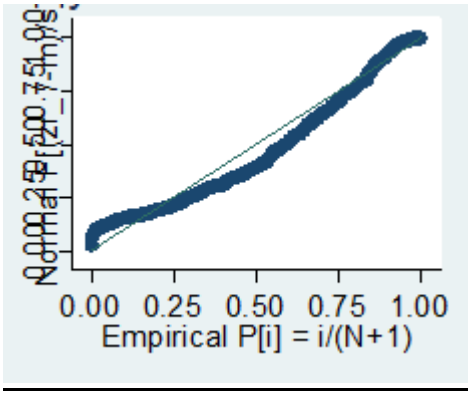
Normality plots: Model 1 (LS 1) (LS 2) (LS3)





Normality plots: Model 2 (LS 1) (LS 2) (LS3)





Skewness-kurtosis test:

				Joint	
Variable	**Observations**	**Pr(Skewness)**	**Pr(Kurtosis)**	**adj chi2(2)**	**Prob>chi2**
LS_1	1383	0.0000	0.5376	.	0.0000
LS_2	1383	0.0000	0.0167	.	0.0000
LS_3	1383	0.0000	0.0000	.	0.0000
PROF	1383	0.0000	0.0000	.	0.0000
GROWTH	1383	0.0000	0.0000	.	0.0000
TAX	1383	0.2985	0.0000	51.29	0.0000
ATANG	1383	0.0000	0.0000	.	0.0000
SIZE	1383	0.0014	0.0000	73.47	0.0000

Appendix C: Results of the Variance inflation factor test and the correlation matrix

Variance inflation factor test:

Variable	VIF	1/VIF
PROF	2.06	0.485436893
CS	1.79	0.558659218
GROWTH	1.74	0.574712644
I	1.62	0.617283951
FS	1.57	0.636942675
BM	1.53	0.653594771
D3	1.5	0.666666667
TN	1.46	0.684931507
D1	1.46	0.684931507
TAX	1.37	0.729927007
CG	1.32	0.757575758
SIZE	1.3	0.769230769
HC	1.29	0.775193798
ATANG	1.27	0.787401575
TE	1.21	0.826446281
OG	1.03	0.970873786

Mean VIF = 1.47

Correlation matrix:

	LS_1	LS_2	LS_3	PROF	GROWTH	TAX	ATANG	SIZE	time
LS_1	1								
LS_2	0.5139	1							
LS_3	0.2776	0.0288	1						
PROF	-0.0435	-0.1674	-0.074	1					
Growth	0.0251	0.006	0.0053	0.4028	1				
TAX	-0.132	-0.1769	-0.0059	-0.1436	0.1355	1			
ATANG	-0.1231	-0.0463	-0.0531	-0.0328	-0.1406	-0.1137	1		
SIZE	-0.0996	-0.026	-0.0271	-0.0779	0.2662	0.1662	0.0815	1	
time	0.1433	0.1835	-0.0536	-0.26	-0.0837	-0.112	-0.0809	0.0196	1

Appendix D: Wooldridge test

Equation 1- LS1

H0: no first-order autocorrelation

F(1, 154) = 34.915

Prob > F = 0.0000

Equation 1- LS2

H0: no first-order autocorrelation

F(1, 154) = 45.364

Prob > F = 0.0000

Equation 1- LS3

H0: no first-order autocorrelation

F(1, 154) = 26.607

Prob > F = 0.0000

Appendix E: Durbin Wu Hausman test

Durbin Wu Hausman test (LS_1)

Source	SS	df	MS	Number of obs =	1383
Model	276668.96	15	18444.5974	F(15, 1367) =	9003.
Residual	2800.57397	1367	2.04870078	Prob > F =	0.00
Total	279469.534	1382	202.221081	R-squared =	0.99
				Adj R-squared =	0.98
				Root MSE =	1.43

LS_1	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interva
PROF	-.3265532	.0086081	-37.94	0.000	-.3434398	-.30966
GROWTH	.9070224	.0272107	33.33	0.000	.8536431	.96040
TAX	-.2524071	.0041773	-60.42	0.000	-.2606018	-.24421
ATANG	-12.18138	.4063295	-29.98	0.000	-12.97848	-11.384
SIZE	-1.122686	.0245215	-45.78	0.000	-1.17079	-1.0745
OG	-11.78041	.8351236	-14.11	0.000	-13.41867	-10.142
BM	2.580716	.1353596	19.07	0.000	2.315181	2.8462
I	3.965134	.1103897	35.92	0.000	3.748582	4.1816
CG	-1.131199	.1662084	-6.81	0.000	-1.45725	-.80514
HC	7.090883	.2391076	29.66	0.000	6.621825	7.559
CS	1.602004	.1381977	11.59	0.000	1.330901	1.8731
TE	9.985638	.2413052	41.38	0.000	9.51227	10.459
FS	-.9151488	.1188334	-7.70	0.000	-1.148264	-.68203
TN	2.171643	.1896191	11.45	0.000	1.799667	2.5436
resi 1	1	.0028454	351.45	0.000	.9944183	1.0055
cons	45.2154	.4237873	106.69	0.000	44.38406	46.046

(Source stata)

Durbin Wu Hausman test (LS_2)

SS	df	MS	Number of obs = 1383	
Model	1.90183214	16 .118864509	F(16, 1366) =	10.8
Residual	14.9993068	1366 .010980459	Prob > F =	0.00(
			R-squared =	0.112
Total	16.9011389	1382 .012229478	Adj R-squared =	0.102
			Root MSE =	.1047

LS_2	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval
PROF	-.0049576	.0006453	-7.68	0.000	-.0062235	-.003691
GROWTH	.0088598	.0019976	4.44	0.000	.0049411	.012778
TAX	-.0023289	.0003091	-7.54	0.000	-.0029352	-.001722
ATANG	-.0219509	.0299797	-0.73	0.464	-.0807622	.03686(
SIZE	-.0032632	.0017964	-1.82	0.070	-.0067871	.00026(
D1	-.0249508	.0096333	-2.59	0.010	-.0438485	-.00605
D3	-.0001672	.0071603	-0.02	0.981	-.0142135	.013879
OG	-.0120477	.0613292	-0.20	0.844	-.1323574	.108262
BM	-.0008705	.0099122	-0.09	0.930	-.0203153	.018574
I	-.0014475	.0080856	-0.18	0.858	-.0173091	.01441
CG	-.02902	.0121697	-2.38	0.017	-.0528935	-.005146
HC	.0413717	.0175082	2.36	0.018	.0070257	.075717
CS	-.0059524	.0101175	-0.59	0.556	-.0258	.013895
TE	.024719	.0176738	1.40	0.162	-.0099518	.059389
FS	-.0207275	.0087065	-2.38	0.017	-.037807	-.00364
TN	.0037376	.0138967	0.27	0.788	-.0235237	.030998
_cons	.2617489	.0321316	8.15	0.000	.1987162	.324781

(Source stata)

Durbin Wu Hausman test (LS_3)

Source	SS	df	MS	Number of obs =	1383
				F(16, 1366) =	4.26
Model	.223920047	16	.013995003	Prob > F =	0.0000
Residual	4.48376178	1366	.003282402	R-squared =	0.0476
				Adj R-squared =	0.0364
Total	4.70768183	1382	.003406427	Root MSE =	.05729

LS_3	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
PROF	-.0011248	.0003528	-3.19	0.001	-.001817	-.0004327
GROWTH	.0031177	.0010922	2.85	0.004	.0009752	.0052602
TAX	-.0001491	.000169	-0.88	0.378	-.0004805	.0001824
ATANG	-.0192574	.0163913	-1.17	0.240	-.0514123	.0128974
SIZE	-.0018507	.0009822	-1.88	0.060	-.0037774	.000076
D1	-.0012842	.005267	-0.24	0.807	-.0116165	.0090481
D3	-.0094386	.0039148	-2.41	0.016	-.0171183	-.0017588
OG	.0511915	.0335315	1.53	0.127	-.0145874	.1169703
BM	-.0030017	.0054195	-0.55	0.580	-.0136331	.0076297
I	.0180118	.0044208	4.07	0.000	.0093396	.0266841
CG	.0093962	.0066538	1.41	0.158	-.0036565	.0224489
HC	.0179041	.0095726	1.87	0.062	-.0008744	.0366826
CS	-.0081845	.0055317	-1.48	0.139	-.0190361	.0026671
TE	-.0063055	.0096631	-0.65	0.514	-.0252617	.0126506
FS	.000883	.0047602	0.19	0.853	-.0084552	.0102211
TN	.0007239	.007598	0.10	0.924	-.014181	.0156289
cons	.1079206	.0175678	6.14	0.000	.0734577	.1423835

(Source stata)

Appendix F: Results of the Hausman test and Breusch-Pagan

Lagrange Multiplier

Hausman test:

	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fixed	random	Difference	S.E.
PROF	-.2576645	-.2666958	.0090312	.0138937
GROWTH	.9228186	.9042244	.0185941	.0564367
TAX	-.2288544	-.2313351	.0024807	.0056934
ATANG	-10.42328	-10.40275	-.0205299	.3291994
SIZE	-1.149549	-1.136756	-.0127933	.0219279
OG	-9.941342	-9.530493	-.4108485	.702999
BM	2.578339	2.467839	.1104997	.1016243
I	4.176205	4.040576	.1356294	.1025068
CG	-1.12125	-1.173541	.0522908	.1099133
HC	7.285126	7.183282	.1018445	.226182
CS	1.615607	1.588121	.0274869	.144748
TE	9.90285	9.730985	.1718645	.1709341
FS	-.8555692	-.9341374	.0785681	.1084796
TN	2.121274	2.05323	.0680445	.1179719

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(14) = (b-B)'[(V_b-V_B)^(-1)](b-B)

= 3.41

Prob>chi2 = 0.9981

(Source stata)

Breusch-Pagan Lagrange Multiplier test (LS_1)

```
Breusch and Pagan Lagrangian multiplier test for random effects

        LS_1[companynum,t] = Xb + u[companynum] + e[companynum,t]

        Estimated results:
                             |       Var     sd = sqrt(Var)
                    ---------+-----------------------------
                        LS_1 |   202.2211       14.22045
                           e |   60.84775       7.800497
                           u |   143.9278       11.99699

        Test:   Var(u) = 0
                                    chibar2(01) =  1669.93
                                Prob > chibar2 =   0.0000
```

(Source stata)

Breusch-Pagan Lagrange Multiplier test (LS_2)

```
Breusch and Pagan Lagrangian multiplier test for random effects

        LS_2[companynum,t] = Xb + u[companynum] + e[companynum,t]

        Estimated results:
                             |       Var     sd = sqrt(Var)
                    ---------+-----------------------------
                        LS_2 |   .0122295        .110587
                           e |   .0033921       .0582418
                           u |    .007931       .0890562

        Test:   Var(u) = 0
                                    chibar2(01) =  1862.79
                                Prob > chibar2 =   0.0000
```

(Source stata)

Breusch-Pagan Lagrange Multiplier test (LS_3)

```
Breusch and Pagan Lagrangian multiplier test for random effects

        LS_3[companynum,t] = Xb + u[companynum] + e[companynum,t]

        Estimated results:
                             |       Var     sd = sqrt(Var)
                    ---------+-----------------------------
                        LS_3 |   .0034064       .0583646
                           e |   .0020095       .0448277
                           u |   .0014337       .0378646

        Test:   Var(u) = 0
                                    chibar2(01) =   626.28
                                Prob > chibar2 =   0.0000
```

(Source stata)

Appendix G: Random effects model

Results of equation 1:

VARIABLES	(1) RE_LS1 (Total debt/Total Assets)	(2) RE_LS2 (Long-term debt/Total Assets)	(3) RE_LS3 (Short-term debt/Total Assets)
PROF	-0.002*	-0.004***	-0.001**
	(9.53232e-04)	(7.17410e-04)	(4.17830e-04)
GROWTH	0.007**	0.009***	0.005***
	(3.30315e-03)	(2.48597e-03)	(1.44787e-03)
TAX	-0.001**	-0.002***	0.000
	(5.88879e-04)	(4.43195e-04)	(2.58123e-04)
ATANG	-0.046	-0.005	-0.015
	(5.30535e-02)	(3.99285e-02)	(2.32549e-02)
SIZE	-0.016***	-0.004	-0.003**
	(3.00009e-03)	(2.25789e-03)	(1.31503e-03)
D1	-0.027**	-0.024***	-0.002
	(1.24629e-02)	(9.37968e-03)	(5.46286e-03)
D3	0.012	-0.011	-0.007
	(1.06216e-02)	(7.99390e-03)	(4.65576e-03)
OG	-0.191**	-0.072	0.097**
	(9.71927e-02)	(7.31480e-02)	(4.26024e-02)
BM	0.028*	0.003	-0.006
	(1.59216e-02)	(1.19827e-02)	(6.97891e-03)
I	0.065***	0.014	0.018***
	(1.32835e-02)	(9.99730e-03)	(5.82256e-03)
CG	-0.020	-0.036**	0.004
	(1.98580e-02)	(1.49453e-02)	(8.70433e-03)
HC	0.113***	0.057**	0.018
	(3.00375e-02)	(2.26064e-02)	(1.31663e-02)
CS	0.026	-0.001	-0.017**
	(1.67053e-02)	(1.25726e-02)	(7.32243e-03)
TE	0.125***	0.034	-0.009
	(2.85187e-02)	(2.14634e-02)	(1.25006e-02)
FS	-0.004	-0.008	0.005
	(1.47408e-02)	(1.10940e-02)	(6.46132e-03)
TN	0.029	-0.002	0.009
	(2.26411e-02)	(1.70399e-02)	(9.92426e-03)
Constant	0.357***	0.215***	0.105***
	(5.47913e-02)	(4.12364e-02)	(2.40166e-02)
Observations	862	862	862
Number of time	9	9	9

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Results of equation 2 (before the crisis)

VARIABLES	(1) RE_2B_LS1	(2) RE_2B_LS2	(3) RE_2B_LS3
	(Total debt/Total Assets)	(Long-term debt/Total Assets)	(Short-term debt/Total Assets)
PROF	0.000	-0.003**	-0.001
	(1.64986e-03)	(1.19884e-03)	(8.35395e-04)
GROWTH	-0.005	0.005	0.003
	(6.00657e-03)	(4.36458e-03)	(3.04138e-03)
TAX	-0.000	-0.001*	0.001
	(1.11664e-03)	(8.11390e-04)	(5.65403e-04)
ATANG	-0.222*	-0.026	-0.105*
	(1.14267e-01)	(8.30303e-02)	(5.78583e-02)
SIZE	-0.007	-0.001	-0.006**
	(5.92755e-03)	(4.30716e-03)	(3.00137e-03)
OG	-0.141	-0.085	0.101**
	(8.83769e-02)	(6.42176e-02)	(4.47490e-02)
BM	0.036	-0.004	-0.003
	(3.00786e-02)	(2.18561e-02)	(1.52301e-02)
I	0.104***	0.003	0.015
	(2.67701e-02)	(1.94520e-02)	(1.35548e-02)
CG	-0.010	-0.050**	-0.004
	(3.46008e-02)	(2.51421e-02)	(1.75198e-02)
HC	0.136**	-0.001	0.037
	(5.62365e-02)	(4.08633e-02)	(2.84749e-02)
CS	0.072**	-0.005	-0.006
	(2.99115e-02)	(2.17347e-02)	(1.51454e-02)
TE	0.128**	0.075*	0.018
	(6.11789e-02)	(4.44547e-02)	(3.09775e-02)
FS	0.004	-0.041*	-0.002
	(3.18413e-02)	(2.31370e-02)	(1.61226e-02)
TN	0.049	0.038	-0.022
	(5.27191e-02)	(3.83074e-02)	(2.66939e-02)
Constant	0.380***	0.182**	0.192***
	(1.14058e-01)	(8.28787e-02)	(5.77526e-02)
Observations	203	203	203

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Results of equation 2 (during the crisis)

VARIABLES	(1) RE_2D_LS1	(2) RE_2D_LS2	(3) RE_2D_LS3
	(Total debt/Total Assets)	(Long-term debt/Total Assets)	(Short-term debt/Total Assets)
PROF	0.000	-0.004***	0.001
	(1.39426e-03)	(1.15856e-03)	(6.54691e-04)
GROWTH	0.003	0.005	0.002
	(5.69020e-03)	(4.72826e-03)	(2.67190e-03)
TAX	-0.001	-0.001	0.000
	(1.06835e-03)	(8.87740e-04)	(5.01655e-04)
ATANG	-0.078	-0.032	-0.007
	(8.44549e-02)	(7.01776e-02)	(3.96568e-02)
SIZE	-0.010**	-0.007	-0.000
	(5.07955e-03)	(4.22084e-03)	(2.38516e-03)
o.OG	-	-	-
BM	0.023	0.004	0.001
	(2.64894e-02)	(2.20113e-02)	(1.24384e-02)
I	0.042*	0.002	0.030***
	(2.15752e-02)	(1.79278e-02)	(1.01309e-02)
CG	-0.029	-0.045	0.018
	(3.33283e-02)	(2.76941e-02)	(1.56497e-02)
HC	0.122**	0.058	0.029
	(5.45439e-02)	(4.53232e-02)	(2.56117e-02)
CS	0.000	0.006	-0.024*
	(2.82338e-02)	(2.34608e-02)	(1.32575e-02)
TE	0.072	0.017	-0.009
	(4.44178e-02)	(3.69088e-02)	(2.08569e-02)
FS	0.005	-0.007	0.027**
	(2.45922e-02)	(2.04349e-02)	(1.15476e-02)
TN	0.013	0.005	0.030*
	(3.48630e-02)	(2.89693e-02)	(1.63703e-02)
Constant	0.335***	0.262***	0.049
	(8.65612e-02)	(7.19278e-02)	(4.06458e-02)
Observations	302	302	302

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Results of equation 2 (after the crisis)

VARIABLES	(1) RE_2A_LS1	(2) RE_2A_LS2	(3) RE_2A_LS3
	(Total debt/Total Assets)	(Long-term debt/Total Assets)	(Short-term debt/Total Assets)
PROF	-0.007***	-0.007***	-0.004***
	(2.01664e-03)	(1.42611e-03)	(7.58232e-04)
GROWTH	0.020***	0.018***	0.009***
	(5.79717e-03)	(4.09958e-03)	(2.17966e-03)
TAX	-0.002**	-0.002***	-0.001
	(9.29130e-04)	(6.57051e-04)	(3.49341e-04)
ATANG	-0.004	0.027	-0.021
	(8.77523e-02)	(6.20556e-02)	(3.29937e-02)
SIZE	-0.027***	-0.004	-0.005**
	(4.91454e-03)	(3.47541e-03)	(1.84780e-03)
o.OG	-	-	-
BM	0.019	0.003	-0.016
	(2.63854e-02)	(1.86589e-02)	(9.92058e-03)
I	0.061***	0.027*	0.008
	(2.19137e-02)	(1.54967e-02)	(8.23926e-03)
CG	-0.020	-0.023	-0.003
	(3.39473e-02)	(2.40065e-02)	(1.27638e-02)
HC	0.106**	0.080**	-0.001
	(4.68652e-02)	(3.31416e-02)	(1.76207e-02)
CS	0.013	-0.019	-0.015
	(2.87694e-02)	(2.03448e-02)	(1.08169e-02)
TE	0.157***	0.029	-0.010
	(4.76451e-02)	(3.36931e-02)	(1.79139e-02)
FS	-0.029	-0.004	-0.020**
	(2.38384e-02)	(1.68577e-02)	(8.96291e-03)
TN	0.021	-0.026	-0.016
	(3.77264e-02)	(2.66789e-02)	(1.41846e-02)
Constant	0.470***	0.192***	0.162***
	(9.37198e-02)	(6.62757e-02)	(3.52374e-02)
Observations	357	357	357

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix H: Results of the Breusch-Pagan / Cook-Weisberg test for heteroscedasticity

Breusch-Pagan / Cook-Weisberg test (LS 1):

Breusch-Pagan / Cook-Weisberg test for heteroscedasticity

Ho: Constant variance

Variables: fitted values of LS_1

chi2(1) = 79.29

Prob > chi2 = 0.0000

Breusch-Pagan / Cook-Weisberg test (LS 2):

Breusch-Pagan / Cook-Weisberg test for heteroscedasticity

Ho: Constant variance

Variables: fitted values of LS_2

chi2(1) = 64.70

Prob > chi2 = 0.0000

Breusch-Pagan / Cook-Weisberg test (LS 3):

Breusch-Pagan / Cook-Weisberg test for heteroscedasticity

Ho: Constant variance

Variables: fitted values of LS_3

chi2(1) = 11.63

Prob > chi2 = 0.0006

Appendix I: Stationarity test results

Stationarity test: LS 1

Fisher-type unit-root test for LS_1

Based on Phillips-Perron tests

Ho: All panels contain unit roots Number of panels = 224

Ha: At least one panel is stationary Avg. number of periods = 6.17

AR parameter: Panel-specific Asymptotics: T -> Infinity

Panel means: Included

Time trend: Not included

Newey-West lags: 3 lags

		Statistic	p-value
Inverse chi-squared(318)	P	930.0719	0.0000
Inverse normal	Z	-7.1611	0.0000
Inverse logit t(649)	L*	-15.3682	0.0000
Modified inv. chi-squared	Pm	24.2702	0.0000

Stationarity test: LS 2

		Statistic	p-value
Inverse chi-squared(318)	P	969.3632	0.0000
Inverse normal	Z	-8.0056	0.0000
Inverse logit t(659)	L*	-16.7933	0.0000
Modified inv. chi-squared	Pm	25.8282	0.0000

Stationarity test: LS 3

		Statistic	p-value
Inverse chi-squared(318)	P	1429.5360	0.0000
Inverse normal	Z	-14.3392	0.0000
Inverse logit t(664)	L*	-28.7543	0.0000
Modified inv. chi-squared	Pm	44.0753	0.0000

Stationarity test: Profitability

		Statistic	p-value
Inverse chi-squared(318)	P	1183.2102	0.0000
Inverse normal	Z	-10.8803	0.0000
Inverse logit t(664)	L*	-21.8541	0.0000
Modified inv. chi-squared	Pm	34.3078	0.0000

Stationarity test: Growth

		Statistic	p-value
Inverse chi-squared(318)	P	1109.0111	0.0000
Inverse normal	Z	-8.7828	0.0000
Inverse logit t(659)	L*	-19.7074	0.0000
Modified inv. chi-squared	Pm	31.3656	0.0000

Stationarity test: Taxation

		Statistic	p-value
Inverse chi-squared(318)	P	1579.6436	0.0000
Inverse normal	Z	-18.7941	0.0000
Inverse logit t(659)	L*	-33.2737	0.0000
Modified inv. chi-squared	Pm	50.0274	0.0000

Stationarity test: Asset tangibility

		Statistic	p-value
Inverse chi-squared(318)	P	1012.2139	0.0000
Inverse normal	Z	-5.6711	0.0000
Inverse logit t(619)	L*	-16.8688	0.0000
Modified inv. chi-squared	Pm	27.5274	0.0000

Stationarity test: Size

		Statistic	p-value
Inverse chi-squared(318)	P	1001.1683	0.0000
Inverse normal	Z	-5.4021	0.0000
Inverse logit t(644)	L*	-14.1979	0.0000
Modified inv. chi-squared	Pm	27.0894	0.0000

Appendix J: Results of equation 2

Table 20: Equation 2 before the crisis (2004-2006)

VARIABLES	(1) RE_2B_LS1 (Total debt/Total Assets)	(2) RE_2B_LS2 (Long-term debt/Total Assets)	(3) RE_2B_LS3 (Short-term debt/Total Assets)
PROF	0.001*	-0.003***	-0.001
	(3.18829e-04)	(6.18163e-04)	(6.62405e-04)
GROWTH	-0.001	0.005***	0.003***
	(3.45729e-03)	(1.72293e-03)	(9.29831e-04)
TAX	0.000	-0.001	0.001***
	(5.77577e-04)	(1.28414e-03)	(2.33262e-04)
ATANG	-0.260**	-0.024	-0.102**
	(1.13827e-01)	(1.47909e-01)	(4.60598e-02)
SIZE	-0.004	-0.001	-0.007***
	(7.06547e-03)	(3.60685e-03)	(1.48489e-03)
OG	-0.151***	-0.084	0.102**
	(1.04190e-02)	(5.26882e-02)	(4.45189e-02)
BM	-0.001	-0.002	0.000
	(3.51872e-03)	(5.89644e-03)	(1.93040e-03)
I	0.066***	0.006	0.018***
	(2.31649e-02)	(9.46178e-03)	(1.13000e-03)
CG	-0.048**	-0.048***	-0.001
	(2.22407e-02)	(4.47044e-03)	(1.65600e-02)
HC	0.083***	0.003	0.041
	(1.57904e-02)	(1.87567e-02)	(4.77977e-02)
TE	0.082***	0.078***	0.022***
	(2.04583e-02)	(2.38932e-02)	(7.03955e-03)
FS	-0.018**	-0.039***	-0.000
	(8.03079e-03)	(1.29133e-02)	(1.26627e-02)
TN	0.036	0.039**	-0.021
	(3.42254e-02)	(1.81376e-02)	(1.47853e-02)
Constant	0.406***	0.181	0.190***
	(1.41056e-01)	(1.78765e-01)	(6.05919e-02)
Observations	203	203	203

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

(Source:Stata)

Table 21: Equation 2 during the crisis (2007-2009)

VARIABLES	RE_2D_LS1 (Total debt/Total Assets)	RE_2D_LS2 (Long-term debt/Total Assets)	RE_2D_LS3 (Short-term debt/Total Assets)
PROF	0.000	-0.004***	0.001
	(7.88220e-04)	(4.78076e-04)	(8.88938e-04)
GROWTH	0.003	0.006	0.001
	(3.96148e-03)	(6.23271e-03)	(1.47439e-03)
TAX	-0.001**	-0.001	0.000
	(5.13208e-04)	(1.12499e-03)	(8.70613e-04)
ATANG	-0.078	-0.034	0.002
	(8.12408e-02)	(4.27017e-02)	(3.97044e-02)
SIZE	-0.010***	-0.007***	-0.001
	(3.04159e-03)	(4.20048e-04)	(2.22885e-03)
o.OG[8]	-	-	-
BM	0.023**	0.002	0.010*
	(9.05765e-03)	(1.31683e-02)	(5.94325e-03)
I	0.042***	-0.000	0.039***
	(6.66897e-03)	(5.26145e-03)	(5.21078e-03)
CG	-0.029	-0.047***	0.028**
	(1.91047e-02)	(4.89901e-03)	(1.15380e-02)
HC	0.122*	0.056	0.040
	(6.55871e-02)	(5.40642e-02)	(4.44419e-02)
TE	0.072***	0.014	0.003
	(2.06489e-02)	(1.83826e-02)	(3.50300e-03)
FS	0.005	-0.008	0.031**
	(4.80068e-03)	(7.21661e-03)	(1.21612e-02)
TN	0.013	0.004	0.035***
	(4.02763e-02)	(5.33351e-02)	(1.17420e-02)
Constant	0.335***	0.265***	0.038
	(4.92219e-02)	(4.80519e-02)	(5.60600e-02)
Observations	302	302	302

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

(Source: Stata)

[8] There were no observations for OG over the crisis period and thus, the sector dummy has been excluded from the analysis.

Table 22: Equation 2 after the crisis (2010-2012)

VARIABLES	(1) RE_2A_LS1	(2) RE_2A_LS2	(3) RE_2A_LS3
	(Total debt/Total Assets)	(Long-term debt/Total Assets)	(Short-term debt/Total Assets)
PROF	-0.007***	-0.007***	-0.004***
	(2.58685e-03)	(8.67141e-04)	(1.17824e-03)
GROWTH	0.021***	0.017***	0.008***
	(8.56893e-04)	(1.86340e-03)	(1.53138e-03)
TAX	-0.002**	-0.002***	-0.001**
	(1.00605e-03)	(3.21527e-04)	(2.64104e-04)
ATANG	-0.009	0.035***	-0.014**
	(4.11754e-02)	(1.03952e-02)	(6.80565e-03)
SIZE	-0.027***	-0.004***	-0.004*
	(2.11289e-03)	(6.04020e-04)	(2.60814e-03)
o.OG[9]	-	-	-
BM	0.015	0.008	-0.012***
	(1.33239e-02)	(9.22430e-03)	(3.57355e-03)
I	0.057***	0.033***	0.012**
	(2.35455e-03)	(1.06559e-02)	(6.03833e-03)
CG	-0.024	-0.015*	0.003
	(1.59850e-02)	(8.81240e-03)	(2.48719e-03)
HC	0.100**	0.090***	0.007
	(4.34458e-02)	(2.84438e-02)	(4.28881e-03)
TE	0.151***	0.038**	-0.003
	(2.56378e-02)	(1.61122e-02)	(6.73127e-03)
FS	-0.030	-0.002	-0.019**
	(2.83325e-02)	(1.09795e-02)	(8.55785e-03)
TN	0.020	-0.025	-0.015
	(5.39645e-02)	(1.69744e-02)	(1.20005e-02)
Constant	0.477***	0.181***	0.153***
	(8.01124e-02)	(2.59027e-02)	(2.84624e-02)
Observations	357	357	357

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

(Source: Stata)

[9] There were no observations for OG in the 'after the crisis period' and thus, the sector dummy has been excluded from the analysis.