# Non-Linear Implications of Credit Ratings in the Selection of Capital Providers and their Validity as Hidden Information Indicators

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# Declaration

*I hereby declare that the research work in this thesis is contributed, written, and composed by me, except where I explicitly stated otherwise. All errors are my own.*

Zeeshan Ali Syed

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# Abstract

The Credit Ratings (CR) and Capital Structure (CR-CS) hypothesis asserts that CR influence firms' debt levels. This study argues that CR as an indicator of hidden information is more influential in determining the choice of Capital Providers (CP). Using a sample of 629 firms and 12,580 firm-year observations, we find that firms use their credit ratings to choose their preferred type of capital providers. This study not only establishes that *"firms do care about their capital providers,"* but it also adds CR as a reliable predictor of such considerations.

This study establishes that managers adopt utility maximising behaviour when choosing their capital providers. Firms differentiated by their credit ratings are likely to choose different capital providers. This study finds that higher rated firms prefer public debt. The preference of public debt is valid under different model settings. We also observe that financial distress, indicated by the current rating of firms, is a significant determinant of the choice of private debt over public debt.

In addition to conventional specifications of CR, this study constructs a new CR specification called realised rating change and historical ratings. This study establishes that the realised rating changes and historical credit ratings influence the choice of capital providers. Evidence indicates that after having a rating adjustment which we call realised rating, firms are more likely to use public providers.

This could be indicative of the fact that after a rating upgrade manager expects public capital providers to ask lower premiums. Alternatively, after rating downgrade they want to test the investors' perception about the creditworthiness of their firm. Our results are robust in the presence of other hidden information indicators and other CR variants. These results are controlled for the financial distress concerns.

This study also extends choice modelling in CS and CR discussion. It shows that revealed preference choice modelling can produce more robust results. Choice modelling allows us to study the utility maximising behaviour of firms and managers and identifies the non-linear implications of CR on financing choices. Using such an approach may enable us to bridge the theoretical gap between monetary economics and corporate finance. The first usually concerns relationship lending or bank lending to firms, and the latter focuses on financial innovation and engineering to raise capital. By combining both strands, we may better understand why managers often make financial decisions contrary to the expected pattern.

More research using the advanced choice models may enable us to understand persistent irregularities found in corporate financing choices. As these models allow researchers to relax IID and IIA assumptions; hence, they can enable derivation of predictive models which capture complex managerial behaviour. As firms are moving away from the traditional financing medium and looking to explore options such as crowdfunding and digital assets. Therefore, understanding complex behaviour is needed now more than ever.

# Preface

Contemporary discussion on capital structure revolves around the three unknowns: preferences of financing instruments, the relationship between the required rate of return and leverage levels, and financing behaviour as strategic choices (Myers, 1984b). Posterior research one way or the other assumes these three unknowns as objective functions of capital structure policies and tries to ascertain their true determinants and optimal solutions. Although each of these unknowns has attracted scholarly attention; nonetheless, it is the first unknown that has earned the lion's share of this attention. Maybe, it is partly due to methodological simplicity and partly due to the desire to have a general theory of capital structure that is easily achievable if one has the first unknown as the aim of the study.

On the other side, the last unknowns, namely the financing behaviour as strategic choices, struggled to maintain their charm for researchers due to its non-linear nature. Moreover, studies focusing on the last unknown also suffer from complex factors such as utility maximising behaviour, non-linearity, and above all, unobservable data. These complexities also require the use of econometric models beyond linear regressions. They also need researchers to construct financing behaviour as non-linear and discrete outcomes which are not sufficiently inferable from data.

Although researchers study the financing behaviour as a non-linear function; however, the issue is that they either view financing decisions as only a choice between financing instruments or a choice between particular security buyers such as bondholders or banks. Further, they also ignore conditional relationships faced by rational agents as financing choices depend on the characteristic of alternatives, other alternatives, and the given alternative's utility.

This complexity and the difficulty of collecting choice data limit researchers' ability to study corporate financing from this perspective. Myers (2001), in a retrospective review of corporate financing research, endorses the importance of this perspective. He concludes that should we want to have a deeper understanding of the capital structure, we need to derive an objective managerial function that treats the capital structure as a manifestation of complex humanly choices rather than simple proportional variations. He further argues that such an ideal objective function must be at least an accurate representation of three paradoxical realities:

1. It should parametrise the utility of dominant groups within the firms (so-called insiders).
2. It should estimate the utility of exogenous financing choices that best serve these insiders.
3. It should lay out the interrelationship between the first two.

This deceptively simple argument opens another holy grail for academics, as deriving a utility function for unobservable human actions is exceedingly tricky; particularly, if one aims to verify these utilities empirically. This study is a modest attempt that adapts these orientations towards capital structure and analyses capital structure as a set of nested choices. There are three equally emphasised but hierarchically placed objectives of this study. Firstly, this research aims to construct corporate financing as an objective function that is more sensitive to utilities associated with each financing choice rather than proportional changes in capital structure. Secondly, it studies the unobservable managerial and firms' preferences using the so-called revealed preference theory. Thirdly, it identifies the relationship between strategic information, credit ratings, and strategic financing

choices. The first two objectives are the methodology contributions of this research. The last one is to add to the credit ratings and capital structure discussion.

However, in contrast to popular studies on this topic, this research treats credit ratings as non-linear information and treats corporate financing decisions as a non-linear set of choices. This study argues that each successive financing decision is not only conditional on its utility but is also the function of the utility derived from the preceding and succeeding decisions. This study notes that joint determination of financing choices is what we say, a nested choice model. In nested logit models, each successive branch of decision is either based on the previous decision or is crucial in selecting the initial decision. However, it is essential to mention that joint determination is not necessarily a sequential or hierarchal determination. Another notable contribution of this study is that it highlights a lateral perspective on the implications of information asymmetry on firms financing preference. Instead of assuming the hierarchy of financing preferences, this study notes that firms' financing decisions are equally likely, given that the decision-makers can derive similar utility from each choice.

# 1. Introduction

What makes firms change their Capital Structure (CS)? Are relative changes in leverage and equity are of any importance? What motivates firms' financing behaviour? These questions have puzzled thousands of Nobel minds for decades now. Ostensibly, there is no sight of a general theory of corporate financing behaviour that can answer any of these questions (Graham, Leary, and Roberts (2015), Leary and Roberts (2010), Brealey and Myers (2008), Myers (2003), and Myers (2001)).

One such puzzling question, albeit a recent one, is whether issuers' Credit Ratings (CR) influence firms' financing behaviour (Kisgen, 2006). Given that the credit ratings are competitively derived information and costs of defection are significant for ratters, firms, and users, the credit ratings are bound to play a vital role in capital allocation (Ahmed, 2011). However, the question is whether their role is limited to the choice of security type or it has some role in selecting capital providers. The first choice is extensively studied. Its proponents argue that credit ratings are significant in determining the type of security to be issued and affecting proportional variations in the capital structure.

This study focuses on the latter question: Can credit rating also influence the choice of capital providers. It also considers that can we use credit ratings to predict what type of capital providers are preferred by firms? We mean capital providers' debt and equity sources, including retained earnings.

This study argues that the implications of credit ratings may be notable in influencing the choice of capital providers. This influence need not be in contradiction to the prior arguments that credit ratings can determine the hierarchal pattern of financing or target adjustment pattern as per TO theory as popularised by (Kisgen (2006), Darren J

Kisgen (2009) and Kisgen and Strahan (2010)). This study extends and, where necessary, parts ways from these academic orientations and focuses on whether credit ratings influence the selection of their capital provider[1], *ceteris paribus*.

Denis and Mihov (2003) had already extended the role of CR in the choice between public debt Vs non-bank private debt Vs bank debt. Nonetheless, they do not consider equity sources while assessing the implications of credit ratings on choices of capital providers. Unique in this respect, this study broadens the available choices of capital providers. Furthermore, this study defines credit ratings and capital structure choices as strategic decisions rather than changing ranks or proportional variations.

Herein, the goal is to consider dynamic characteristics of credit ratings rather than their static view. Credit ratings are solicited and subscribed status of credit quality. They are subjective assessments performed by legally responsible parties. Credit ratings are also influential in determining institutional investors' portfolios, and more importantly, they are a communique of the invisible hands of an organisation. Further, credit ratings are not a linear variable; instead, they are discrete statuses; hence, they ought to have a discrete effect on the financial decisions of firms. Therefore, the importance of credit ratings extends beyond simple ranks and changes in their signs. Instead, it should be interpreted as either imposed or desired change of circumstances between firms and investors.

[1] Previous studies on the relationship between credit ratings and capital structure primarily focus on the type of securities or type of debt lenders. In this paper, we aim to look at the whole range of sources of capital, such as public sources versus private sources and debt providers versus equity sources.

This study argues that any category of credit rating at any given time indicates an equilibrium desired by the rated firms to be conveyed to third parties. Firms use these ratings to attract certain capital providers and keep them in line with their expectations. Firms feel that their current rating or future change in their credit rating should influence firms' access to certain capital providers. They may adjust their financing behaviour to retain or gain a new rating. In this context, this study attempts to define the non-linear and strategic relationship between credit ratings and firms' choice of capital providers.

## 1.1. Background of Study

Arguably, Kisgen (2006) is the first to note the concrete relevance of credit ratings on capital structure decisions; however, towards a different direction than this study. He notes that credit ratings are a significant determinant of debt issuance by firms and are reliable predictors for models based on Pecking Order (PO) and Trade-Off (TO) theories. Later, Darren J Kisgen (2009), Kisgen and Strahan (2010), Drobetz and Heller (2014), Noulas and Genimakis (2011), Kemper and Rao (2013), Dasilas and Papasyriopoulos (2015), and others note similar evidence. These studies view financing decisions as a set of choices between debt instruments and equity instruments and assume perfect market conditions in capital markets.

However, this view is limited and does not consider the firms' attention towards the type of capital providers. Such orientations are understandable as firms' financial data is coarse and provides little room to ascertain firms' stated preferences concerning capital providers. Annual information is issued as one number per period; hence, any meaningful interpretation requires a detailed analysis of incremental financing decisions (Naeem, 2012).

Existing literature also argues that despite being a discrete variable, credit ratings can be treated as a stochastic determinant of capital structure choices which is reliable under

PO and TO settings. The methodological simplicity and easy assimilation of credit ratings into existing models are the reason for the popularity of this approach. The econometric models popularised by studies such as Frank and Goyal (2003) and Shyam-Sunder and Myers (1999) can easily absorb credit ratings as just another explanatory factor. Hence, there begin the integration of credit ratings into well-established models of capital structure discussion. However, poverty of this approach, not only for credit ratings but for all other variables, is that it ignores non-linear effects of credit ratings, and make their empirical benefits model-dependent and limit their statistical significance interpretation to a particular theory (Chirinko and Singha (2000) and Leary and Roberts (2010))[2].

In addition to this, the debate on credit ratings is subject to the behavioural restrictions imposed by PO and TO theories (Myers (1984a) and Leary and Roberts (2010)). These behavioural restrictions come in the form of requiring firms to use internal funds before seeking external financing. Similarly, the econometric model requires that the utility derived by different financing choices are not correlated and hence are not relevant for decision making.

This study argues that the imposition of such prerequisites limits our ability to evaluate the role of credit ratings in the financing choices made by firms. Maybe it is due to such limitations; there is mixed evidence about the importance of credit ratings as the determinant of capital structure, and it needs further investigation (Dasilas and Papasyriopoulos (2015), Drobetz and Heller (2014), and Kemper and Rao (2013)).

We argue that the importance of credit ratings stems from the role of credit rating agencies as certification intermediaries (Bolton, Freixas, and Shapiro (2012), Ahmed

[2] This criticism is valid for all other determinants of capital structure.

(2011), and Lizzeri (1999)). Being issued by certified agents, the credit ratings are valuable for their informativeness, solicitation process, and signalling value (Daley, Green, and Vanasco (2020), Boot, Milbourn, and Schmeits (2006), and Bolton et al. (2012)). These characteristics suggest that firms and their investors have a significant stake in aligning their capital exchanges to the credit ratings. Therefore, the role of credit ratings is above and beyond the effect on proportional variations in capital structure. Furthermore, Goldstein & Huang (2020) note the existence of the feedback loop between ratters, rated entities, and investors. This feedback loop means that firms' choice of capital providers is influenced before and after a rating change (Goldstein & Huang, 2020). Therefore, we need to improve our methodological treatment of firms financing choices, credit ratings, and analysis of their implication before and after rating changes.

Moreover, Mackie-Mason (1990), Rajan (1992), and Saa-Requejo (1996) note that firms' financing choices are more complex than the simple choice of security instruments. They propose that firms pay close attention to their capital provider, e.g., insider versus outsiders or private versus public. Therefore, any variable that is considered an indicator of hidden information should be viewed as a determinant of the choice of capital providers.

In this context, this study seeks to understand the role of credit ratings on managerial choices. It uses choice models and incremental financing decisions to analyse how credit ratings influence the selection of capital providers.

## 1.2. Research Problem

Hitherto discussion allows us to assert that firms' credit ratings and their choice of capital providers are meaningfully linked. We can also agree that firms at given credit ratings are likely to choose their capital providers that maximise their wealth and meet long-term strategic objectives. The existing literary approach attempts to assimilate this

phenomenon into the existing literature on debt levels adjustments and choice of securities. First, this assimilation occurs by treating credit ratings as a randomly generated variable and secondly, focusing on the role of anticipated rating changes and firms' response through debt level adjustments. One can identify three broad issues in the existing literature:

1. The First is the methodological limitations imposed by existing econometric models. It requires treating the credit ratings and capital structure as stochastic variants. It also considers capital structure choices as proportional adjustments in debt levels.
2. The Second is the limited treatment of credit ratings which view them as a co-factor of debt levels of a firm.
3. The third is the treatment of the dependent variable, corporate financing choices which, views them as a choice between security instruments.

This study argues that firms' current, anticipated, and realised rating changes play an essential part in determining the composition of firms' capital providers, not debt levels. Strategic capital management makes it imperative for the firm to minimise unwanted variance in their capital cost or availability caused by changes in credit ratings. This variance minimisation can be achieved by, *inter alia*, having a stable composition of capital providers.

Firms achieve this stability by procuring their capital from those investors who do not over-react to the change in credit ratings. This study argues that firms achieve such stability by carefully selecting capital providers who, in the opinion of management, are less likely to over-react or under-react to changes in credit ratings.

The problem is *what is meant by the composition of capital providers and why it needs to be stable*. The composition of capital providers, in existing literature, is generally

characterised as either debt versus equity divide or actual versus optimal debt levels. This treatment omits the behavioural aspects of corporate financing aspects and focuses on finding one general theory of debt levels and its determinants. Welch (2007) and (2011) note this as an eternal problem of capital structure studies. This study argues that better treatment of corporate financing choices is to look at incremental financing decisions and ascertain the primary source of such incremental finances (Naeem, 2012). MacKie-Mason (1990) provides the basis for this argument and notes that firms' financing choices are better understood when analysed as private versus public sources of capital rather than securities or debt level choices.

Previously, Denis and Mihov (2003) come very close to the spirit of this study in its treatment of credit ratings as an indicator of the probability of firms going for public debt or choosing private debt. However, methodologically it treats corporate financing choices as mutually exclusive decisions to accommodate the Independent and Identically Distributed (IID) and Independence of Irrelevant Alternatives (IIA) assumptions of the logistic analysis. This study will use nested logit choice models to analyse the relationship between credit ratings and the choice of capital providers to relax the IID and IIA restrictions. We can infer joint and conditional probabilities by considering financing behaviour as a set of nested choices. Furthermore, this approach treats financing behaviour as a more complex phenomenon using a two-level nested logit model. It also allows considering the whole nest of financing decisions such as public versus private capital providers and debt versus equity providers.

The second question is why firms need to ensure stability in the composition of capital providers. Among other things, firms need this stability to inhibit rent appropriation and loss of valuable investment opportunities in unfavourable circumstances. Kisgen (2006) notes that firms, when expecting a downgrade, are less likely to issue debt. This choice is

irrespective of whether such a decrease may force managers to forego good projects. It is also against the spirit of wealth maximising that is the prime duty of managers and their choices. We will discuss the importance of the stable composition of capital providers in the forthcoming section. However, herby the critical question is how firms choose their capital providers and whether there is any role of credit ratings.

This study argues that credit ratings as a reliable indicator of hidden information can indicate the choice of capital providers. Credit ratings are solicited information; therefore, firms are likely to use them to maximise their wealth and inhibit any wealth destruction due to instability in the composition of capital providers. Firms can use their credit ratings to maintain their reputation with investors and avoid paying a higher premium in worst-case scenarios, as well.

This study seeks to overcome the issue in existing studies on credit ratings and capital structure. These studies discount those variables which are not random and indicate strategic behaviour in capital structure choices such as credit ratings. Credit ratings are not random scales; instead, they are meaningful scales carefully derived through rigorous negotiation and solicitation processes.

This study notes that existing literature needs to be broadened to understand the behavioural implications of credit ratings. Therefore, credit ratings should have a more extensive remit than mere stochastic implications on mere proportional adjustments in capital structure. Such treatment of credit ratings is also more compatible with the hypothesis of hidden information problems and their implications on firms' financing choices.

According to Boot et al. (2006), credit ratings act as a "coordination mechanism", which facilitates mutual rationing between firms and investors in the presence of

information asymmetry. Credit ratings as indicators of hidden information[3] may be more robust in determining the choice of capital providers rather than securities. Mackie-Mason (1990) argues that the hidden information hypothesis and its proxies are good indicators of a firm's choice of the capital provider rather than capital instruments. According to MacKie-Mason (1990), firms do "…care about who provides the funds because different providers will have different information and expectations, thus being willing to pay different amounts for the securities". If we treat credit rating as the information equaliser for investors, firms may find it a robust tool to harmonise their investors' expectations. It may enable us to identify the fundamental role of credit ratings as a minimiser of information asymmetry affecting financial contracting and capital structure relationship management.

Therefore, the issue now under consideration is not the statistical or economic significance of credit ratings. Instead, their role as a rationing mechanism that allows firms to position themselves for their desired capital provider base. Secondly, it also enables investors to assess the quality of issuers without incurring high monitoring costs. Thirdly, it allows public investors (especially retail investors) to compete with private investors by giving them access to insider information which is usually available to private investors (Ahmed, 2011). Hence why credit ratings act as a "coordination mechanism" which facilitates mutual rationing between firms and investors (Boot et al. (2006)).

This study argues that implications of credit ratings suffer from the strong preference of fitting them perfectly into already established linear regression models. As Informational Equaliser in the presence of information asymmetry, we argue that credit ratings fit well into the financial contracting process between firms and investors. Firms may change the composition of their capital provider in anticipation or after realising a change in credit

[3] I borrow this term from MacKie-Mason (1990), and it would mean Information Asymmetry in our report.

rating. Therefore, credit ratings are better assessed when treated as utility maximising factors in choice models.

## 1.3. Research Questions

Hitherto discussion illustrates three broad gaps in existing studies on credit ratings and their role in determining the choice of capital providers:

1. These studies assume that firms and investors are mainly concerned with given premiums asked or offered securities.
2. Since it is the perfect market, firms and investors do not ration and would be random in making financing and investment decisions.
3. Corporate financing choices and determinants adhere to IID and IIA assumptions.

This study proposes that utilities derived from financing choices of firms are correlated, and firms do care from whom they get their capital. These considerations are not only pertinent to the choice firms make in the current period, but they are also linked to choices made in previous periods. Further, management intends to take an active role in determining the composition of their capital providers should and ration them carefully. Although bank versus non-bank choice is crucial in financing choices; however, choice of other capital sources such as public debt providers, public equity providers, and private equity is also significant for management. These considerations are important determinants of firms' success under normal circumstances and during financial distress scenarios.

This study also argues that credit ratings can be a reliable predictor of the utilities described above. It is now a well-researched phenomenon that firms change their capital structure in anticipation of credit rating change. This study goes one step further and aims

to analyse what firms do once their ratings have changed. Four main questions are the prime focus of this study to do so. These questions are as follows:

Is hidden information more relevant in determining the choice of capital providers or financing instruments?

1. Are credit ratings a reliable indicator of hidden information that can influence corporate financing decisions in the presence of other indicators?
2. Is there a relationship between credit ratings and the firms' choice of capital providers?
3. Is firms' choice of capital providers influenced by anticipated rating changes or realised rating changes?

## 1.4. Research Contributions

This study broadly relates to three strands of corporate financing literature; first, it enhances our understanding of the persistent irregularities found in firms' financing behaviour (DeAngelo and Roll (2015), John R Graham et al. (2015), Lin, Ma, Malatesta, and Xuan (2013), Leary and Roberts (2010), Frank and Goyal (2009), Lemmon, Roberts, and Zender (2008), and Faulkender and Petersen (2005)). It treats financing behaviour as a choice of financing sources rather than debt and equity levels (MacKie-Mason (1990), Diamond (1991), Rajan (1992), Petersen and Rajan (1994), Denis and Mihov (2003), Marshall, McCann, and McColgan (2016), and Rossokhin and Ryabova (2020). In this respect, this study furthers the idea that firms' financing choices are beyond proportional adjustment in debt levels. This study also argues that capital providers' choice is a more robust indicator of firms' financing preferences.

Lastly, it treats credit ratings as 'verified strategic information'[4] [1] shared by firms and verified by rating agencies to achieve the optimum composition of their capital providers, i.e., internal, external, public, and private (Bolton et al. (2012), Ahmed (2011), Darren J Kisgen (2009), Kisgen (2006) and Boot et al. (2006)).

This study extends the current debate that primarily focuses on the role of credit ratings on debt versus equity or bank versus non-bank to public versus private. We argue that credit ratings are one of the anchors around which financial contracting between parties occurs in the presence of information asymmetry. According to Boot et al. (2006), An and Chan (2008), and (Cascino et al. (2014), credit ratings are a crucial piece of information for investors to make decisions. This study would add to the literature that treats credit ratings as strategic information rather than a stochastic variant.

This study also introduces new a construct of credit rating, namely realised rating change. We argue that firms' behaviour after receiving a change in their credit rating is as meaningful as the behaviour in anticipation of such rating change. Furthermore, we also aim to establish the reliability of credit ratings in the presence of other information asymmetry indicators.

Thirdly, this study enriches the methodology used to analyse credit ratings' role in capital structure. This study is among the first to use nested logit models to study the role of credit ratings in the capital structure debate. By utilising these models, it is the earliest attempt to view the implications of credit ratings on the choice of capital providers. Furthermore, this study also relaxes the IID and IIA assumptions and adopts a more

[4] To remain in line with our hypothesis, we ignore the unsolicited ratings issued by credit rating agencies.

positivist approach. It does not impose any conditions such as the type of financing choices firms can make, normality assumption, or homogeneity of firms' choices. These methodological modifications allow us not to bind firms to any pre-determined financing behaviour. It also allows understanding the utility maximising behaviour, which may not be the ideal behaviour as emphasised by existing theories such as pecking order theory or trade-off theory.

## 1.5. Thesis Structure

The thesis is divided into five chapters. These chapters aim to develop a case for our approach towards credit ratings and financing choices; secondly, outline how we will handle these two variables; thirdly, present the model, data, and results. The following discussion comprises four main chapters (starting from chapter two). Chapter two will summarise the literature on credit ratings, financing choices, theoretical gaps and hypotheses. Chapter three will discuss our research methodology, econometric model, and variable selection and construction. Chapter four will present our discussion using data and descriptive analysis. It will also present results, assess the robustness of these results, and justify these results. Chapter five concludes our study by summarising key findings, identifying limitations of the study, and discussing the implications and future areas of research.

# 2. Chapter- Two: Theoretical Framework and Literature Review

## 2.1. Introduction

This chapter aims to explain why we need to treat the role of credit ratings differently. It will argue that the role of credit ratings is more important in determining the type of capital providers a firm chooses rather than the type of security they issue. To do so, one needs to understand what credit ratings mean under different settings and circumstances.

This chapter begins by discussing the different specifications of credit ratings used in the professional and academic context and what they mean. After explaining the nature and characteristics of credit ratings, we will analyse the role of credit ratings as hidden information indicators. We will aim to elaborate on the orientations of existing academic literature and what is missing in them. This chapter's middle part (2.3 onwards) focuses on corporate financing choices and their suitable specification from a hidden information perspective. The discussion will elucidate the nature of corporate financing choices and their various specifications and the role of hidden information in the specification of these financing choices. Once the case for the alternative specification is established, we will elaborate on how this study will specify corporate financing choices. The last part of this chapter (2.4 onwards) will present the existing literature relevant to our topic, summarise the gaps in our knowledge about the role of credit ratings on the choice of capital providers, and layout the main hypotheses that will be tested in chapter four.

The uniqueness of our research stems from its epistemological breadth that simultaneously elaborates the theory of hidden information, theory of capital structure, and theory of financial intermediation concerning information availability.

Moreover, our primary goal is to further the codification of credit ratings as reliable indicators of hidden information and their influence on the choice of capital providers. This study will also try to discuss the hidden information problem in the context of corporate financing choices, critical issues faced in minimising it, limitations of the existing paradigm, the need for an alternative paradigm, and the solution offered by this research. It is important to note here that this study is not about hidden information problems; hence, we will not cover all aspects (e.g., signalling theory) but only what is relevant for this study.

## 2.2. Specification of Credit Ratings

Credit ratings are forward-looking projections or more appropriately forward-looking opinions. These ratings are issued on an ordinal scale, and within each scale, they are further divided into sub-categories. Each category and its respective scale carry a different meaning for its reader. Furthermore, the meaning of credit ratings is complicated by the complex definitions. In academic literature and operational definitions issued by rating agencies, there are at least five different meanings attributable to credit ratings. These meanings can be summarised as a professional opinion, likelihood of default, an evaluation of credit risk, an informed judgment, and a subjective assessment (Nye, 2014). Although none of these claims certifies ratings as a quantifiable factor, credit ratings are considered quantitative variables in academic literature. Another issue in understanding credit ratings is the temporal variations in the meaning and messages conveyed by credit ratings (Cantor & Packer, 1994). It is noted that ratings awarded during periods of economic growth and post-recession are systemically different. Alp (2013) notes that rating agencies significantly inflated ratings issued before the financial crisis. Finally, the rating business is highly concentrated, and nearly 90% of the market share lies with three prime agencies: S&P,

Moody's, and Fitch. These agencies issue varying ratings and associated symbols despite the objective of these ratings across agencies to convey a universal message.

Given such a multifaceted nature of credit ratings intended by issuers and then resultant differentiation in their interpretation, we must identify standard operating meaning for each scale and symbol. Therefore, before beginning with our data analysis and model creation, it is imperative to provide a succinct explanation of credit ratings and the meanings associated with them. The following discussion is intended to ease the life of readers for the rest of the research. The whole phenomenon is divided into two sections: rating symbols and orientation. Each of these topics is explained to help understand the distinction and draw comparisons. It is important to note that this section will provide the basis for the transformation undertaken to construct credit rating variables in the methodology section.

### 2.2.1. Rating Symbols

Rating symbols are the most visible differentiation of credit ratings adopted by rating agencies. Rating symbols and signs also distinguish factors between ratings issued by different agencies (i.e., S&P, Moody's, and Fitch). The simplicity of these rating symbols plays an integral part in their widespread use. These symbols are not only instrumental in the subjective differentiation of firms as per their creditworthiness, but they also rank firms inter and intra-rating categories. For instance, symbols AAA, AA and A,.... indicate firms belong to a different class of credit rating. However, the addition of signs such as '+' (high) and '-' (low) tells the firm's level within a rating category. Therefore, rating symbols are essential in discussing the implications of credit ratings on corporate financing choices. Rating symbols are issued in alphabetic orders such as AAA, AA and A,..... These symbols perform four functions to help minimise information asymmetry between firms and investors.

Firstly, they classify firms according to their creditworthiness by placing them in different rating classes such as AAA, AA, BBB, and BB. Following Kisgen (2006), we will call them broad ratings. Secondly, they identify the issuer's position within that class, such as AA+, AA, AA-, ...., we can identify them as micro ratings. Thirdly, these symbols also provide the basis for the issuer's macro classification, such as investment grade and speculative grade; we will call them macro-ratings. Lastly, it identifies the future direction of credit ratings of that issuer by plus or minus signs. This symbolism enables investors and firms to establish and convey their creditworthiness, respectively.

However, the last role of rating symbols (i.e., plus or minus signs) has received special treatment in the capital structure and credit rating research. After Kisgen (2006) study, plus and minus signs are used as the main specification of credit ratings in capital structure discussion. Therefore, they will be further evaluated in the rating orientations sections. The first three roles of rating symbols are generally treated as ordinal scales and are used in econometric models to identify the impact of moving from one symbol to another. This study is going to use all these symbols in our econometric models. It may enable us to minimise the error of omission and prevent bias if we choose only one or two specifications. The three main classes of credit ratings based on the abovementioned roles can be identified as follows:

1. Micro-Ratings (MicR): AAA, AA+, AA, AA-, ...,.
2. Broad Ratings (BrR): AAA, AA, BBB, ...,.
3. Macro Ratings (MacR): Investment Grade comprising firms rated above BB+ Speculative Grade comprising firms below BBB-.

Table 1 provides a comparative review of credit ratings and shows how three leading agencies use alphabetic symbols to express their opinion. Ratings signs and symbols are

noted in descending order in terms of creditworthiness (i.e., AAA or Aaa indicates the highest possible financial health). The last two noted signs inform us about the nature of the relation between rating agencies and rated entities. Not Rated (NR) means an agency does not consider this firm, and a withdrawn Rating (WD) means the agency has withdrawn any previously awarded rating.

| **Credit Ratings Symbols used by three main agencies** | | | | | | |
|---|---|---|---|---|---|---|
| Moody's | | **S&P** | | **Fitch** | | |
| Broad Ratings (BrR) | Micro ratings (MicR) | Broad Ratings (BrR) | Micro ratings (MicR) | Broad Ratings (BrR) | Micro ratings (MicR) | Macro Rating (MacR) |
| Aaa | Aaa | **AAA** | AAA | **AAA** | AAA | Investment grade (InvG) |
| Aa | Aa1 | **AA** | AA+ | **AA** | AA+ | |
| | Aa2 | | AA | | AA | |
| | Aa3 | | AA- | | AA- | |
| A | A1 | **A** | A+ | **A** | A+ | |
| | A2 | | A | | A | |
| | A3 | | A- | | A- | |
| Baa | Baa1 | **BBB** | BBB+ | **BBB** | BBB+ | |
| | Baa2 | | BBB | | BBB | |
| | Baa3 | | BBB- | | BBB- | |
| Ba | Ba1 | **BB** | BB+ | **BB** | BB+ | Speculative grade (SpecG) |
| | Ba2 | | BB | | BB | |
| | Ba3 | | BB- | | BB- | |
| B | B1 | **B** | B+ | **B** | B+ | |
| | B2 | | B | | B | |
| | B3 | | B- | | B- | |
| Caa | Caa1 | **CCC** | CCC+ | **CCC** | CCC+ | |
| | Caa2 | | CCC | | CCC | |
| | Caa3 | | CCC- | | CCC- | |
| Ca | Ca | **CC** | CC | **CC** | CC | |
| C | C | **C** | C | **C** | C | |
| | | **D** | D | **D** | D | |
| NR | = Not Rated | | | | | |
| WD | =Withdrawn Ratings | | | | | |

Table 1: Credit Ratings Symbols used by three main agencies

### 2.2.2. Rating Orientations

Credit ratings, by their nature, are an indication of the present and future direction of the creditworthiness of a firm. Although it is very subjective to ascertain such direction; however, rating orientations, especially signs associated with them, are essential from management's perspective. In addition to the signs, rating agencies also add the rated entity's outlook and issuance model[5]. These agencies do so to maintain their repute, impartiality, and accuracy. The rating agencies are expected to provide forward guidance of the direction of the ratings, indicate that they are monitoring the firms closely, and are willing to adjust ratings when required.

Therefore, rating orientations can broadly be summarised into four main categories: signs, outlook, credit watch, and solicitation. These four categories enable the investors to achieve more objectivity in interpreting a firm's credit rating.

a) **Rating Signs:** Credit ratings signs primarily serve two purposes; firstly, they provide the relative classification of firms within broad ratings and macro ratings. Secondly, they enable the reader to speculate about the creditworthiness concerns of a firm. Kisgen (2006) argues that firms with a minus or plus signs are often nervous about the possible change in their micro rating. For example, he argues that firms with the plus sign might be aiming or expecting that if they maintain a particular composition of their capital structure may get an upgrade. Alternatively, a firm with a minus sign may avoid debt issuance to prevent a further downgrade. We consider this firm's behaviour is in

[5] When a rating agency rates a firm without solicitation, they usually identify this.

anticipation of a rating change. This behaviour is inevitable due to the ever-changing dynamics of the external environment of capital market participants.

This study aims not to accept or reject these claims about rating signs. Instead, this study aims to further these assertions by investigating these signs' reliability in more detail. We argue that the propagated role of plus or minus in determining capital structure choice only presents part of the picture, not the whole picture. As Kisgen (2006) and others note, changes in the firm's debt issuance behaviour are anticipatory. Firms feel that they may get downgraded or upgraded due to a given rating sign if they choose not to issue debt. However, these studies do not evaluate the corporate actions that firms may take ex-post such change once a firm has received the upgrade or downgrade. This study will first use the plus and minus classification to predict the choice of capital providers and then aim to analyse their choices after receiving the upgrade and downgrade. Table 2 summarises the broad and macro ratings and classifies them using the signs.

Credit Rating Classification using their signs

(This table summarise the broad rating and macro ratings (Investment and speculative grade) using the plus and minus signs. Each rating class with plus indicates that firms is the highest within the broad rating class and for minus it's vice a versa. Whereas, for investment grade and speculative grade BBB- and BB+ are considered important signs)

| | Standard and Poor's | | Moody's | Fitch | |
|---|---|---|---|---|---|
| Signs | '+' | '-' | 1, 2 and 3 | '+' | '-' |
| Broad Rating | From 'AA' to 'CCC' | | From 'Aa' to 'Caa' | From 'AA' to 'CCC' | |
| Investment Grade | From 'AAA' to 'BBB-' | | From 'Aaa' to 'Baa3' | From 'AAA' to 'BBB-' | |
| Speculative Grade | From 'BB+' to 'C' | | From 'Ba1' to 'C' | From 'BB+' to 'C' | |

Table 2: Credit Rating Classification using their signs

b) **Outlook:** Outlook refers to the potential change in a firm's creditworthiness in the medium to long term. It is in anticipation of changes in a firm's fundamental economic and operating environment. It manifests the assessment of the rating agencies about the

future financial health of issuers and the quality of their issued instruments. An important thing to note here is that the rating outlook depends on two things: probable effects of incumbent shocks in the economic environment of firms and actual realization of such an event. Therefore, the assignment of outlook to a firm's rating indicates what effects the possible event may bring and in which direction it will affect the credit rating (i.e., positive or negative). There are five types of outlook usually noted by rating, which are as follows.

i. Positive (Pos): Indicated by 'Pos' shows the prospective increase in the rating.
ii. Stable (Stable): Indicated by 'Stable' shows the ratings will remain stable for the foreseeable future.
iii. Negative (Neg): Indicated by 'Neg' shows the prospective decrease in the rating.
iv. Developing: Indicated by 'Dev' shows that the effects of a situation are not sure. Moreover, the rating change could go in any direction.
v. Not Meaningful (N.M): Indicated by 'N.M' shows that developments are not meaningful in terms of their effects.

c) **Credit watch:** Credit watch indicates the opinion of rating agencies about an evolving situation that can affect the creditworthiness of a firm. This opinion is mainly concerned with the short-term implications of the event. They are not related to outlook. Instead, they are linked to time-specific events such as mergers, takeovers, regulatory actions, or even upcoming elections. Depending upon the nature of the event, a sign (- or +) may follow an asterisk (*).

i. * = Credit watch developing, but the direction is uncertain.
ii. +*- = Credit watch may take any shape.
iii. *+ = Credit watch is under review with the possible upgrade.

iv. *- = Credit watch is under review with the possible downgrade.

d) **Unsolicited:** It tells us about the rating issue model. It indicates whether the credit rating issued by a rating agency is solicited. If a rating is unsolicited, then it may be based on publicly available data. Although, one school of thought may consider such rating free from conflict of interest. However, an opinion about hidden information of a firm without consultation and privileged access to information is not worthy of being considered a hidden information indicator. The importance of unsolicited rating is lower as it is based on information no different from the information available to investors. Bloomberg data terminal notes these ratings with an additional "U" such as "B-u", which means an unsolicited b rating.

## 2.3. Hidden Information and Credit Ratings

Timely provision of hidden information is of central essence for the efficient functioning of capital markets and financial intermediation (Fama, 1970). Firms furnish the hidden information either in adherence to regulatory requirements or voluntarily to minimise the difference between actual and expected premiums on firms' securities (Diamond (1985) and Diamond and Verrecchia (1991)). For instance, the publication of annual accounts and subsidiary statements can be considered a regulatory requirement for releasing information. On the other hand, firms use corporate actions to signal hidden information to minimise the difference between expected and market prices of their stocks. Although both releases of information aim to convey hidden information, their medium of release makes them qualitatively different from each other. The first information is often managed, organised, and presented in ways that managers prefer. Investors view this information as an observed historical fact for analysis and investment decision-making. This information is verified by independent auditors and prepared under-auspices of regulatory

guidance; hence, it is used as a direct basis for valuation, required rate of return, and lending agreements. However, this information is historical, and several constraints inhibit firms to release forward-looking information.

Therefore, firms rely on corporate actions to indicate the future of firms' profitability and success. However, signals issued by firms are open to interpretations and often lead to unnecessary frictions.

In this backdrop, credit ratings become a unique type of information. On one side, they have become a regulatory requirement for institutional investors to justify to the basis of their portfolios (i.e., systematically important banks). On the other hand, they are issued by independent agencies whose reputation is at stake and may suffer if the issued rating is contrary to facts. Although the issuing models[6] of these ratings may raise the question of their reliability, yet they are the ideal forward-looking indicators.

This study argues that, arguably, credit ratings are the information managers view essential to have a good relationship with investors and financial markets (Graham and Harvey, 2001). Although managers may desire to make this public themselves; however, doing so directly and in detail may carry high costs for them. Hence, these firms subscribe to a third party that verifies the information indicating the creditworthiness of firms and issue a meaningful rank of their creditworthiness. In addition to verification and certification characteristics, credit rating agencies universalise the language of this information by assigning an ordinal rank such as AAA+ or AA. This universal assignment of ranks makes

[6] There are two main credit ratings issuing models: solicited ratings and unsolicited ratings. The solicited ratings are issued after the mutual agreement, and firms agree to give rating agencies access to privileged information. In contrast, the unsolicited ratings are issued by rating agencies without having the consent of the firms and are issued based on the publicly available information (Fitch Ratings, 2018; MOODY's, 2018b; Standard & Poor's, 2018a).

the information comparable across different issuers and allows investors to ration the firms efficiently.

Although, credit ratings have been criticised for their inherent problems due to moral hazard issues and conflict of interests of parties involved. Still, credit ratings have become a piece of the mandatory information, viewed as a proxy to assess a firm's ability to access public markets (Cantillo and Wright,2000). Before the financial crisis of 2008, credit rating agencies systematically distorted ratings through rating inflation, poor methodologies to derive them, and poor regulatory oversight of the credit rating agencies (DeHaan (2017) and Partnoy (2017)). Alp (2013) found that credit ratings were systematically inflated in the run-up to the financial crisis. Nonetheless, credit ratings are now an integral part of capital markets, and firms accessing public capital markets find it incumbent upon them to acquire and maintain a credit rating that suits their objectives. This consideration is also noted as the second most important consideration for Chief Financial Officers (CFO) (Graham & Harvey, 2001). They note that managers view the credit ratings of their firms as a tool to maintain the trust of their investors, per se. Investors, particularly those whose balance sheets are regulated, rely on credit ratings to determine their portfolio mix such that it optimises their regulatory capital requirements.

Now in the next few headings, we aim to provide a comprehensive review of the role of credit ratings in the context of corporate financing choices and hidden information problems.

### 2.3.1. Why Credit Ratings Matter?

Credit ratings are ordinal estimates of the creditworthiness of firms, which manifest the opening of credit rating agencies about the issuer (MOODY's, 2018b; Standard & Poor's, 2018a). These ratings are, to an extent, used as an anchor by lenders to ration their borrowers

but also set the required rate of return (Cantillo and Wright (2000), Denis and Mihov (2003), and Dougal, Engelberg, Parsons, and Van Wesep (2015)). Their importance is also subject to the rollover ability that makes them valid across periods[7]. For example, we observed that credit ratings are usually stable across periods until the agency adjusts. It makes them a reliable basis for rationing in capital markets, and they can also be a dynamic factor to which investors can link their portfolios. Furthermore, these ratings are said to be derived from Key Corporate Indicators (KCIs); that help minimises the information asymmetry between insiders and outsiders (Coffee (2006), Elkhoury (2009), and Nye (2014)).

Although Fitch Ratings (2018), MOODY's (2018b), and Standard & Poor's (2018a) argue that these ratings are mere opinions; still, they are inferred as a reliable attribute for making financing decisions by institutions and individual investors alike (Bolton et al., (2012), Boot et al., (2006), Graham & Harvey (2001), Kisgen (2006), and Nye (2014)). Their importance increases further as the three leading agencies call them forward-looking assessments of credit risks.

Fitch Ratings (2018), MOODY's (2018b), Standard & Poor's (2018a) note credit ratings as indicative of the probability of default. This probability is based on first-hand access to privileged information. Therefore, credit ratings hold considerable importance in capital markets as indicators of hidden information and significantly influence capital exchange decisions.

The next question is whether the issuers of these ratings are reliable and do the financial market participants trust these parties. According to Thatcher and Sweet (2002) and Sinclair (2010), credit rating agencies are de facto regulatory authorities that confirm

[7]A rated entity is monitored by credit rating agencies through the credit watch process. Any degradation or improvement in the credit quality of firms is depicted through subsequent changes in credit ratings.

the credit quality of firms and their risk profile to outsiders. Regulators and investors rely on issued ratings and use them to assess investors' default risks.

Although, a Marxist understanding of rating agencies might poise them as protectors of vested interests in financial markets aiming to prolong the financial hegemony of financial elites. Nevertheless, they are needed for the smooth functioning of trustless financial systems. In line with a structuralist view, these agencies are required to ensure that hidden information does not result in disequilibrium of the system (Sinclair, 2010). Therefore, credit rating agencies are gatekeepers of the financial system, which ensure the smooth functioning of the system (Bilson & Delacour, 2012). Their rise is further attributable to recurrent bond market crises of the 20th century and the rise of financial innovation (Shorter and Seitzinger (2009) and Bilson and Delacour (2012)).

There are three major rating agencies: Moody's, Standard and Poor's, and Fitch with 40%, 40%, and 15% market share, respectively (Will Smale, 2016). Historically, their emergence occurred post-civil war due to the mushroom growth of debt and equity securities in financial markets up until 1907(Sinclair, 2010). In 1860 Henry Varnum Poor began publishing investor guides about the railroad industry, which later evolved into Standard and Poor's information service by 1941(Standard & Poor's, 2018b). Similarly, John Moody began publishing his investor guide by 1900, offering information on companies' management and financial record (Moody's, 2018a). However, the financial crisis of 1907 required a more robust debt assessment that resulted in the initiation of John Moody's Analyses of Railroad Investments and outstanding securities (Moody's, 2018a). Therefore, Moody's became a pioneer in bond rating and stands as one of the largest ratters of corporate and sovereign bonds other than Standard and Poor's. Fitch Ratings, the smallest of three agencies, was established in the early 19th century by John Knowles Fitch and investor guide and now survive as a subsidiary of Hearst Corporation.

Analysis of the history of credit rating agencies allows us to identify four distinct phases in the evolution of CRAs: fledgling activity, regulatory compliment, speculation engine, and public good (Bilson & Delacour (2012) and Sinclair (2010)). During the first phase, rating agencies emerged as "subscriber paid" agents, which furnished guides on the quality of outstanding securities. By 1920 Moody's was rating approximately all public securities and had emerged as a critical factor in investors' decision-making (Shorter & Seitzinger, 2009). The second phase emerged after the depression of 1930, which resulted in the 1930 Glass-Steagall act that saw the separation of the financial institution and more stringent provision on the kind and nature of financial exposures held by institutional investors. Therefore, market participants began relying on credit rating agencies' certification to meet the regulatory requirements and ascertain the quality of the available investments. Their importance increased dramatically after the Securities and Exchange Commission (SEC) established the Nationally Recognised Statistical Rating Organisation (NRSRO) in 1975. This status, along with the designation of credit ratings as a direct determinant of the net capital amount required by financial brokers and other financial institutions, made credit ratings agencies effectively a de-facto regulator (Shorter & Seitzinger, 2009).

Post-1970, credit rating agencies began operating as "issuer paid" agents acting as assembly and relay centres of privileged information about firms and their securities. They are argued to help minimise entry barriers on reputable and new security issuers into financial markets. Their ability to provide investors with one relatable scale indicating firms and securities creditworthiness made them imperative in the financial intermediation eco-system.

Recently, with the passage of the Sarbanes-Oxley act of 2002 and the Credit Rating Agency Duopoly Relief Act of 2006, credit rating agencies are now designated as a public

interest good. Their implication on the national economy, business performance, and public welfare makes them nationally important institutions (Shorter & Seitzinger, 2009). This research focuses on this last aspect of credit rating agencies, namely a public good that plays a crucial role in maintaining capital flows between investors and firms and bringing trust in the financial system. We, herein, do not propose a new econometric model of information moderation that can verify credit ratings agencies as financial intermediaries. Instead, we advance arguments proposed by Diamond and Verrecchia (1991), Kisgen (2006), and Ahmed (2011).

### 2.3.2. Credit Ratings and Finance Function

Credit ratings are an essential determinant in assessing the firms' financing decisions. They are also instrumental in creating or diminishing the demand for financial instruments and are a noticeable factor in determining the required rate of return.

Graham and Harvey (2001) note that credit ratings are the second most important consideration for firms' Chief Financial Officers (CFOs). According to Andenas and Chiu (2014), such importance of credit ratings can be ascribed to their capacity to discern the imperfect instruments from good instruments[8].

In the overarching extension of the role of credit ratings beyond mere a regulatory benchmark, one key reason is the prevalence of complex financial products, the internationalisation of capital markets, and the inability of the investor to observe the true credit quality of firms. According to Hau and Rey (2006), cross-border exchange of capital in the form of bonds and equity has grown by 245% since 2000. This intense financial connectedness, in turn, requires investors to have standard information about investment

[8] This helps reduce Lemmon premium and minimises costs of information asymmetry.

across the world. Credit ratings play an important role in standardising an asset's credit quality information. They also save investors' time and costs of due diligence, data collection, and verification. For foreign investors, it gives them digestible and ordered information to classify borrowers or investment products. To firms seeking international capital, it relieves them from the high costs of reducing information asymmetry and gaining investors' trust, as credit rating becomes a genuine indicator of hidden information.

Although credit ratings are beneficial, yet they are not free from controversies. It is argued that rating shopping should be discouraged, and disclosures should be enhanced to make credit ratings more credible and relatable to the future. Conflict of interest is one of the critical challenges the rating industry face. For example, in the case of solicited ratings, firms may indulge in shopping for ratings and choose the rating providers that are likely to issue a favourable rating. Similarly, credit ratings are based on historical information, and using them for futurist financing contracts might lead to poor judgment. Moreover, firms might not find them very useful to convey information about the firm's prospects. Hence, even after the issuance of rating, and information slack may emerge that could act as a deterrent to ratters and rated parties to input the best information possible.

Notwithstanding these good and bad aspects about ratings, it is a fact that credit ratings will remain an integral part of financial markets. Because one must not overlook the fact that credit ratings convey the information required by regulators to analyse the capital structure of regulated entities (Andenas & Chiu, 2014). With such non-diminishing status, credit ratings play an important role in corporate financing decisions (Brealey and Myers (2008) and Boot et al. (2006)). According to Boot et al. (2006), credit ratings act as a coordination mechanism that regulates the flow of information and provides the basis for an agile financial market and equilibrium for supply and demand of capital.

Furthermore, the cost of capital, which acts as an equilibrium, is also not immune to the effects of credit rating. Kisgen and Strahan (2010) and Dougal et al. (2015) note that the cost of capital required by investors is anchored to the firm's recent and current credit ratings. Moreover, having multiple ratings enable firms to certify their hidden information from multiple sources and obtain favourable borrowing rate (Bongaerts, Cremers, and Goetzmann (2009) and Kisgen and Strahan (2010)).

Sinclair (2010) notes that credit ratings can also affect the intra-organizational dynamics of a firm. For instance, a firm wants to achieve a higher credit rating and wants to remain in that pedigree. Then it might bring in the long-term structural changes in its financial and non-financial processes. Moreover, it can also make investment decisions that are more sustainable and oriented towards long-term strategic gains. For instance, Kisgen and Strahan (2010) note that firms may have a target credit rating in mind, and they may adjust their debt levels (financial risk) to maintain a targeted level of credit rating.

Therefore, one may not find it preposterous to argue that credit ratings are a ubiquitous element of the contemporary corporate finance sphere. The abnormality of their influence upon the corporate capital structure and its providers is deeply rooted in its complex nature. This study argues and furthers the literature by arguing that credit ratings can help us understand how firms choose their capital providers. It is different from notable studies on credit ratings and capital structure such as Kisgen (2006), (2009), (2012), and Aktan, Çelik, Abdulla, and Alshakhoori (2019), among others. Unlike these studies, we will focus on the credit providers, individuals, and institutions intended users of these ratings. Our objective is to establish whether there is a relationship between credit ratings and firms' preference of their capital providers, Ceteris Paribus.

### 2.3.3. Roles of Credit Ratings

In the light of the above discussion, a few essential roles of credit ratings would enable us to understand why credit rating may play an essential part in selecting capital providers.

a. **Bargaining and contracting:**

Firms make a contract in an uncertain and asymmetric environment; where, investors and managers are equally unsure whether the ideal outcome may be realised. Historical credit ratings act as a tool to minimise the adverse effects for both parties in this unexpected situation. Dougal et al. (2015) note that credit providers use past ratings to determine current spreads and argue that credit ratings are "historical signals" which comprise ex-post information about the reaction of credit rating agencies to changes in the capital structure of firms. Firms and investors will use this historical information in making current decisions (Tversky & Kahneman, 1974). Further, credit ratings are not mere ordinal ranks, but they comprise a whole set of time-variant signs such as "+" or "-",…,. These variations indicate the difference between firms even within a credit rating class and the future direction of travel in a firm's credit quality. Therefore, credit ratings can play an essential role in forming the opinion of financial markets towards prospects of firms (Cantillo and Wright (2000) and Hadlock and James (2002)).

b. **Capital market trust:**

Rated firms are shown to have a comparative advantage in accessing capital markets. Faulkender and Petersen (2005) point out that firms with bond ratings have nearly 50% more debt than firms without bond ratings. This differential cannot be solely attributed to random factors, and we argue that this is because of the trust accorded by credit ratings to the firms.

Credit ratings, in a sense, diminish the ex-ante opacity and unobservability of large issuers (Faulkender & Petersen, 2005). Further, small investors in capital markets can also use credit ratings to analyse firms for investments without incurring high monitoring costs.

c. **Dynamic categorisation:**

Credit ratings come in multiple forms and shapes; they are long-term and short-term. They rate local and foreign currency issuers, and these ratings adjust to the macroeconomic developments influencing firms' financial health. Given such dynamic nature of credit ratings, credit ratings allow us to study firms from multiple aspects. They allow us to study firms' financing from the public and private aspects; they also enable us to consider local and foreign sources of firms,…, etc.

d. **Capital market access:**

Firms are categorised into investment grade and speculative grade depending on the credit rating symbol. This categorisation may be considered glass sealing which may act as the ultimate determinant of capital structure and its source for firms. Firms in the broadly speculative-grade category may struggle to attract risk-averse large institutional investors and vice versa. Therefore, the broad classification provided by credit ratings becomes vital for firms to gain access to capital markets and maintain the trust of institutional investors.

### 2.3.4. Credit Ratings and Capital Providers

This study argues that firms' credit ratings are a reliable tool to inform investors about a firm's creditworthiness. As credit ratings are described for investors; hence, this study argues that credit ratings are more impactful in determining the choice of capital providers.

This study also argues that practices such as issuing financial reports, conducting internal and external audits, and attainment of favourable ratings are primarily designed to meet capital providers' needs, not capital instruments' needs. Further, these processes provide the sources of information for the derivation of a credit rating. Hence, the value-added status of credit ratings for capital providers is higher than the superficial information disclosure.

The role of credit ratings is multifaceted, and their implications are far-reaching. For instance, Mathis, McAndrews, and Rochet (2009) and Bolton et al. (2012) note that credit ratings assess deficient agents' creditworthiness, inform surplus agents' investment decisions, and enhance regulatory objectives. These roles indicate that firms use credit ratings to communicate unique information to capital providers.

This study argues that credit ratings are a reliable signal and establish trust between firms and investors. Bolton et al. (2012) argue that investors are trusting participants, who are bound to rely on credit ratings to assess the creditworthiness of firms. Furthermore, the perception developed by capital providers about a firm persists in the future. Dougal et al. (2015) find evidence that investors base their spreads using historical spreads and creditworthiness assessments they have previously undertaken.

Credit ratings are often the prime source of information about a foreign firm or investment for international investors. Although, Luitel, Vanpée, and De Moor (2016) note that credit ratings are often biased towards home firms; nonetheless, in countries where accounting standards are not of high standards, credit ratings are the only reliable tool. Furthermore, firms from emerging markets who want to access international markets can use ratings issued by international agencies to establish trust with international investors. This relationship is more beneficial for investors to decide the credit quality of foreign firms.

In addition to this, credit ratings also help firms and investors to align their expectations about risk and returns expectations. On one side, credit ratings help the investor develop and maintain their expectations about different security issuers and adjust their required rate of return accordingly. At the same time, firms can use investors' trust to ensure better returns for its shareholder and liquidity for their instruments. Li, Jeon, Cho, and Chiang (2008), Chen, Chen, Chang, and Yang (2013), Lee, Sapriza, and Wu (2016), and Sensoy, Eraslan, and Erturk (2016) note that firms with stable and improving ratings help firms to maximise returns on their stocks and ensure the liquidity of their stocks.

The role of credit ratings in a firm's financing decisions is also crucial due to their contagion effects and ability to exacerbate effects of adverse events on a firm's capital structure and the likelihood of default. Wilmott (1998), Kräussl (2005), and Afonso, Furceri, and Gomes (2012) note that credit ratings exhibit contagious nature and can cause rapid adjustments in the prices of securities. These capabilities of credit ratings pose a risk for firms, as once a firm loses its rating, it may result in either investor withdrawing their investments or seeking higher returns. It can also create further negative pressures on a firm's risk profile and cause further downgrade and investor flight.

Therefore, understanding credit ratings and persistent irregularities in corporate financing behaviour are valuable. However, this study argues that the emphasis should be placed somewhat differently. In this study, we attempt to understand how credit ratings influence firms' capital provider.

The most relevant study on credit ratings and capital structure is Kisgen (2006). However, his study's significant limitation is that it tries to limit this relationship to issuance behaviour rather than choice behaviour. Our study would extend Kisgen (2006) work and establish the relationship between credit ratings and the choice of capital providers.

Our research argues that credit ratings are a robust and reliable tool to minimise information asymmetry between firms and investors. Being independent assessments of a firm's creditworthiness, they can quickly signal the internal net-worth of firms to outsiders. Furthermore, regulatory trust in credit ratings enhances their legitimacy. Credit ratings can help investors in several aspects, such as inhibiting adverse selection, becoming a screening tool, and helping investors to ration firms.

Credit ratings can also enable firms to construct a trade-off between costs and benefits of information disclosures and risks of over disclosure. Therefore, we argue that credit ratings can establish trust between firms and capital providers as MacKie-Mason (1990) notes that hidden information can inhibit managers from seeking external finance due to the risk of under-pricing or demand higher risks premium. Therefore, firms with reliable ratings are less likely to suffer from this problem. In this pretext, credit ratings can be regarded as a reliable tool to convey hidden information and allow firms to capture market trust, tailor their financing policies and optimise the cost and structure of capital.

## 2.4. Hidden Information Problem in Financing Choices

A hidden information problem, commonly known as the "information asymmetry" problem, arises due to a trustless financial exchange system. One party knows more than the other party, and the information-deficient party depends on what the knowing party discloses to them. Therefore, in a pure exchange economy, financial contracting (e.g., between firms and investors) is an inferred process where each party assumes the stated prices as a de facto indicator of actual value. This price reflects complete information pertinent to a commodity or an asset. Hence, using price as an indicator of value, supply and demand forces clear the market. In the disequilibrium scenario, market through tatonnement resets the equilibrium and the exchange flow continues.

In capital and money markets, the expected return rate act as the price, which ensures the equilibrium of the market (Stiglitz & Weiss, 1981). Stiglitz & Weiss (1981) note that in a single period exchange, the supply side of firms' capital is likely to be influenced by the rate at which the firm is willing to borrow. Using banks as an example, they suggest that banks may use the offered rate as a criterion to judge the hidden attributes of investments. Thence, the rate becomes an indicator of hidden information pertinent to borrowers (firms), and it is indicative of the perceived quality and riskiness of investment or loan under consideration. For example, a higher rate would indicate that the firm has exposure to riskier projects.

On the other hand, firms and management would use the rate offered by the bank as an indicator of the bank's perception about themselves and try to create financial contracts that may maximise return to its efforts. Therefore, managers should choose the bank which offers them the most favourable rate and flexibility to maximise their personal and corporate gains.

However, due to demand greater than supply or supply greater than demand, this interest rate struggles to eliminate the information asymmetry problem even within a single period. (Marshall et al. (2016), Rajan (1992), MacKie-Mason (1990), Bester (1985), Stiglitz and Weiss (1981), and Jaffee and Russell (1976)). It can lead to adverse selection, risk substitution, moral hazard problems, rent appropriation, free-rider problems, and risk aggression. These issues arise as no party can fully observe the hidden information using offered and accepted rates.

There are three other notable issues with the single period rate-based equilibrium: multiperiod exchange, no rate, and unobservable objectives. The first is how financial exchanges could continue in a multi-period setting where the incentive (rate) needs to continually adjust to ensure firms do not deteriorate the quality of their assets after

borrowing and they fulfil the terms of investment. The agreed rate remains fixed for the contract duration; hence, its dynamic alignment is far from possible. Although the principals (lender or shareholder) can offer other rewards to maintain the profitable relationship, the agent (firm) can pretend trustworthy behaviour to maintain the relationship. Still, we need a device to derive a dynamic equilibrium where each party can maintain a stable relationship to ensure their income and cost certainty over a more extended period.

Secondly, for exchanges such as equity, how this rate can act as an indicator of hidden information, where the agent is not bound to pay a rate and equity investors have no power in drafting the covenants of the contracts as shares are usually traded as standard instruments. Lastly, how to harmonise the strategic interests of each party to capital exchange using interest rates (Stiglitz & Weiss, 1981). For example, the supply-side may be more concerned about having access to stable and safe income, and the demand side is interested in using capital to invest in projects with variable cash flows. Therefore, it becomes difficult to maintain the equilibrium using one single rate in the presence of conflicting objectives.

These issues jointly exacerbate the information asymmetry problem and make it imperative to have another tool to minimise information asymmetry. Diamond (1985) argues that there is a need for an informational instrument over and above the interest rate to inhibit market disequilibrium. It is observed and proposed that firms should use (visual or hidden) reliable tools to signal external parties about firms' creditworthiness, asset quality, and future cash flows stability (Ross (1977) and Diamond (1985)).

The desirability of such signals has been questioned that whether issuing extra information or releasing somewhat privileged information can enable firms and managers to extract better rent for their decisions (Miller and Rock (1985) and Daniels, Shin, and Lee (1997)). The release of extra information is costly and burdensome for a firm and encourages

emitters to distort information to gain extra advantages. For instance, if we consider dividends as a hidden information signal and expect outsiders to use them as a gauge of firms' expected earning then firms are incentivised to pay more dividends at the cost of investing in positive Net Present Value (NPV) projects (Miller & Rock, 1985). Similarly, when debt level is used as a signalling tool, it indirectly incentivises firms to continue borrowing irrespective of whether the new borrowing level adds to the value of firms or only increases risk causing severe financial distress.

Voluntary disclosure of insider information beyond the minimum regulatory requirement is standard in public firms. Public firms expend resources to continually update their external investors about their growth, earnings, and risks, among other things (Diamond (1985), Hartmann-Wendels (1987), Diamond and Verrecchia (1991), Easley and O'hara (2004), and Kothari, Shu, and Wysocki (2009)). However, the issue is that we do not have precise criteria to judge which type of disclosure is best for optimal financing decisions. Two critical questions need a priori answer to suggest the appropriateness of a hidden information indicator. The two questions are as follows:

1. What is the best instrument for information disclosure that satisfies both parties to a financial contract?
2. How to know that the firm has achieved its desired objectives?

Consider this scenario, if one would like to ask that out of dividend policy, a target leverage level and enhanced reporting, which minimises hidden information costs. The likelihood is that one's reply maybe none or a combination of all. We want to present a few points for consideration without problematising the issue. It will enable us to visualise how would a firm prefer to handle the hidden information problem.

Let us examine the first question: "how to decide which approach is better for firms to signal insider information?". To answer this question, let us consider a firm that needs to make some long-term financing decisions; it has found a set of new projects with positive NPV and has estimated default risks. Knowing these projects' quality, the firm wishes to raise finances without incurring any significant information asymmetry.

Three common strategies are prescribed in the literature to minimise information asymmetry costs. These options are no disclosure, optimal disclosure, and rationed information. We will describe each scenario briefly below to develop a case for this research.

The first instance could be when the management chooses not to tell prospective investors about projects and default risks. Then, one scenario is that investors may seek higher premiums for their money, which may destroy shareholders' wealth. Moreover, no disclosure could also result in the situation where the firm can only attract risk aggressive buyers aiming to take advantage of information asymmetry by short selling. In either case, firms must let transfer of wealth from existing investors to new investors as the latter will get a higher premium than existing investors, and the latter will have a free ride on the long-term investments of existing investors.

The second instance could be the scenario where firms may use corporate actions as a strategy to relay about a firm's prospects and risk (Ross (1977), Diamond (1985), and Diamond and Verrecchia (1991)). In this case, the firm will reduce the premium demanded by telling investors about risks and return and ensuring that investors pay a fair price for the security. However, an unintentional cost of this news is that a firm's competitors are also equally likely to access this information and interpret it the same way investors would do (James, 1987). It could lead to the free-rider problem where a third party tries to replicate the firm's investment and disclosure strategy and attract the investors away. It is a more

acute case of a hidden information problem that is given the least attention in corporate financing literature.

Even if the firm manages to find some optimal tool to release the information, this cost alone should be sufficient to eliminate firms' competitive advantage and brings us back to the age-old problem, irrelevance theorem (Modigliani and Miller (1958), Miller (1977), and Miller and Rock (1985)).

The third scenario is a more mediated approach that assumes firms will carefully ration their medium of disseminating information and audience to whom they want to disclose their information. Firms can either use a well-informed investor or a mediator on whom investors trust, such as credit rating agencies. Firms might choose a third party capable of verifying the information and disclosing it to the extent that it does not harm the firm's overall goal.

The second question, which is more subtle than the first one that "how to verify that the firm has achieved its objective via reducing information asymmetry". Because analysis of a firm's ability to signal appropriate and timely insider information has always generated contradicting results, moreover, the empirical evidence is mixed that at best offer partial explanation vis-à-vis signalling and its success.

For instance, researchers have studied dividends increment and decrease as a measure of reducing information asymmetry and improving returns (Fama and Babiak (1968), Fama, Fisher, Jensen, and Roll (1969), Miller and Rock (1985), Healy and Palepu (1986), Hartmann-Wendels (1987) and Lang and Litzenberger (1989)). Nevertheless, the results indicate a mixed behaviour and note dividend policy as a ritual or at maximum as the desire to maintain a stable pay-out ratio or serve a particular clientele (Short, Zhang, and Keasey (2002) and Baker and Smith (2006)). Even if there seems to be an association

between dividend policy and hidden information, the issue is to estimate the success of this signal. Furthermore, each firm is bound to have different views concerning their future cash flows, expected stock price, and acceptable cost of capital. Therefore, a more robust indicator is needed that is not only directly verifiable or verified by someone on behalf of outsiders but is also observable as a priori and a posteriori fact.

Therefore, a hidden information problem requires two indicators: One indicator that can convey information to outsiders, and the second to help firms know that they have achieved their objective. The first indicator may act as an information signal that firms wish to emit, and the second is an outcome that firms wish to achieve.

This study proposes that credit ratings are an ideal indicator to communicate hidden information to outsiders, and the adjacent or subsequent choice of capital providers is an excellent indicator to assess the achievement. This study will test and verify that "credit ratings and choice of capital provider" can be the two indicators required for minimising hidden information problems. We will discuss the strengths of these indicators in a later section. For the following few sections, we will elaborate on the hidden information problem further, how capital structure literature treats it and what this study proposes.

### 2.4.1. A critique of the existing paradigm

In the previous section, hidden information is explained as a multi-faceted issue that is imperative in capital structure discussion. However, it is argued that the role of hidden information in determining financing behaviours of firms depends on the interpretation of theory used to analyse the relationship (Leary & Roberts, 2010). They argue that due to this non-standardised interpretation of the theory, researchers struggle to find conclusive evidence for this relationship.

Furthermore, attempts to establish the link between hidden information and capital structure struggles to maintain consistency across different theories. For instance, pecking order theory argues that firms' decision to raise funds externally and then choose between debt and equity instruments is a function of information asymmetry. However, target debt level theory proposes that firms use their leverage levels and change to signal hidden information. Neither of the cases presents a satisfactory solution to the problem of hidden information.

This study argues that capital structure research unnecessarily "…impose homogeneity in capital structure across heterogeneous firms and analyse the changes that different firm types would make in capital structures to signal their types" (James & Wier, 1988, p. 343).

The homogeneity imposed in hidden information models can be categorised into two major types: debt and equity levels and the issuance of new instruments. The first homogeneity assumes that the role of hidden information is limited to determining the optimal debt level. It is also assumed that investment levels are fixed, and firms are not facing imminent deficits to finance their projects. Therefore, the objective of management can be about signalling the existing quality of firms' assets and the firm's value. The second type suggests that different firms under different circumstances follow the same issuance behaviour.

This study argues that both treatments of hidden information problems, as described above, are flawed. These approaches do not consider the issues such as bankruptcy costs or renegotiation costs in the case of financial restructuring. These approaches also assume a perfect market condition where firms have unfettered access to capital markets.

Furthermore, none of these models accounts for the strategic contents of corporate financing decisions, as noted by Williamson (1988) and Barton and Gordon (1988). Moreover, neither of these approaches requires firms and investors heterogeneity, and more importantly, they assume that all investors possess the same information level for the firm, Ceteris Paribas. Therefore, we need to develop a lateral interpretation of hidden information's impact on the financing choices of firms.

This study argues that the role of hidden information is more profound in the selection of capital providers rather than capital structure instruments. Klein, O'Brien, and Peters (2002) argue that firms use their choice of capital providers to communicate hidden information. This study argues that firms are not passive actors in capital markets. They can ration their investors and choose from whom they would prefer to raise their capital. As passive agents, firms need to be rule-taking parties that must continually adjust to the expectations of their investors. However, firms are noted to play an active role in their financial contracting. Firms select their capital providers based on the type of information asymmetry they are most concerned about[9] (Rudolph, 2006) or based on the quality of information possessed by different investors (MacKie-Mason, 1990). Such division of investors, as argued previously, is necessary to meet the strategic objectives.

Reasons for which firms may consider rationing their capital providers are varied. Firms may prefer private investors to raise additional capital to finance their new projects because it would not release information to their rivals. Similarly, firms' desire to reduce moral hazard and adverse selection consideration (Krishnaswami, Spindt, & Subramaniam, 1999) or their concerns about post-default circumstances (Rudolph, 2006) can also compel

[9] Rudolph, 2006 notes three types of information asymmetry: ex-ante, interim and ex-post.

firms to prefer some capital providers over others. Similarly, other objectives can be protecting existing ownership structure (Brealey, Leland, & Pyle, 1977) or formulation of incentive contracts (Ross (1973) and (1977)).

For the following sections, we further critique common orientations towards capital structure decisions and hidden information problems and argue why they are insufficient.

### 2.4.2. Debt Levels and Hidden Information

In decisions regarding debt levels, the role of hidden information is limited to achieving an optimal debt level. Firms use the issuance of new debt or reduction of debt as an instrument to indicate the hidden information to outside investors. Herein, the managerial objective is to convey information about a firms' quality of existing assets, their expected cash flows, managerial stake in the success of the firm, and mean and variance of returns (Ross (1977), Leland and Pyle (1977), Heinkel (1982), Ravid and Sarig (1991), and Brick, Frierman, and Kim (1998)).

As per this approach, the debt levels of a firm ideally present two realities about a firm: fixed commitment and default probability. This perspective argues that from investors' perspective, these two factors indicate how confident managers are about their expected cash flows and how they feel about their current risk level. A higher debt issuance should indicate that managers can generate enough cash flows to cover future fixed claims and remain solvent.

The issue, however, is to predict the expected cash flows variance and default probability. In a world where investors and managers can make reliable mean and variance returns forecasts, the only rationing mechanism required is ascertaining an optimal debt level. This simplicity often does not stand in reality, as variance estimates based on historical information are not dynamic enough to handle future shocks. Further, this approach does

not consider the cost of restructuring in the event of financial distress or default. Firms facing adverse shocks to their expected cash flows may attempt to restructure their debt agreements to delay bankruptcy. Therefore, firms need to know from whom they are borrowing when issuing debt. Certain capital providers could be more hostile in the restructuring; then, restructuring costs should lower the optimal debt level. Models based on pecking order theory and target debt levels struggle to consider these issues.

Further, the mean and variance of returns as indicators of a firm's risk level also inhibit management from taking the necessary risk. To generate higher returns and maximise the value of firms', managers need to invest in riskier assets. This risk must be over and above the current debt level and involve taking more risk projects. This new risk level is not the risk level that is initially used to indicate the firms' value and quality of past returns. Therefore, the existing investor may view this as a decline in the creditworthiness of firms and demand higher returns.

Another critical limitation of debt level and hidden information hypothesis is that it overlooks the hysteresis in managerial decision making (Dixit, 1992), which inhibits firms to make sudden changes. Let us assume that management understands the optimal relationship between risk and debt level. Moreover, there is a sudden negative change in the expected cash flows from the investment. It should ideally result in managers trying to reduce their debt levels by disposing of this investment or retiring their other loans to minimise the financial risks. However, the issue is to liquidate that investment immediately, which firms should find difficult to do as it is bound to take time; therefore, firms must operate under a state of disequilibrium for a prolonged period. The question is, how would firms inform outsiders about this unwanted disequilibrium. Hence, firms need another modus operandi to continue borrowing without incurring high costs.

In addition, simple reduction and increment in leverage do not consider the re-negotiating effects of debt agreements with private lenders. Given the importance of private borrowing for firms (Gorton & Winton, 2003), any change in debt level should consider the implications for agreements with a private lender. Any unnecessary restructuring of lending agreements with extra-informed private lenders may lead to a higher premium for subsequent financing arrangements. More importantly, if the resultant change in covenants depicts a negative perception by these private lenders, then the public investor is likely to give more weightage to this negative and demand a higher premium.

Empirical evidence also indicates that the so-called expected relationship between debt levels and hidden information is not easily observed in the data. Harris and Raviv (1991), Rajan and Zingales (1995), Titman and Wessels (1988), Fama and French (2002), Frank and Goyal (2003), Fama and French (2005), Frank and Goyal (2008), and Frank and Goyal (2009) note mix evidence on the relationship between debt level and profitability and changes in debt level and returns on stock prices. Studies that treat changes in debt levels as an event followed by market reaction also note that markets underreact for a prolonged period after the change (Eckbo, Masulis, and Norli (2000) and Brav, Geczy, and Gompers (2000)).

Even if a manager chooses to use debt level changes as a means to (mis)lead investor (assuming the management believes debt level is an important indicator), the reaction is not different from a normal change, and there are no extra benefits from (mis)leading the investors (Chan, Ikenberry, Lee, & Wang, 2010). Therefore, treating debt levels changes as an indicator of hidden information is confusing for investors and managers to screen and decide how to send an appropriate signal. According to Klein et al. (2002, p. 329), debt levels are not sufficient to indicate that *"...whether the information pertains to managers' private information about future profitability, changes in risk, and managements' belief that*

*shares are simply misvalued by the market* (even if the managers have no private information about future profitability or risk)."

### 2.4.3. Security Issuance and Hidden Information

What if the objective function of hidden information signalling is not only to signal risk and quality of a firm's existing assets; but also to convey the quality of their new investments. The new investments are unobservable to outsiders, and firms cannot communicate directly about their plans to investors. Therefore, Myers and Majluf (1984) argue that managers can communicate to outsiders about the quality of new investments by their choice of new securities. This perspective argues that managers may only decide to raise capital through the issuance of equity if the market currently overvalues the firm's equity. Otherwise, management should pass such an investment opportunity.

Therefore, financing decisions can be described as a function of a manager's attempt to select the mode of financing, such as it minimises the information asymmetry costs and enable her to maximise the wealth of existing shareholder. Klein et al. (2002) categorise the possible issuance behaviour to raise new financing into two categories: equity versus none and debt versus equity.

In the first type of decision, the manager is faced with the choice to issue new stocks as an Initial Public Offering (IPO) and Seasoned Equity Offer (SEO) or not make any issue. Because if we assume that the manager is going to act in the best interest of existing shareholders, then she should only issue new shares if the market is willing to pay a premium; otherwise, it is better to pass this opportunity. However, the catch is if she thinks that the market overvalues the firm's stock and issues new stocks; even then ex-post issuance market value of the firm may drop. Hence, according to Myers and Majluf (1984), issuing equity is never an ideal option and should only be considered a last resort option. It will

signal negative hidden information, and as a result, it will generate negative returns for existing shareholders and those who paid premium (D'Mello & Ferris, 2000). A contradictory note to this is that if investments are perilous, then firms should choose an equity to finance them (Frank and Goyal (2003) and Morellec and Schürhoff (2011)).

The second set of choices comprises firms' decision to raise funds either through debt and equity securities and assuming that information asymmetry cost is lower for debt.

Myers and Majluf (1984), Myers (1984b), and Shyam-Sunder and Myers (1999) summarise this behaviour as a pecking order behaviour in which a firm follows a hierarchal preferential financing behaviour. Firms would ideally move from internal funds to riskless debt, then risky debt, and if the firm still wants to raise more funds than equity, equity is only issued in desperate conditions, Ceteris Paribas.

Firstly, empirical evidence in support of these financing behaviours is mixed and often contradicts the pecking order hypothesis itself (Jung, Kim, and Stulz (1996), Helwege and Liang (1996), Fama and French (2002), and Frank and Goyal (2003)). Furthermore, firms with fewer growth opportunities and higher exposure to risk assets can mimic the issuance behaviour of firms who genuinely have good growth opportunities (Klein et al., 2002). As a result, investors would struggle to ration poor quality instruments in favour of good quality instruments .

Secondly, this treatment of corporate financing decisions imposes a strict behavioural order on firms, in which firms fully exhaust each preceding option before moving on to the next option (Leary & Roberts, 2010). Therefore, firms tend to use (ideally exhaust) their internal funds before raising funds externally. Once the investment needs exceed internal funds, firms first prefer to issue debt (ideally, they should be able to issue an unlimited amount of debt), and if they still need more capital, only then equity is being

issued (Leary & Roberts, 2010). However, such strict interpretation of theory limits the ability of researchers to accurately predict firms' behaviour as per the pecking order hypothesis. For instance, Bartholdy, Mateus, and Olson (2015) note that Portuguese firms do not exhaust the first option (internal funds or debt) before moving to the second option. Similarly, Viviani, Lai, and Louhichi (2018) note that despite the high cost of cash holding, firms do tend to hold excess cash under the state of information asymmetry. Leary and Roberts (2010) also note firms' propensity to hold cash reserves and preserve their debt capacity as the main reasons which lead firms to defy pecking order behaviour.

Chirinko and Singha (2000) find that the pecking order remains valid even if we reverse the issuing order. Since firms cannot strictly observe pecking order behaviour, models based on pecking order behaviour struggle to have more than 50% predictive accuracy (Leary & Roberts, 2010). Further, the reliability of financing decisions as per the pecking order hypothesis is also limited by the existing equity structure of a firm as firms who have more equity prefer to use equity for new financing (Chirinko & Singha, 2000). Further, the degree of information asymmetry due to firms' age and growth is also not a significant determinant of a firm's financing decision (Helwege & Liang, 1996).

Klein et al. (2002) also note that studies struggle to find evidence for pecking order behaviour to exclude static trade-off theories of capital structure. Even, Shyam-Sunder and Myers (1999) test and find that firms' behaviour to finance deficit is in line with pecking order hypothesis and static trade-off, though the first has special significance. Hovakimian, Opler further confirm these mixed results, and Titman (2001), where firms exhibiting pecking order behaviour tend to adjust towards a target capital structure.

Therefore, how can managers use pecking order behaviour to convey hidden information and simultaneously nullify its purpose using the target adjustment model? An initial solution to this problem suggested by Myers (2003), Leary and Roberts (2010), and

Lemmon and Zender (2019) is a modified version of the pecking order. This modified version is proposed to allow for unexplained firms financing behaviour by allowing firms to navigate away from a strict order of pecking order behaviour. A non-aligned behaviour can be described as a firm's tendency to maintain a minimum cash balance or a firm's preference to maintain a certain debt level. However, this modified version also struggles to consider such as cash balance target into account (Leary & Roberts, 2010).

Hence, despite its conceptual eloquence, pecking order behaviour is not very reliable when it comes to the treatment of financing decisions as a signalling device. If firms strictly follow pecking order behaviour, they may struggle to differentiate their high risk and high return projects from ordinary ones. Because a bond may be issued when the project is of high default risk, and stock may be issued when the project has low default risk. On the other side, they may also struggle to differentiate themselves from low-value firms that are just mimicking their financing behaviour and causing unnecessary downward pressure on the value of their instruments.

Lemmon and Zender (2019) strive to overcome these limitations by offering a theorem  to use debt covenants as a mechanism to infer the correct objective and propose that capital structure policy should reflect these covenants and the necessity of their renegotiation. However, the issue is that it is hard for new and retail investors to observe these covenants, and further, in the case of renegotiation, the details are also not subject to public disclosure. Secondly, the equilibrium proposed by Lemmon and Zender (2019) is more suitable for existing lenders who are writing new contracts as they are better ought to know the extent of additional restrictions to be imposed on management. They argue that when an existing lender receives a negative public signal, they may opt to demand early payment given the debt covenant allows them to do so.

Furthermore, debt contracts issued for public financing cannot force the firms to write more restrictive covenants as these investors do not know the restrictions imposed by existing debt covenants. Lastly, in the case of renegotiation, Lemmon and Zender (2019) assume that negotiation is more likely to occur between existing investors and firms, not the new investors and firms. This study argues that to minimise these issues and improve the predictive power, we need to allow firms to have a relational capital structure base.

This study argues that the pecking order theorem cannot be successfully shown doing any better than target debt level theory. In some respects, pecking order behaviour exacerbates the issue by requiring the firm to avoid equity at all costs and use internal funds for reinvestment as much as possible. If an inferiorly informed lender allows firms to extract better rent but poses a severe risk in case of financial distress, then why not a superiorly informed existing shareholder can help raise cheaper funds without losing much informational advantage.

This study does not say that firms should differentiate between their shareholders by giving more information than the other. However, a better investor relation mechanism can improve investors' information about firms' prospects and use this extra knowledge to raise funds from them. Although one may note this as an anomaly, Warren Buffet's investor relationship management style at Berkshire Hathaway indicates a success story.

### 2.4.4. Need for an Alternative Paradigm

If we reimagine the hitherto defined relationship between hidden information and corporate financing decisions, it seems a manager's desire to take a "path of least resistance" (Barclay & Smith Jr, 1999). This least resistance approach often suffers from ignorance of the strategic needs of firms, debt capacity of firms, and cash reserve needs (Leary & Roberts, 2010). Even if we assume a perfect market scenario, in which firms enjoy unfettered access

to debt, the firm still must observe a limit on its borrowing levels; otherwise, investors may sell the stocks and move to another firm (Modigliani & Miller, 1958).

Furthermore, in contradiction to what a purist signalling theorem suggests, firms need to consider the costs of violating the target debt levels, contractual obligations, and costs of financial distress (Barclay and Smith Jr (1999) and Lemmon and Zender (2019)). Evidence also points that the pecking order theory should adopt a modified version to explain firms' financing behaviour that contradicts its predictions (Leary & Roberts, 2010).

This study is critical of existing capital structure theories due to their undue reliance on linear econometric models. Although this makes the signalling model of corporate financing simple, they do not provide reliable generalisations. The efficacy of these models depends on time, industry, and even the treatment of debt levels. Therefore, we argue that this ignores the long-term nature of financing behaviour.

As a running entity, firms financing behaviour is not only a function of its accumulated debt ratio or prospective projects, but issues such as refinancing existing projects, retiring non-interest-bearing commitments, and meeting short-term liquidity need also play an important role. Therefore, we argue that firms need a financing policy that can provide continuity of policies and consistency. It requires firms to finance from reliable, informed sources, and suit firms' needs under different periods and conditions.

In their seminal paper, Stiglitz and Weiss (1981) recognise that lenders and borrowers need to employ some other mechanisms for having a long-lasting relationship. They argue that banks offering lower interest rates and firms adhering and outperforming their commitments can be one way to handle the relationship across periods. However, we propose that credit ratings are a better alternative to this.

Lastly, empirical evidence ascertained from conventional hidden information models is neither conclusive nor immutable. For instance, pecking order and trade-off models propose capital structure as a function of information asymmetry and ex-post debt issuance costs of financial risk. However, studies note contrary evidence to this relationship. Frank and Goyal (2003) note that small firms prefer equity rather than debt, given that equity is the costliest instrument for raising capital. Another example is larger and old firms with extra cash flows; as per theory, they should avoid issuing any external securities (Barclay & Smith Jr, 1999). Instead, they should use internal funds to finance new investments. However, Rajan and Zingales (1995) and Jung et al. (1996) note that firms with significant assets and surplus cash flows increase their debt levels. Maybe these firms find that additional debt is cheaper for them and marginal implications of new debt on their debt capacity are negligible.

This study argues that such contradictory behaviour of firms is due to the utility maximising behaviour of managers. Often management finds alternative options, contrary to folk wisdom, maximising their utility. Furthermore, many endogenous and exogenous factors can limit a manager's ability to raise finances unhinderedly from her desired source.

We propose to study capital structure as the choice of capital providers instead of capital instruments. Current paradigms prescribe a general financing behaviour of firms that ought to minimise informational asymmetry and maximise the firm's value. However, the issue is their oversimplification of the dividing line between securities preference and preference of buyers of those securities (MacKie-Mason, 1990). Each preference is bound to generate different effects on firms' financing behaviour as the motivations for both are different.

Therefore, this study argues that the decision to securitise a financing event is at the second stage in sequence as firms first need to choose from whom to raise new funds and

choose which instrument is best. This section will lay out this lateral perspective in more detail and provide the conceptual framework to justify how this study constructs firms' financing decisions.

### 2.4.5. Information-Based Division of Capital Providers

The division of a firm's investors based on their information quality is well-grounded in financial theory; however, the emphasis is usually placed on bank versus non-bank investors. Therefore, to understand the division of capital providers based on information, we first need to examine the dynamics of the lending relationship between firms and banks. Fama (1985) divides the fixed payoff claim holders into inside and outside parties and notes that *"...inside debt is … a contract where the debtholder gets access to information from an organisation's decision process not otherwise publicly; available…, [and] participate in the decision process…." Fama (1985, p. 36).*

He further notes that "…bank loans are inside debt, as are the other types of debt commonly classified as private placements." These privileged lenders help firms reduce their information asymmetry costs and become reliable third-party verifiers to outsiders (Fama, 1985). Therefore, a firm's financing behaviour is influenced by the savings a firm can make by maintaining a long relationship with the bank and maintaining its creditworthiness as per the requirements of the bank (Fama and Jensen (1983) and Fama (1985)). In addition to cost savings, firms can also use the relationship with the bank, renew loan agreements with the bank, and attract additional investment from the bank to signal positive information about the firm. As noted by Fama (1985, p. 36) that *"...positive renewal signals from bank loans mean that other agents with higher-priority fixed payoff claims need not undertake similar costly evaluations of their claims."*

This study argues that firms need to carefully select their other investors, such as private lending firms and fund managers and maintain a good relationship with them in addition to the bank. These investors will become well-informed over time and can help firms minimise their costs. Diamond (1991) furthers the importance of these insiders by arguing that they can also act as the verifier of a firm's risk and creditworthiness to outsiders. Therefore, a firm can rely on its insider lenders through thick and thin and feel confident while making bold investment decisions.

### 2.4.6. Sequentially Signalling using Capital Providers

An essential benefit of the approach, which this study notes, is that firms can use their choice of capital providers to construct sequential signals of their hidden information. We argue that a firm can emit two hidden information signals to outsiders by carefully selecting its capital providers. Firstly, firms can send a screening signal by securing funds from desired capital providers. It may help firms indicate that firms are of good credit quality and well-informed investors trust the firm. Secondly, they can also signal hidden information by renewing their financing agreements with the preferred investors without any negative changes with these investors. Let us call it a consistency signal. These two combined signals can be considered sequential signalling, which this study argues are the prime objective of firms' financing decisions.

Let us assume a firm actively borrows from a bank to finance its short-term and long-term needs. This relationship can be categorised into two events: debt agreement announcement and debt agreement renewal or change or cancellation. Both events help minimise information asymmetry (Fama (1985), James and Wier (1988), and Diamond (1991)). For instance, the announcement of a new debt agreement exhibits that banks with access to private information about the firm consider the firm creditworthy. Therefore, firms

can indicate their credit quality to outsiders at no extra cost by securing a debt agreement. Later, if a firm can ensure that the bank chooses to maintain its relationship with the firm, this continuity itself can act as a "hidden information signal". In contrast, public lenders can use this continuity as a positive signal about a firm's risk and growth prospects. Once the outsiders feel confident that the firm is not a lemon, they may be willing to pay a higher premium for its shares, which will increase the firm's value.

Instead, it is a more complex way of linking firms' financing decisions to the firm's value maximisation objective. However, this view allows us to entertain those aspects of financing which are non-linear and more complex than a simple linear interpretation of financing decisions.

Furthermore, if firms need to finance their projects every year and the scale and scope of projects change more often than assumed by traditional pecking order theory, firms need to have a stable lender who is well informed about the firm. A firm may consider their private bank such a lender. Firms can achieve a multi-period signalling equilibrium by maintaining an effective communication link between borrowers and lenders. Firms try to maintain the quality of their assets and creditworthiness and maintain earning capacity to meet the fixed obligations. Firms can also enjoy financial certainty by having a stable base of capital providers.

In contrast, lenders continue to assess the firm's risk and growth profile through their privileged rights and access to hidden information. Therefore, if a firm dither from best practices or takes value-destroying risks, then these lenders may stop lending to such a firm. Hence, a new rationing equilibrium is derived where both parties mutually ration each other in line with their strategic interest (Stiglitz and Weiss (1981) and (Fama, 1985)).

A peripheral benefit of the sequential signalling approach is that outsiders can make inferences about the hidden information using the changes in the lending relationship of a bank and a firm. If a firm announces new bank debt, then such news should be viewed positively by outsiders, and if a firm is subject to cancellation of bank loan, then that should be treated as a piece of negative news. This view of bank debt is still a favoured argument as it is argued that to minimise hidden information problem covenants attached to debt agreement should be more restrictive and give a decisive role to the privileged lenders (Lemmon & Zender, 2019).

### 2.4.7. Is Bank vs non-Bank Division Enough

Although previous discussions outline how valuable a relationship with banks is; nonetheless; firstly, it ignores the moral hazard problem innate in such a relationship between a bank (or any other privileged lender) and a firm. Secondly, it overlooks the conflict of interest in the relationship between bank and firm. Thirdly, this division of capital providers focuses only on bank loans and suggests that to manage hidden information problem, a firm only need to choose between bank loans and all other types of financing. Above all, empirical studies have not been able to find conclusive evidence to support that there is a significant relationship between returns and bank debt agreements. There are two broad approaches in the existing literature on this: those who favour this relationship and those against it. For example, earlier studies such as James (1987) and James and Wier (1988) note that the announcement of credit agreements with banks affect stock prices positively compared to other credit agreements with other private lenders. They also note that the so-called positive effect is due to debt agreements with banks and any such positive effect is negligible for non-bank private placements.

Similarly, Diamond (1991) also notes that banks, due to their informational advantage, can also act as a valid intermediary for outsiders to verify the hidden information of the firm. Therefore, in a sense, he extends the role of debt agreements with the bank as a certification of a firm's creditworthiness. Slovin, Johnson, and Glascock (1992) also note the favourable implication of debt agreements with banks on a firm's value; however, they argue that such effects are more significant for smaller firms. Rajan (1992) also notes the critical role played by the bank as lenders for a firm's value maximisation; however, he also notes this relationship as a power struggle between borrower and lender. Bank loans announcements are also very informative for opaque firms, as bank spends considerable resources to gather hidden information about the firm (Best & Zhang, 1993).

If one adopts the rationale offered by these studies, then it becomes clear that a proper signal of the credit quality of a firm is its ability to borrow from a bank or being able to continue borrowing from the bank. When a firm can get a debt agreement with the bank, outsiders should view it very favourably. Moreover, if the firm remains of good quality, the bank will continue its lending agreement. However, this notion struggles to sustain when other factors come into play.

James and Wier (1988) and Slovin et al. (1992) note that bank loans only indicate some positive hidden information indicator when smaller firms use them as for them, the cost of going public is too high. For example, James (1987) notes the stickiness of bank loans and finds that a firm suffers from negative return on the announcement of bank loan retirement using other private placements. So, if a firm makes any gains by borrowing from a bank, it may get eliminated when it tries to pay back that loan using other loans.

Billett, Flannery, and Garfinkel (2006) argue that a well-protected bank loan not only indicates a poor-performing firm but also follows abnormal negative returns to stockholders of a firm. They argue that covenants that are the source of a bank's monitoring

abilities indicate negative hidden information rather than positive hidden information. Furthermore, the economic specialness of bank loans is questionable as Billett et al. (2006) find negative returns on the firm's stocks. They argue that a bank loan, in the long run, is no different than seasoned equity offers as both generate identical effects on a firm's stock performance.

Furthermore, the monopolistic power enjoyed by banks also leads to firms paying higher borrowing costs than the firm with access to the public market during economic downturns (Santos & Winton, 2008).

Beck, Degryse, De Haas, and Van Horen (2014) note that the importance of bank loans as indicative of hidden information is cyclical, which is strongest during the downturn but negligible during the boom period. Hasan, Hoi, Wu, and Zhang (2014) find that bank loans do not indicate positive hidden information. Instead, they indicate high-risk tax-avoiding firms. Arena (2011) concludes that the selection of insiders depends on the credit quality of a firm, a firm with higher creditworthiness would instead prefer non-bank private placement than a bank loan, per se.

Therefore, there is growing evidence that a strong relationship between a bank and a firm indicates negative hidden information. This study argues that these studies find bank loans as signals of negative hidden information rather than positive due to the moral hazard and adverse selection problem. During the recent crisis, it became apparent that banks, as market makers have a strong incentive to sell lemons like oranges. If we incorporate this into the bank and strong lending relationship, then the same bank who is the deposit holder of the firm may be the underwriter of a firm. Hence, it is in the bank's interest to make a private loan before selling the equity. One may argue that corporate governance mechanisms can inhibit such behaviour; yes, they should be able to do so. However, what if the bank

itself is a significant shareholder of the firm. Hence, the hidden information signalled by bank debt announcements can generate confusion and undesired consequence.

Therefore, it becomes evident that although the choice of capital providers is crucial in minimising confidential information, it should not be limited to the bank versus non-bank. Instead, this study, in line with MacKie-Mason (1990), argues that firms can devise screening and consistency signals by carefully selecting their capital provider based on a mix of factors. Managers need to balance the information monopoly their capital providers enjoy and ensure that no one party can extract undue rents during difficult times such as recession or restructuring. These considerations usually get less attention in corporate financing as they are coarsely ingrained in data and hard to model in a simple linear model.

### 2.4.8. Towards a Robust Approach

Myers and Majluf (1984), Titman and Wessels (1988), Rajan and Zingales (1995), Shyam-Sunder and Myers (1999), and Kisgen (2006) have, hitherto, popularised a particular view of capital structure and hidden information. They note that proportional variance in debt levels is a reliable indicator of hidden information. Although, this view provides the necessary modelling simplicity to link this behaviour with factors such as tax shields, targeted leverages level, information asymmetry, agency issues, and adverse selection to meet financing needs. However, this treatment of financing behaviour as a stochastic variant not only limits the empirical power of the models but also does not allow to account for strategic motives of firms in their financing choices (Chirinko and Singha (2000), Welch (2007), Leary and Roberts (2010), Welch (2011)). Furthermore, this treatment of corporate financing choices is also vulnerable to changes in the interpretation of financing needs, non-financial considerations, and changes in interpretations of financing theories (Chirinko and Singha (2000), Fama and French (2005), and Leary and Roberts (2010)).

Therefore, this study proposes that to understand and predict corporate financing behaviour better, we need to view choices made by firms as strategic choices which are affected by endogenous, as well as exogenous forces ((Williamson (1988) and Barton and Gordon (1988)). The word strategic herein refers to the careful selection of choices and discernment of alternatives available to firms (Williamson (1988), Barton and Gordon (1988), MacKie-Mason (1990), and John R. Graham and Harvey (2001)). Signalling needs, incentive conflicts, financial constraints, lenders' rationing, and characteristics of projects, among other things, make strategic financing choices imperative (Stephen A Ross (1977), Stiglitz and Weiss (1981), Williamson (1988), MacKie-Mason (1990), Fama and French (2005), and Leary and Roberts (2010)). Corporate strategy literature also cites the inevitability of linking corporate finance theory with corporate strategy to improve understanding and practices in both areas (Williamson (1988); Barton and Gordon (1988) and Bettis (1983)).

Kisgen (2006) is arguably the first study of the relationship between credit ratings and the firm's capital structure. This study parametrises the relationship between stochastically distributed 'Net Debt Issuance' and credit ratings. Although the study notes the significant influence of credit ratings on firms' capital structure decisions, the issue is that he treats credit ratings as a stochastic variant. We argue that credit ratings are carefully released information, and firms spend considerable effort to gain a credit rating, then why a firm would let their implications be random. We argue that by treating corporate financing choices as strategic choices, we can better understand the implications of credit ratings.

Further, Kisgen (2006, p. 1035) himself notes that "…credit ratings are significant for capital structure decisions, given discrete costs (benefits) of different credit rating levels…". If the costs and benefits of credit ratings are discrete, then their influence on the capital structure should also be discrete, not stochastic. Therefore, we argue that corporate

financing behaviour is a set of discrete nested choices, and it is appropriate to study it like discrete choices.

### 2.4.9. Do Capital Providers Matter?

Academic literature points that firms prefer informed investors over less-informed investors and closer investors over distant investors. However, one significant question that needs discussion that "do firms need to select their fund providers, Ceteris Paribas carefully". Because it is deeply rooted in corporate financing theory that capital structure is a function of perfectly elastic demand and supply of capital. Therefore, firms only need to consider the costs associated with additional use of debt relative to equity or use of equity relative debt. This idea, however, overlooks the fact that firms do underutilise their leverage capacity, and investors do have a preference of claims on safer earnings than risky equity investments (Graham (2000), Myers (2003), and Taggart Jr (1985)).

Firms are prone to the inward selection of capital resources despite having access to public credit markets (Faulkender & Petersen, 2005; Himmelberg & Morgan, 1995; MacKie-Mason, 1990). In addition to this, Berger and Udell (1995) argue that investors' growing monopolisation of corporate information due to their scale or longevity also leaves firms a select a few options to source their capital. Therefore, firms willingly or unwillingly may have to optimise upon their "placement mode" well before selecting the placement of financing instruments itself. Similarly, when Doidge, Kahle, Karolyi, and Stulz (2018) and Jensen (1989) discussed the eclipse of public corporations and the public market, they may be intending to point out how firms are changing in their approach to raising corporate finances.

Hence, it is arguable that firms cannot afford to be passive or ignorant to their lenders' careful selection. In the corporate finance literature, this phenomenon is popularly

discussed as 'relationship lending' or 'private financial intermediation, focusing on banks and finance companies. Historically, there has been a reluctance to ask this question directly due to the overwhelming empirical ease provided by trade-off and pecking order theories. However, the need to derive capital supply and demand equilibrium under imperfect market conditions induced the necessity to consider that "who is the provider of the capital". At first, the selection was noted as a function of the high costs of acquiring private information and difficulty in subsequent verification by public investors (Brealey et al., 1977). Therefore, Brealey et al. (1977) show that firms may get better treatment if they are sorted and sold by financial intermediaries rather than directly selling to primary investors. Furthermore, Brealey et al. (1977) also note that the quality of signals emitted from capital structure changes with the extent of entrepreneurial ownership in it. Therefore, they note that firms with a higher amount of capital contribution from their owners might receive differentiated treatment from external capital providers.

James (1987) finds the existence of this phenomenon by showing varying reactions of markets to the announcement of different types of financing arrangements. Rajan (1992) shows that young, small, or growth firms may be better off acquiring capital from banks. Information problematic firms may prefer private placement of their financing instruments rather than arm's length lenders (Carey, Post, & Sharpe, 1998). Cantillo and Wright (2000) show that firms' preference for the type of funds provider varies with their profitability, size, growth options, and interest rates. They also note that firms' default likelihood and default ex-post considerations might play a significant role in firms' determination of their funding provider.

Therefore, firms' selection of funding providers precedes the so-called components of balance sheets. Issues such as ex-ante information asymmetries, costs of managing interim information asymmetry, and ex-post consequences of negative results make firms

carefully select the source of their capital. Because investment decisions of firms may also be influenced significantly by the type, characteristics, and nature of investors.

## 2.5. Related Literature

Rating agencies react to asset prices volatility by adjusting credit ratings (Jorge, 2019). Irrespective of whether such a move distorts equilibrium or not, this action alone indicates that investors' perceptions influence firms' ratings. Hence, it is in firms' interest to manage this perception and perceivers. Although, Manso (2013) notes that it is not up to credit ratings or rating agencies to minimise investor reaction ex-post rating change. Nevertheless, firms use their previous, current, and prospective credit ratings to choose their investors carefully and reduce unnecessary volatility in the prices of their securities (Kisgen (2006), (2009), (2012), Aktan et al. (2019).

Therefore, it is plausible that firms choose a composition of capital providers based on their current ratings, expected ratings or realised ratings. This study defines this so-called relationship as the Credit Ratings (CR) and Capital Providers (CP) hypothesis. It is a lateral perspective to Kisgen (2006) Credit Ratings (CR) and Capital Structure (CS) hypothesis. The possibility that 'firms may use their credit ratings to attract capital providers who do not overreact to downgrades or underreact to upgrades' is the basis of the CR-CP hypothesis. It is also in the interest of rating agencies to ensure that their ratings are reliable and help firms attract investors who understand firms' fundamentals and are not highly sensitive to small changes in ratings. Otherwise, this can severely damage the economic case of firms seeking credit ratings for their instruments and themselves as a corporate.

Credit ratings and information asymmetry play a critical role in drafting financial contracts and their covenants (Rudolph (2006) and Parlour and Rajan (2020)). This study

argues that the ability of credit ratings to be meaningful in firms and capital providers relation is their status as an indicator of hidden information. Although Parlour and Rajan (2020) do not consider the active role of firms in using credit ratings to establish a relationship with investors, they accept that rating can minimise "surplus in investor-manager transaction".

Furthermore, Kisgen (2009, 2012) notes that firms are not passive recipients in the credit rating game. He argues that firms target credit ratings and strive to achieve and retain them by adjusting their capital structure? In this context, credit ratings cannot be restricted to "for investor use only" or valuable in only determining debt ratios. Instead, their role extends to more critical questions such as "do credit ratings indicate which type of capital providers[10] are preferred by firms." This is the prime question of this study, and it receives minimum attention in the existing literature.

The role of credit ratings as a determinant of firms' choice of debt sources such as a bank, non-bank private, bonds, and loan placements is well established (Marshall et al. (2016), Ahmed (2011), Denis and Mihov (2003), Johnson (1997), Rajan (1992), and Diamond (1991)). Denis and Mihov (2003) find that credit ratings are a significant determinant of a firm's preference for its debt source. They note that firms with the highest credit quality use bonds, medium rated firms prefer bank loans, and lowest-rated firms opt for private loan placements. They also find that higher ratings mean firms would prefer the public over the bank and non-bank debt and non-bank over the bank. They find these

[10] By capital providers, we mean all kinds of investors such as private, public, public, private equity, debt providers and equity providers.

implications are significant even after controlling for firm-specific attributes and are least affected by managerial discretion.

An important issue with these studies is that they do not include private equity and public equity; therein, they ignore the broader implications of credit ratings. Moreover, the study of Denis and Mihov (2003) assumes that financing decisions are mutually exclusive[11] and that firms are only allowed to make one choice per year. Further, they also use debt ratings to indicate a firm's overall credit quality, which is a minimal approach. Rauh and Sufi (2010) note that debt ratings are issue-specific, and they may not reflect the overall actual creditworthiness of firms.

Despite these limitations, these studies provide a priori case to argue that credit ratings are a crucial determinant of the choice of capital providers (in their case, providers of debt).

Faulkender and Petersen (2005) also confirm that firms having a rated debt are intrinsically different from other firms in their borrowing behaviour. The difference in leverage is the function of the source of capital, and firms with a lower rating who use public lenders are more likely to have lower leverage (Faulkender and Petersen, 2005). It indicates that credit ratings simultaneously influence firms' leverage level and the choice of debt provider.

Rauh and Sufi (2010, p. 17) also argue that it is flawed to assume that "the equilibrium debt structure conditional on credit quality consists of [only] one type of debt for a given firm". Instead, they argue that firms are likely to choose different sources of

[11] To impose IID and II.A assumption on their Multi-nominal logistic Models.

capital providers depending on their current credit ratings or future change in their credit ratings.

Boot et al. (2006, p. 108) also argue that credit ratings act as a remedy to coordination failures between firms and their different creditors (i.e., bank versus public). They note that "…effectively, the CRA can "resolve" the coordination failure…, [as it] affect[s] healthy behaviour through conditioning of investment decisions on the assigned rating by investors. This role of CRAs in the financial market qualifies the distinction between public debt and bank financing". They argue that this role of credit ratings explains why firms may view their choice of capital providers and their required premium as a discrete outcome. Therefore, any adjustment in credit ratings can result in a change in capital providers or compel firms to agree to stricter terms for their capital providers.

A significant limitation of these all studies is that they limit the role of credit quality and credit ratings to monitoring costs and reputational concerns of firms. This perspective also overlooks that firms' choice of debt sources is only a part of the overall capital structure debate. Credit ratings may have a link with firms' decision to go for Initial Public Offerings (IPOs), Seasoned Equity Offerings (SEO), and tendency to use private equity and internal funds.

An and Chan (2008) note IPO of rated firms are less likely to be under-priced due to value certainty provided by credit ratings. Liu and Malatesta (2006) note that credit ratings minimise information asymmetry, enable firms to inhibit wealth transfer from shareholders to debt holders and prevent price distortion for rated firms when they issue more shares. Therefore, they argue that firms' credit ratings are influential in (fairer) pricing of SEO.

Chou (2013) also notes the importance of credit ratings for equity holders by finding that rated firms can convey more information about their future earnings to prospective

shareholders. This additional information, he notes, is significantly reflected in the stock returns of the firms. Rated firms with higher ratings observe that investors are more likely to pay a better premium for their expected earnings and growth prospects. Moreover, having an issuer rating also helps firms minimise the cost of equity issuance. McBrayer (2019) notes that firms having credit ratings before issuing equity have to pay lower banks' fees, and the indirect costs of their issuance are low. It indicates that investors view credit rating as an information asymmetry minimising agent and expect lower monitoring and evaluation costs.

Therefore, by limiting the role of credit ratings only to the choice of debt sources or debt levels, we are ignoring the fact that credit ratings can be a focal point for firms and all types of investors (An and Chan (2008) and Boot et al. (2006)). The influence of credit ratings on capital providers is also notable due to the ease with which individual investors can estimate ratings themselves and or use the intermediaries (rating agencies) to predict them (Cascino et al., 2014).

This study attempts to develop a holistic understanding of the relationship between credit ratings and capital providers. It bridges the gap between two strands of academic literature on credit ratings and financing choices. As mentioned above, one strand of literature overwhelmingly focuses on credit ratings and debt sources' choices. The second strand tries to certify the role of credit ratings in determining the fair price of IPOs and SEOs. Both approaches do not uphold the innate complexity of financing choices where firms may choose to raise capital from different sources at a time.

For instance, Kisgen (2006) notes that credit ratings in their different forms, at best, can only influence proportional adjustment in leverage levels. Nevertheless, according to Kisgen (2006), these adjustments do not identify any implications for the choice of debt

providers. Therefore, if credit ratings indicate that firms may use more debt, we need to know whether that increase comes from bank loans, bonds, or private placements.

This distinction is essential as firms do care about who are their capital providers (MacKie-Mason (1990) and Saa-Requejo (1996)). Firms spend resources, signal hidden information, and undertake corporate actions to maintain good investor relationships. Kisgen (2006, 2009, 2012) also points that firms undertake similar actions to achieve and maintain their preferred credit ratings. Hence, studying credit ratings and capital providers from the same perspective may help us understand the relationship.

# 3. Chapter- Three: Research Methodology

## 3.1. Introduction

This study emphasises the utility maximising behaviour of managers when making corporate finance choices. This chapter aims to elaborate on how this study will test the utility maximising behaviour of firms. Section 3.1, 3.2, 3.3 and 3.4 will explain the treatment of financing decisions as discrete choices. We will elaborate on how we will decide which capital provider firms choose in each period. These sections will provide theoretical justification for our econometric model and enable us to compare the utility implications of credits ratings on firms' choice of their capital providers. Section 3.5 and 3.6 presents the econometric model used in this study and the choice of independent variables. Section 3.7 discusses the data collection process, its treatment, imputations, and its limitations.

## 3.2. Nested Financing Choice: Why and how

Leary and Roberts (2010) argue that econometric models studying pecking order financing behaviour suffer from statistical limitations. These limitations, they note, are either due to purist interpretations of theory[12] or ignorance of factors other than information asymmetry. However, even after overcoming these limitations, they still cannot account for all the financing behaviours in their sample. It shows that other concerns may also limit the predictive abilities of capital structure models based on information asymmetry. Welch (2007), (2010), and (2011) note three such concerns: the ratios used as proxies for financing behaviour, non-linearity in capital structure changes, and survival bias in the sample. Another issue that is relatively less acknowledged in literature is the preference imposed on

[12] Leary and Roberts (2010) note that a Modified Pecking Order (MPO) are more successful in predicting the financing behaviour of firms.

firms, where they are ought to prefer internal over external and debt over equity, Ceteris Paribas.

Furthermore, results generated by capital structure studies are also directly influenced by the size of the firms and the size of the issue they make. For instance, large-size firms or large debt and equity issues can increase the error size of predicted estimates. This unobservability results in estimates that contradict the common understanding of the relationship between financing choices and their determinants. Fortunately, for most of these issues, there are remedies available in financial econometrics that can overcome them.

The two issues which continue to exist even after modelling manoeuvres are non-linearity and Independent and Identically Distributed (IID) and Independence of Irrelevant Alternatives (IIA) assumptions.

This study argues that non-linearity in financing behaviour is beyond linear changes in leverage ratios. For instance, a firm's decision to issue equity when it should issue debt or debt when it should go for equity indicates the factors causing such non-linear behaviour. Leary and Roberts (2010) note the role of minimum reserve cash balance and incentive conflicts in causing firms to behave unexpectedly. However, this study argues that a firm's preference for its capital providers induces non-linearity in financing models.

Secondly, the assumption that the error term of choice models is Independently and Identically Distributed (IID) creates a limiting effect on the true potential of behavioural studies on capital structure. Although linear models can minimize IID's negative implications, it creates a unique problem in logit models. This particular problem is due to behavioural implications of the IID assumption that is the Independence of Irrelevant Alternatives (IIA). Hensher (2005) notes that IIA is the behavioural equivalent of IID that asserts that choice probabilities of two alternatives are independent of presences or absences

of any other alternative. This assumption is not only counterintuitive but also ignores conditional probability.

To understand these problems, let us consider the two-choice trees given below in Figure 1. One choice tree represents a firm that has decided to issue debt, and now they need to choose between public or private lenders. In comparison, the second tree indicates that firms have decided to issue equity, and now they need to choose between public or private investors.

Given these two scenarios, IIA assumptions assert that the distribution of residuals of these two alternatives is independent of each other (selection of one does not affect the other), and their residuals are identically distributed (firms exhibit the same behaviour over time). Furthermore, this assumption also asserts that the conditional probability of each alternative is equal to their independent probability. It also argues that the error term of the probability estimate of one alternative does not affect the error term of the other alternative; therefore, firms only need to decide about one alternative at a time. Moreover, in each new period, financing decisions are independent of previous selections and are subject to new circumstances. However, such assumptions are not valid; the selection and availability of these alternatives are mutually dependent. For instance, firms that can access public markets (large-sized rated firms) have a competitive advantage in using private sources. In contrast, firms that enjoy more accessible contractual terms in private capital markets (small, young, and growing firms without credit ratings) have to offer higher rates to access public sources. Therefore, the conditional probability of each alternative is neither zero nor independent of the other alternative.

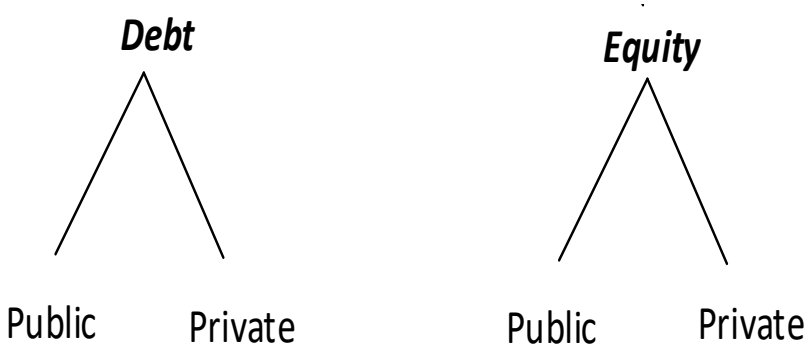



*Figure 1: Binary Financing Choices*

IIA assumption also imposes that the unobserved utility of each alternative is also identical between alternatives in terms of quantity and relationship; therefore, different alternatives are equally similar or dissimilar (Hensher, 2005). Based on this strict assumption, the logit model does not allow firms to make two selections within a period. As a result, creates counterfactual exclusivity of financing alternatives, which means that research models ab initio assume that firms may only make one financing choice per year.

One approach to minimize the implications of IIA is the use of nested logit models (see Figure 2 and Figure 3) which allow the possibility of collinearity between alternatives, their attributes, and error terms. This collinearity allows to bundle similar or closely similar alternatives together and create nests of alternatives to accommodate correlation among alternatives. By bundling alternatives together, we simultaneously allow marginal and conditional choices in a hierarchal structure. For example, if we create a nested logit model of the two choice trees given above, tree structures such as below may emerge.

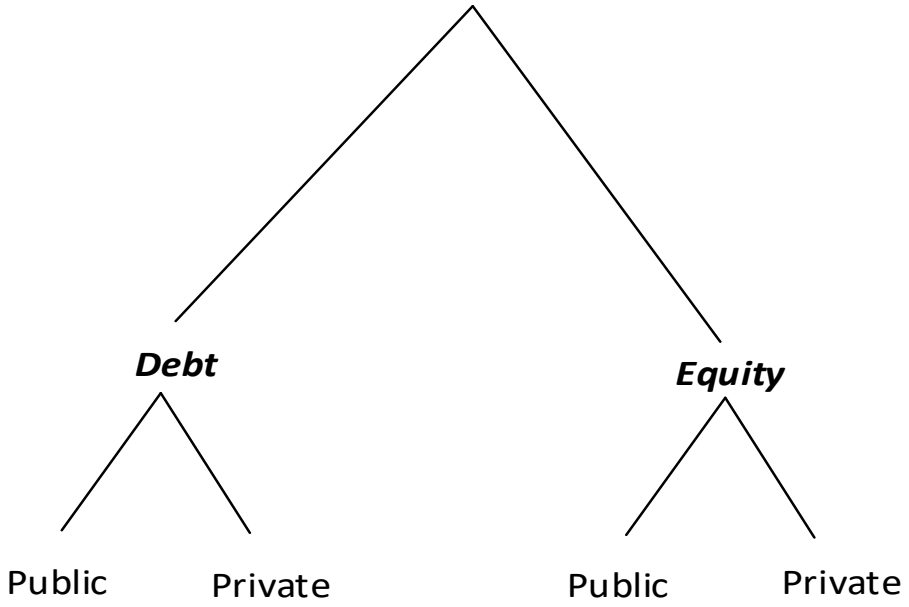



Figure 2: Nested Financing Choices Tree 1

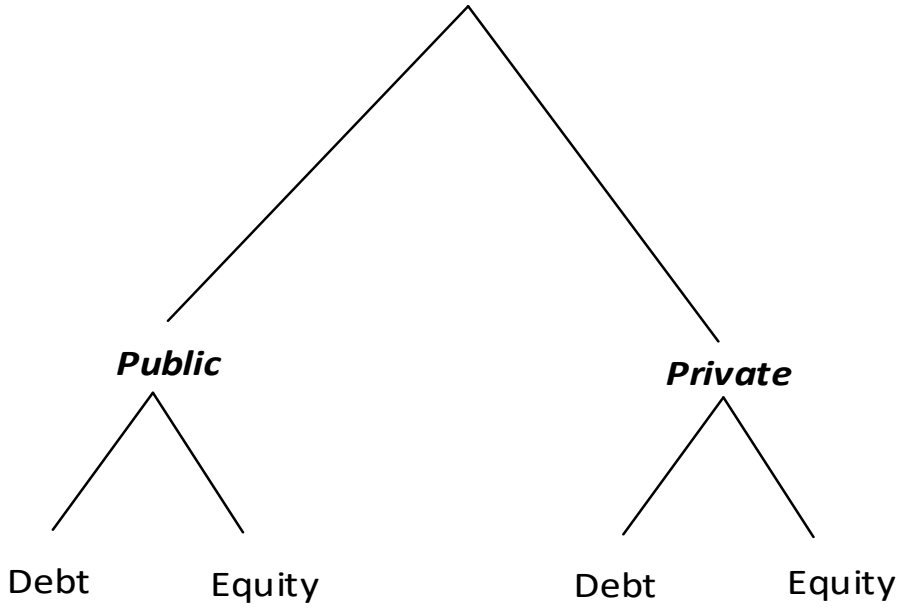



Figure 3: Nested Financing Choices Tree 2

In line with the hidden information problem, this study argues that capital structure is a function of the rationing process necessitated by prevalent information asymmetry. Bargaining and negotiations under asymmetric information require firms to source their capital differently (Carey et al. (1998) and Rudolph (2006)). In economic theory, this behaviour is also addressed as "borrower-lender interaction" and noted as a process of handling sub-optimality in monitoring and controlling financial contracts (Cooper & Carleton, 1979). However, this study argues that the resultant corporate financing behaviour is not selecting the debt level or security type but the selection of the capital providers.

This study argues that firms make their corporate financing decisions simultaneously by selecting the type of instrument and type of provider because of this interaction. So, firms either first select that they want to raise their capital from public or private sources, and then they choose whether they will use a debt instrument or an equity instrument. Although this resembles a hierarchal preference, our econometric model imposes no such restrictions; hence, firms are free to make their financing decisions in any sequence. This approach can also help us explain decisions that are not easily explainable by other theories. For instance, firms with surplus cash flow often are noted to raise external financing. Leary and Roberts (2010) note that firms target to have a minimum cash balance[13], which means, even if firms have a positive cash balance, they may choose to raise additional capital from external resources, Ceteris Paribas. Our approach will be able to accommodate this anomaly easily as compared to other pecking order theories.

The first choice in broth tree structures is marginal choices, and the latter is conditional choices. A firm can first choose between debt or equity and then, be given a choice, choose between public investors or private investors. Alternatively, a firm can

[13] They define this cash balance as a parametrised outcome of the vector of firm-specific variables. They note that incentive conflict and minimum cash reserve are more important determinants of financing behaviour.

choose between public or private sources and then, be given a choice, choose between debt and equity.

Despite the emergence of a behavioural process, the nested structure in no way imposes that firms must progress in a way as argued above—instead, this bundling of choices accommodates collinearity between alternatives and their random error components. For instance, despite having different alternative specific attributes, public debt and equity may share certain attributes such as public disclosure, market discipline, and stock prices adjustments that allow us to group them in one alternative. Similarly, despite having different covenants and costs associated with private debt and equity are similar in terms of information disclosure, monitoring requirements, and information asymmetry.

Once the firm has decided to raise capital from external capital providers, the next step involves deciding the kind or nature of capital providers. Arm's length or close capital providers, fixed-income or high return seekers, creditors or partners. Therefore, at this stage, firms need to choose between the type of financing sources or the type of financing instruments. Firms can take two possible financing decisions as presented in choice trees on the next page. A firm can first select the nature of the contract, such as debt and equity and then choose the capital provider to be private or public. Alternatively, a firm can first select the capital provider, be it private or public, and then the nature of the financing contract, such as debt or equity.

The first selection addresses a firm's preferences concerning its desired type of financial obligations (interest vs dividend) and sharing control (i.e., shareholders vs creditors), among other things. The latter manifest a firm's strategic preferences concerning the extent of information sharing (close lenders vs distant lenders), ease of restructuring or refinancing (sole lenders vs numerous lenders) and costs of communication (private lenders vs public lenders), among other things. Hence, this study argues that corporate financing is

a set of discrete nested choices made by firms motivated by time-invariant strategic factors rather than the hypothetical, optimal target or hierarchal choices.

The financing decisions, in this study, are not determined by a priori logic of PO or TO theories; instead, they are based on incremental financing decisions. Any event on the choice tree is random and does not depend on the occurrence of other events on the branch(es) above or below. Moreover, within a nest, the likelihood of an event might be influenced by the likelihood of other events in the nest, as assumptions of IIA and IID shall not hold. Whereas, across nests, any such correlation or proportional substitution between alternatives is not allowed to maintain IIA and IID assumptions.

## 3.3. Defining Financing Choices: Dependent Variable

Let m be the branch level, and s be the elemental level, then the occurrence of an event at each level tree indicates firms preferred selection of their capital providers. Choice tree 1 indicates that firms may first decide whether they would like to raise capital from private sources or public, and then second, they may decide which type of security they may issue. In choice tree 2, the firms may first decide about the type of security, and then they may decide which type of capital provider they would sell these securities. Following MacKie-Mason (1990), the two-choice trees are presented below in figure 4.

This approach suffers from the observability of firms' choices and data. Financial statements published by firms do not indicate the sources used by firms to raise their capital. Therefore, the choices are coarsely engrained in the data and difficult to ascertain. Following MacKie- Mason (1990), I assume that firms can only make one financing choice per year, and their preferred choices are inferred from changes in the book values of respective financial accounts. A prime determinant of this approach towards firms' financing decisions is the data modelling conditions imposed by nested logit choice models. Nested choice

models require that decision-makers can only make one choice at the elemental level out of all observed variables at each time. Therefore, to run the model, we must treat each year's observation as a unique cross-section unit; and no respondent should be able to make two choices. An example of this is that a decision-maker is made available all the alternatives and then it is observed that the respondent only chooses one alternative at a time. For the branch level $(m)$;

$$Public\ (Pub_{it}) = \begin{cases} 1 & if\ firms\ issue\ public\ debt\ or\ equity\ irrsespetive\ of\ size \\ 0 & otherwise, \end{cases} \quad (1)$$

$$Private\ (Pr_{it}) = \begin{cases} 1 & occurence\ of\ 1\ in\ any\ of\ the\ two\ elements\ of\ private\ sources \\ 0 & otherwise, \end{cases} \quad (2)$$

$$Debt\ (D_{it}) = \begin{cases} 1 & if\ firms\ use\ public\ or\ private\ or\ public\ debt \\ 0 & otherwise, \end{cases} \quad (3)$$

$$Equity\ (E_{it}) = \begin{cases} 1 & if\ firms\ use\ public\ or\ private\ or\ public\ debt \\ 0 & Otherwise \end{cases} \quad (4)$$

For elemental level (s);

$$\text{Public Debt } (PbD_{it}) = \begin{cases} 1 & \text{if firms issue bonds in any given year} \\ 0 & \text{otherwise,} \end{cases} \quad (5)$$

$$\text{Public Equity } (PbE_{it}) = \begin{cases} 1 & \text{if a firm registers issuance of new stocks} \\ 0 & \text{otherwise,} \end{cases} \quad (6)$$

$$\text{Private Equity } (PvE_{it}) = \begin{cases} 1 & there\ is\ deficit\ in\ finances\ and\ no\ other\ sources\ have\ been\ use \\ 0 & Otherwise \end{cases} \quad (7)$$

$$Private\ Debt\ (PrD_{it}) = \begin{cases} 1 & \Delta\ Private\ Debt > 0\ and\ no\ public\ security\ is\ issued \\ 0 & otherwise \end{cases} \quad (8)$$

.

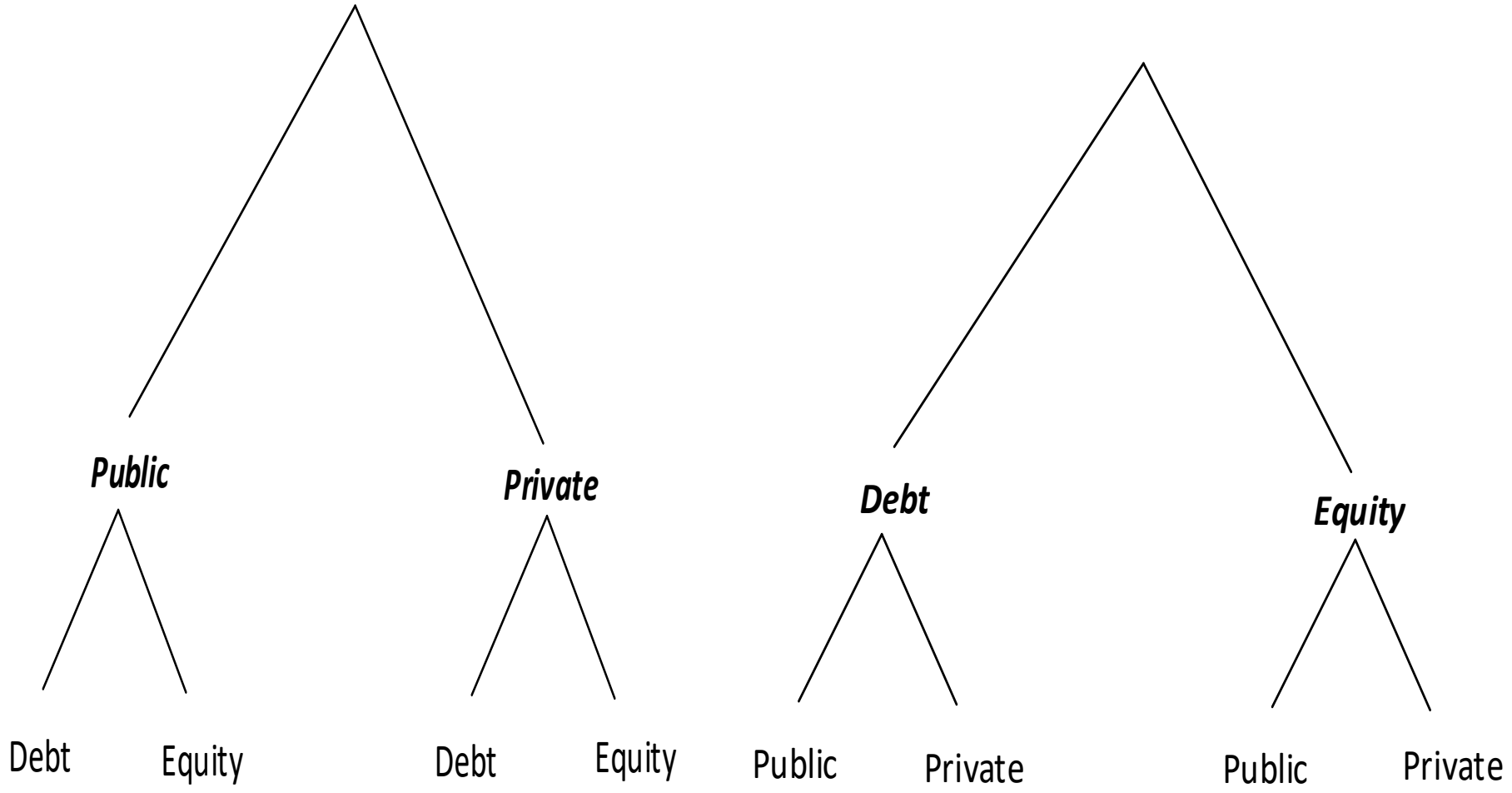



Figure 4: Nested Financing Choices Trees for the Study

Exclusivity is imposed within nests and across nests at the elemental level. Coefficient estimates will only indicate the likelihood of an individual firm choosing a particular financing alternative. However, the issue is that not all choices are observable. Secondly, firms make multiple decisions in a year. Actual data shows that firms make more than one choice in the year, such as they choose to issue public equity and use debt in one year.

In response to this, this study imposes a preferred order that aligns with the innovative approach used by MacKie-Mason (1990). Choices are coded as that if a firm issues public equity in any year, then the choice is public equity irrespective of any other choice made. Second, if a firm issues public debt in any year and has not issued public equity, then the choice is public debt irrespective of any other choice made. The reason for which public issuances are given priority is due to their presumed hidden information content. According to pecking order theory, the decision to make a public issuance has the highest information asymmetry implications, and their use should be given more weight than the other sources. For the private sources, if a firm has not made the issuance of public securities such as bonds or shares and there is a positive change in firms' private debt sources, it is coded as private debt. In all other cases, where firms have a deficit in finances, and none of the other sources is used, it is coded as private equity (retained earnings). The deficit in financing is calculated using the equation provided by Shyam-Sunder and Myers (1999).

Lastly, this study treats private equity sources as a last resort. It does not mean that this study ignores the fact that retained earnings or internal funds are the most used sources of financing (MacKie-Mason (1990) and Leary and Roberts (2010)). However, this is not going to affect the results of our tests as the econometric model uses private equity as a baseline equation to estimate probabilities.

## 3.4. Empirical Validity of Nested Financing Choices

Choice tree structures, outlined above, provide the methodological dynamism to handle fundamental objections raised on capital structure models. First, they facilitate the non-linear treatment of dependent and independent variables. Secondly, they allow accounting for non-linear changes in debt ratios (Welch, 2007); which are not explained by pecking order theory. However, the question is that whether debt versus equity and public versus private is the valid rational choice. To establish the validity of these choices, the following section presents a brief overview of the literature that treats these variables as choices.

### 3.4.1. Debt versus Equity Choice

This study summarises a firm's financing behaviour as a nested structure, where a firm first selects the nature of the financial contract and then chooses between instruments of placement for such financing contracts. Treatment of debt and equity as choices rather than annualised percentage change is well established in the literature; for instance, Baxter and Cragg (1970, p. 229) note that financing decisions made by firms can be described as *"...a series of choices between pairs of alternatives. First, it has to choose between debt and equity. Having made this decision, a choice needs to be made between bonds and preferred stock or between common stock and convertible securities."* Therefore, this study argues that after choosing between debt and equity, firms' next decision is to choose the source of debt and equity (i.e., public or private).

Martin and Scott Jr (1974) also identify debt and equity as discrete choices due to their episodic nature, in which a firm's subsequent decision choice is influenced by its choice in the previous period. Noting debt and equity as mutually exclusive choices where firms

have used debt in the previous circumstance, a firm may choose equity as debt providers might charge a higher rate for further lending. This view is unique in two aspects; firstly, it notes that firms do not want to signal their desperateness to outsiders by using the same financing type again and again. Secondly, it also acknowledges that debt providers and equity providers expect firms to observe a limit of raising debt or equity, respectively.

Taub (1975) also argues that firms' choice of debt versus equity is conditional on their choice of a target debt-equity ratio, given a firm knows better if its current debt-to-equity ratio is higher or lower than its target. Then, the firm may decide to issue debt or equity to get closer to such a target. Although, he further constructs debt versus equity choice as mutually exclusive events and does satisfy the necessary conditions of IIA and IID assumption. However, the limitation with his approach is that it does not specify how firms choose their target debt to equity ratio, and once such choice is assumed to be endogenous then, parametrising its implications is not going to generate desired effects. As Taub (1975, p. 415) concludes, the "…general lack of success in explaining the determinants of the firm's choice of a debt-equity ratio that further research is required."

Marsh (1982) also notes that issuance of bonds and stocks are discrete decisions that often occur in distant intervals; hence, studying them as discrete variables may generate interesting results. He argues that such treatments of debt versus equity allow deriving conclusions about firms' financing behaviour under similar circumstances. Furthermore, these conclusions are not firms invariant but also time-invariant to make valid inferences regarding firms' financing behaviour.

Helwege and Liang (1996) also argue that, firstly, firms' selection of debt versus equity financing is influenced by the firm's decision to raise external financing. Secondly, it is influenced by a firm's understanding of its risk profile, where a low-risk firm with good quality assets is more likely to issue public debt. However, they also impose IIA

assumptions on each alternative. Their prime motive was to test the reliability of the pecking order theory and provide an important choice dimension of the firm. They note that by making debt versus equity choices, firms either seek to minimise mispricing of their securities or maximise the benefits of their creditworthiness. Either way, such choices identify firms' strategic motives and highlight how firms try to maximise their strategic objectives. They conclude by noting limited evidence on firms displaying such choice behaviour. However, the issue is that they have imposed a hierarchal preference on the firm.

Leary and Roberts (2010) also propose a novel approach to construct debt and equity as mutually exclusive choices and argue that it may enhance the predictive abilities of econometric models of capital structure. Their approach towards constructing choice variables is unique as it allows firms to have a minimum cash reserve policy and allows firms to move from one alternative to another without exhausting the first option in sequence.

Croci, Doukas, and Gonenc (2011) also construct firms' financing behaviour as debt versus equity choice to account for the differences in family-controlled and other firms. They conclude that such firms view debt and equity as two discrete outcomes; alternative specific characteristics bound each alternative. Family-controlled firms choose debt over equity to ensure their power is not diluted. They note that one reason family firms prefer debt is to preserve the information asymmetry; debt issuance ensures that they are not subject to the release of extra information. However, the issue is that they do not distinguish whether these firms prefer public debt or private debt. Family firms are more likely to have limited access to public markets, and when they raise financing from a private lender, such lenders may try to extract higher information or higher rate.

Coleman, Cotei, and Farhat (2016) extend the debt versus equity choice as a choice made by start-up firms; that lack access to primary sources and channels to raise capital.

They note that debt is preferable for large start-up firms, whereas small and growth firms have equity or private sources of debt. Interestingly, they also note that entrepreneurs' characteristics (immigrants or newcomers) also influence their choice of business debt over personal loans.

Goh, Lim, Lobo, and Tong (2017) also use debt versus equity choice to understand the conservatism of a firm's management and argue that more conservative firms are likely to use equity instead of debt. Moreover, these firms focus primarily on public sources of debt, not private sources of debt. Secondly, for a conservative firm, private debt provides a perfect substitute for new equity and public debt.

This allows us to conclude that debt versus equity is a valid financing choice. It enables us to understand a firm's approach towards its broad financial objectives, such as target debt to equity ratio. Secondly, it helps in assessing the non-linear determinants of financing behaviour of firms such as credit quality, age, scale, and conservatism.

### 3.4.2. Public versus Private choice

Analysing corporate financing choices as a choice between capital providers asserts that firms care who provide their capital (MacKie-Mason, 1990). Firms find capital providers differing in their risk tolerance, information disclosure requirements, return expectation, and bargaining power (Fama (1985), Diamond (1991), Petersen and Rajan (1994), Rajan and Zingales (1995), Denis and Mihov (2003), and Lemmon and Zender (2019)). These differences generate the factors specific to the choice of capital providers; hence, the utility derived by firms from each capital provider is different. Therefore, as utility-maximising agents, firms must maximise their objective function by carefully choosing their capital providers. An innate issue in these studies is that these studies limit the private and public discrimination to creditors only and ignore this division for equity

investors. In this study, I argue that such division of capital provider applies to both types of financing (i.e., debt and equity). Further, by constructing a nested logit model, this study asserts that private creditors and private equity are alternatives with identical utilities as, in both cases, firms can minimise their information asymmetry costs.

Having established that debt versus equity is a valid economic choice made by rational, let us explore whether public versus private sources of capital is also valid alternatives of choices. Although the answer to this question is possible using econometric constructs, I would present the review of empirical literature that uses this division to study corporate financing behaviour. One more interesting and unique fact to our study is that we do not limit private versus public division to creditors only, but we extend this to equity as well.

Earlier debates on private versus public capital providers revolve around insider versus outsider or bank versus public creditors. This classification is based on the degree of information asymmetry that exists between firms and these investors (Fama (1985), James and Wier (1988), Diamond (1991), (Rajan, 1992), and Petersen and Rajan (1994)). However, this approach towards capital providers is not only limited but also contradictory. For instance, Fama (1985) notes banks as the sole representative of private debt and argues that all private lenders should be treated alike. However, James and Wier (1988) find that the market perceives the announcement of bank loans and debt agreements with private lenders differently, which is reflected through different gains on firms' stocks. Diamond (1991) extends this division to the bank versus public lenders and argues that firms' choice of lenders depends upon their life cycle and credit quality. Rajan (1992) also argues that firms differentiate between arm's length creditors and informed creditors, and he notes that informed creditors enable firms to inhibit underinvestment and pass away profitable investment opportunities. Petersen and Rajan (1994) note that a good lending relationship

helps firms lower the cost of capital and increase the supply of credit. However, the issue is that such division of capital providers is limited as it ignores equity providers and treats private versus public as a continuous variable by noting percentage change in debt levels of respective categories.

MacKie-Mason (1990), arguably, is the first study to construct a holistic choice category of public versus private capital providers. He argues that full implications of hidden information problems are more appropriately manifested in their choice of capital providers. He further notes that firms have two main alternatives when selecting firms' capital providers: private versus public. Further, he also constructs the base level choice as a nest of two mutually exclusive alternatives such that each nest does explain the probability of choosing another nest and subsequent alternative. He further argues that

*"...firms are concerned with who provides their financing, not just with the debt/equity distinction. Debt is more than just debt; equity is more than just equity."*; hence, *"... it becomes crucial to know who the parties providing the funds are and what information is available to them."* Mackie-Mason (1990, p. 98). This knowledge enables firms to relate their characteristics to capital providers and choose the most suitable source of their financing.

Saa-Requejo (1996) further confirms the validity of choice between private versus public and finds that Spanish firms care about who provides their capital. He also notes that these financing choice does not reflect any hierarchy as predicted by pecking order theory. This further validates the argument that firms' financing behaviour manifests a rational agent's choice process rather than stochastic variations.

Cantillo and Wright (2000) also favour this rationing behaviour of firms, where they note that large and well-established firms prefer public lenders over private. Furthering

public and private division of capital providers, Denis and Mihov (2003) study the firm's choice of a bank versus non-bank private and public lenders. They note that a firm's credit quality directly determines a firm's choice of their capital providers, as firms having higher credit quality would prefer public lenders over private lenders. However, the issue is that they stop short of making empirical observations about public versus private equity. Faulkender and Petersen (2005) note that firms distinguish between public and private sources of capital, and if they have access to their preferred capital providers, they prefer to have higher debt levels. Therefore, the choice between capital providers also influences the overall capital structure of firms.

The study by Gomes and Phillips (2012) adopts a more holistic approach towards capital providers' choice. They argue that firms make a joint choice of source and security type based on the degree of information asymmetry. They construct capital provider choices as a choice of security issuance in public versus private markets. This categorisation is more in line with our analysis. Atanassov (2016) notes that the financing decision does represent a choice between public and private capital providers. He also notes feedback relationship between firms' choice of capital providers and their approach towards innovation and risk management.

To conclude, academic literature provides ample support to the notion that capital provider categorisation as public versus private is a valid choice set, and firms do care from which source they raise their capital.

This study enhances the academic literature by providing a more holistic stratification of investors. It defines financing choice of firms as public debt and Equity versus Private debt and equity. This classification would consider the 'differing degrees of information asymmetry between firms and investors. For instance, increasing utilisation of retained earnings may indicate the possible vulnerabilities or growth opportunities inhibiting

management from raising funds from external investors. Similarly, private placements of debt and equities may also exhibit managerial disinclination towards market discipline. This indeed is the affirmation of fears of market transactions, as identified by Coase (1937). Therefore, a holistic understanding of firms' capital providers may enable us to understand the capital structure choices of firms more elaborately.

## 3.5. Econometric Model

Assuming the choice tree structure discussed in section 2 if $C =$ Capital provider choices; $m =$ branch level choice (such as type of capital provider or type of security) and $s =$ elemental level choice ; (such as private or public and debt and equity). Then for firm *i* at time t; any random $C_{it}$ can be explained as $C_{ms} \in M \times S$.

MacKie-Mason (1990) argues that a firm's choice of the combination vis a vis their finance providers are bound to affect the firm's overall value. By selecting their capital providers carefully, firms can lower their cost of capital and minimise the negative costs of restructuring in the event of financial distress and restructuring through investors relationship (Easterwood and Kadapakkam (1991) and Rajan (1992)).

For instance, the graphs presented below show that an optimal mix of capital providers enables firms to lower the cost of capital during normal times (see Graphs 1A and 1B). It also enables them to keep their capital costs lower in financial distress state (see graphs 1C and 1D). Therefore, this study argues that firms can use their composition of capital providers to maximise their value of firms. MacKie-Mason (1990) has defined the firm's value, given this hypothesis, as a function of utility derived from the combination of financing choices made by firms. The objective value function is defined as such:

$$V_{ms} = U_m + U_s + U_{ms} + \varepsilon_m + \varepsilon_s + \varepsilon_{ms}$$

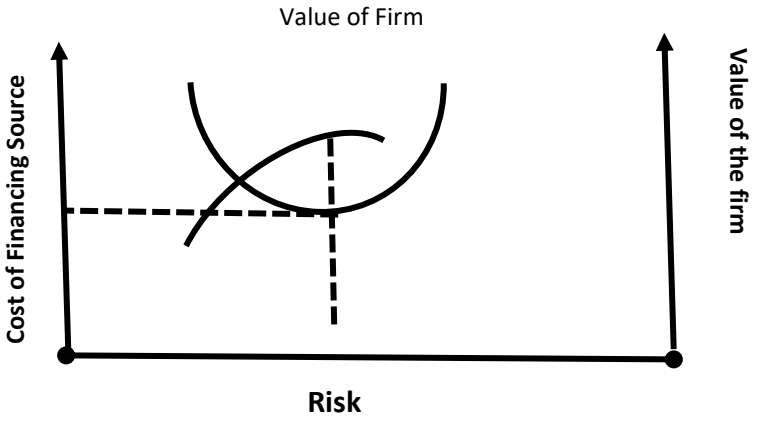
Where;  increment in the firm's value from each financing alternative and remaining terms indicate alternative specific utilities, as well as the utilities, are driven from their combination. The error term indicates an unobserved proportion of utilities for individuals and the combination of alternatives.

Following the Random Utility1[14] these value functions can be estimated through the maximum likelihood method or sequential non-linear optimisation method. The first approach is used in this study to maintain the similarity with prior works, as this approach is often applied in capital structure studies. The behavioural implications of our objective function are that the observed financing behaviour of firms is the function of the utility associated with each combination. For instance, after deciding from which source a firm wants to raise finance, it may choose the type of instruments. Alternatively, a firm may first decide which type of instrument it wants to issue and then choose the source from where it may want to raise capital. There are four joint decisions a firm can make, which are as follows

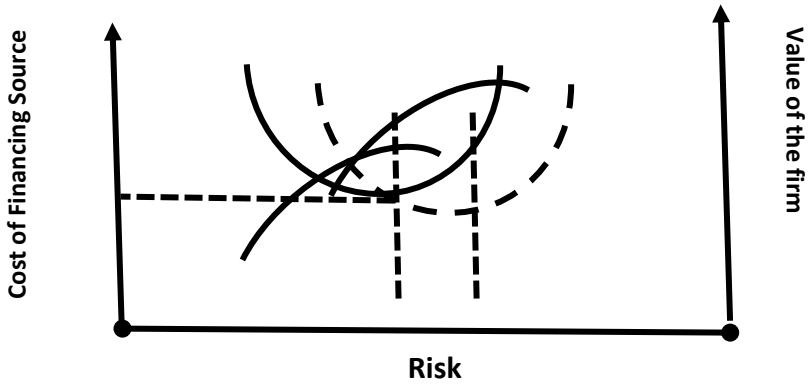
1. $C_{ms0}$ Equals firms selecting public and equity or vice versa.
2. $C_{ms1}$ Equals public and debt or vice versa.
3. $C_{ms2}$ Equals public and equity or vice versa.
4. $C_{ms3}$ Equals private and debt or vice versa.
5. $C_{ms4}$ Equals private and equity or vice versa.

[14] Hensher (2005) notes that the test results of Random Utility 1 approach and Random Utility 2 approach does not differ significantly.

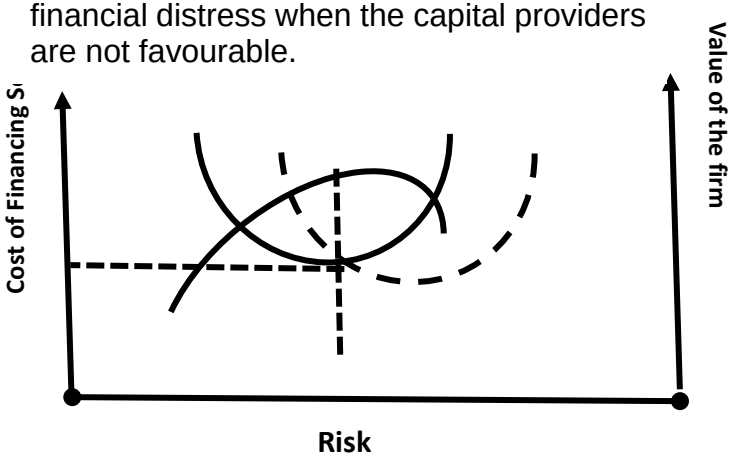
**1A:** Value of the firm, risk and cost of capital under normal circumstances.



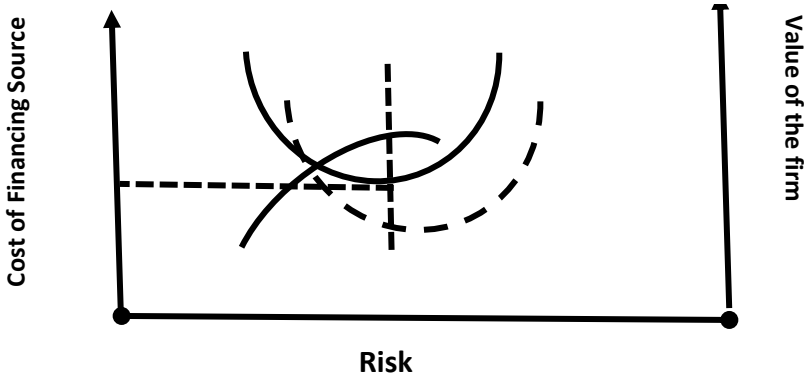

**1B:** Value of the firm, risk and cost of capital given firm selects the optimal mix of capital providers.




**1C:** Value of the firm and cost of capital in financial distress when the capital providers are not favourable.




**1D:** Value of the firm and cost of capital in financial distress when the capital providers are favourable.



Let, *m* be the branch level for n branches and *s* be the elemental level for z elemental alternatives, then the likelihood of observing a financing behaviour depends upon the maximisation of utilities associated with each composite financing decision[15]. I will now going to define the complete set of choice probabilities for a two-level Normalised Nested Logit Model (NNLM).

$$Pr_{m1} = Prob\{[U_{m1} + \max(\sum_1^z U_{s|m})] > [U_{mn} + \max(\sum_1^z U_{s|m})]\} \quad \forall\, s|m \in m = 1,2,3,\dots,N \qquad (1)$$

$$Pr_{s1} = Prob\{[U_{s1|\mathrm{m1}} > U_{sz|m}]\} \qquad \forall\, s|m \in s = 1,2,3,\dots,Z \qquad (2)$$

Therefore, if a firm is considering selecting its capital providers, then it shall choose a combination to maximise its utility. Given the utility of such choice is unobservable; therefore, we will infer the likelihood estimates as an indication of firms' perceived utility.

In equation (1), the probability asserts that a firm is going to choose between public versus private (choice tree 1) or debt versus equity (choice tree 2) given their overall utility is maximised. Similarly, the selection of elemental level alternatives depends on the maximum utility firms can derive from one alternative compared to other alternatives. In contrast, the selection of branch level is the function of the utility derived from branch level alternatives plus the maximum utility derived from elemental level selection.

These utility functions are parametrised as a linear function of credit ratings, proxies for information asymmetry, and control variables. Let, $\lambda$ and $\mu$[16] be the scale parameters of *m* and *s* respectively, then at each level, the utility function of an alternative is a linear

[15] Composite alternative means the alternative given at level m and s. Each composite has two components, where the branch level is assumed to be conditional on the elemental level..

[16] These are scale parameters, and their estimation is also the same; however, for the ease of notation, they are noted as different Greeks.

function of a vector of parameters estimated for alternative specific and firm-specific attributes.

The utility functions for each non-degenerate alternative at level s are as follows.

$$V_s = \mu_1\beta_1 f(X_{1s}) + \mu_2\beta_2 f(X_{2s}) + \cdots + \mu_k\beta_k f(X_{ks}) \quad \forall s \in S = 1,2,3,\ldots,Z \tag{3}$$

Where we normalize the scale parameter of the elemental level attribute to allow for derivation of parameters above. This can be stated as;

$$\mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 = \mu_6 = \cdots = \mu_n = 1 \tag{4}$$

As the normalization of the IV parameter at this level dictates the $var(\varepsilon_s) = \sigma_s^2 = 0$ and allows us to assume that the variance is constant across the alternatives. therefore, we only need to estimate one inclusive value function to identify the link between elemental levels and branch levels. The equation for the likelihood of branch level alternatives is defined as:

$$V_m = \lambda_m \left(\beta_1 f(X_{1m}) + \beta_2 f(X_{2m}) + \cdots + \beta_k f(X_{km}) + \frac{1}{\mu_{m|s}} . I.V_{s|m}\right) \quad \forall m|s \in m = 1,2,3,\ldots,N \tag{5}$$

Where:

$$I.V_{m|q} = \ln\left(\sum_{s \in S} V_s\right) \tag{6}$$

$$I.V_{S|mq}\ parameter = \frac{\lambda_m}{\mu_s} = \lambda_m \text{ as } \mu_s = 1 \tag{7}$$

Louviere, Hensher, and Swait (2000) note that $\sigma^2 = \frac{\pi^2}{6\lambda^2}$ and $\sigma = \sqrt{\frac{\pi^2}{6\lambda^2}}$. From this, we can calculate the value of $\lambda = \sqrt{\frac{\pi^2}{6\sigma^2}}$. The scale parameter allows us to estimate the influence of unobserved utility on the decision-making of the firms and how do firms make their choices given they have already selected an alternative. In the MNL model the $\lambda$ can easily be set equal to 1.283; if we impose the constant variance assumption and set it equal to 1. However, in the nested logit model, we need not make such an assumption and only assume that the scale

parameter of elemental level is equal to 1. Therefore, the unobserved utility effects will be estimated at the branch level.

Given these utility functions, from a multidimensional array of choice, the probability that a firm selects a combination can be stated as a multiplicand of two conditional probabilities and one marginal probability.

$$Pr_{m|s} = Pr_{s}.Pr_{m|s} \quad (8)$$

$$Pr_{s1} = \frac{exp^{(V_{s1})}}{\sum_{s\epsilon S} V_{1,2,3\ldots Z}} \quad (9)$$

$$Pr_{m1|s} = \frac{exp^{(V_{m1|s})}}{\sum_{m\epsilon N} V_{1,2,3,\ldots,N}} \quad (10)$$

## 3.6. Variables[17]

We have already defined the dependent variable in sections 3.2, 3.3, and 3.42. In this section, our objective is to understand how we will construct independent variables for our utility models. The variables used in the models can be divided into two categories Alternative Specific Attributes (ASA) and Firm-Specific Attributes (FSA). The first category represents innate characteristics of financing options with similar meaning across all firms. The second category manifests the heterogeneous factors that can influence individual firm choices. An experimental design where choices and alternatives are based on stated preferences is straightforward to define the ASA and FSA. In our case, where firms' choices and attributes are unobservable, we will use proxy settings to estimate our variable.

[17] Summary of variables derivation and calculation is given in Appendix B.

It is essential to mention that the ASA is not the prime subject of this study; therefore, their inclusion is to run the models on STATA®. Moreover, these ASAs are not directly observables; however, they play an essential role in firms' decisions to choose certain capital providers over others. The list of variables used in this study is presented below in the table. Following is the explanation of the standard notations used in this study.

**Micro Ratings** $_{it}$ ($MRTC_{it}$) = 22 rating scales used by credit rating agencies such as AAA, AA+, AA, AA-… D.

**Broad Ratings** $_{it}$($BR_{it}$) = 10 broad categories of ratings such AA = AA+, AA, A- and BBB = BBB+, BBB, BBB-, and so on.

**TA** $_{it}$ = total book value of assets.

**Debt** $_{it}$ = Book Value of Interest-Bearing Long-term Debt

**DR** $_{it}$ = Debt ratio estimated as $Debt_{\ it}/TA_{\ it}$

**ΔDR** $_{it}$ = $DR_{\ it} - DR_{t-1}/DR_{t-1}$

**EBTD** = Earnings before TAX that are proxied for maximum cash generated in a year through operations

**EBIT** = Earnings Before interest and Tax proxied for firm accounting earnings.

**Capex** = Percentage change in total assets estimated as $TA_{\ it} - TA_{t-1}/TA_{t-1}$

**WC** $_{it}$= Working capital of firm as estimated by OSIRIS ®.

**ΔWC** $_{it}$ = Change in working capital estimated as **WC** $_{t}$ − **WC** $_{t-1}$/**WC** $_{t-1}$

**CPLL** = Current portion of long-term loan

**CSH/E**$_{it}$ = Cash and cash equivalent.

### 3.6.1. Alternative Specific Attributes (ASA)

### 3.6.2. Firms Specific Attributes (FSA)

ASA variables are the attributes of the financing choice available to firms (i.e., public debt, private debt, public equity, and private equity). These attributes are time-invariant as they constitute the essence of the financing alternatives available to firms. The use of these variables is due to the modelling requirements of the software STATA ® to run the nested logit commands. Three categorical variables are used, which are measured on ordinal scales. Based on theoretical consensus in capital structure literature, these scales will be interpreted as the high or low of the stated attribute. It is important to note that these all variables are constructed as dummies and would only be used as and when required by the model.

#### 3.6.2.1. Required Rate of Return (RRR)

The first of these variables is the differing rate of return required by different capital providers, given the risk and expectation of investors. The variable is ranked as 1, lower to 4 highest.

If RRR is 1, it indicates the required rate of return for financing from internal sources. The required rate of return on internal financing is assumed lowest as the firm has to offer no rate to use those funds. It will take a value of 4 for the public equity sources, which are in line with the fact that equity holders require the highest rate of return due to the perpetual nature of their investment and highest risk. Further, in case of default, these investors are poised to lose their investment in the entirety; hence, these investors would seek the highest rate of return.

The issue is to establish that capital providers might seek a higher rate of return between public debt and private debt. Although James and Wier (1988), Diamond (1991) and Easterwood and Kadapakkam (1991) note that the required rate demanded by these investors depend on firm-specific circumstance. However, it is hard to establish these circumstances, which are endogenous to the firms and may require further modelling to ascertain such facts. Therefore, we will consider ostensible facts only and argue that private lenders such as banks with higher access to information may demand lower returns than public lenders. Therefore, 2 will indicate the required rate of return for private lenders, and 3 will proxy for public lenders.

#### 3.6.2.2. Control and monitoring

Control and monitoring indicate the degree to which capital providers can directly observe management's actions. It is constructed as a dummy variable that shows the information-sharing concerns with third parties. Information sharing requirements differ between public and private investors. Firms can choose their capital provider based on the extent to which they need to share privileged information with outside parties. Rajan (1992) notes that private investors such as banks are the best skilled and most likely to monitor firms closely. Although firms may restrict their access to some information, its effects are negligible due to the wide-ranging relationships banks may have with firms. Public lenders and public equity holders usually have equal access to information. However, the equity holders have the extra ability to monitor through annual general meetings and voting rights. Whereas, when firms raise finances from internal sources, such concerns are unfounded.

I will scale the variable from 0 to 3; where, 0 for private equity proxy for internal finances, 1 for the public lender, 2 for public equity, and 3 for private lenders.

#### 3.6.2.3. Tax considerations

Tax consideration estimates the tax concerns of investors vis a vis their investment in a firm. Public and private debt investors' interest income is taxed once; therefore, debt investors are likely to be less sensitive to tax management by the firm. Whereas, for the equity investor, their dividend income is taxed twice; hence, these investors are likely to care about tax management by firms.

Therefore, the tax concerns of investors are significant for firms as it influences their decision-making. Firms need to manage their investments and devise payback policies (especially for equity holders) to optimise their investors' tax costs. Although debt investors are less likely to be influenced by firms' tax policies, rational lenders would still like to see their firms optimise their taxes.

Tax Concerns are scaled on a rank of 0 to 2; where 0 means no concerns and 2 means the highest concern. 0 rank is given to private equity proxied for internal finance, 1 to public and private lenders, and 2 to public equity investors

### 3.6.3. Credit rating Variables

Treatment of credit ratings is an intuitive process, as they represent qualitative opinions estimated on ordinal scales. On the other end, despite being a rank, the credit ratings do not certify the strength of that rank. To understand the methodological necessity for constructive designs of credit ratings, let us consider two examples below.

For instance, imagine a grading system that gives students ordinal ranks such as 1st class, 2nd class,....,. Now imagine, students who achieve first-class marks in their degree. The issue is that these first-class marks do not tell us the quality of first-class marks. Have they achieved 70.5%, 80%, 90%, or 95%; because any mark above 70% is a first-class mark?

Similarly, two firms within the same rating level and sign may have some intrinsic difference in their creditworthiness.

Secondly, often issuer ratings are very stable, and once they are issued, it takes a long time or some severe event to make them change. The stability of these ratings is due to the "credibility and incentive risk" posed to a credit rating agency if their ratings exhibit high variance. An agency that tends to change its rating more often may lose its credibility to investors and firms for their inability to assess its prospects correctly. However, this prolonged stability makes it harder to verify the implications of rating changes on the corporate financing decision of firms. Moreover, because of a stable state, it is also hard to estimate the effect of lag ratings on firms' financing decisions.

Thirdly, the change in credit ratings can be divided into two other categories: expected change and realized change. The expected change is usually inferred from the plus or minus signs attached to a firms' overall rating. In comparison, the realized change is the actual event in the next period. Academic literature adopts intuitive classifications of credit ratings to make sense of these intrinsic differences. This study will also use different variants of credit ratings to test our hypotheses.

This study used long-term domestic issuer credit ratings issued by three rating agencies Standard & Poor's (S&P), Moody's, and Fitch. Using ratings from three agencies allows us to fill the gaps in the rating data of firms and construct meaningful forms of these indicators. I have already presented a detailed discussion of the mechanics of credit ratings in section 2.2. Here, I will elaborate on the construction of credit ratings as a variable.

#### 3.6.3.1. Micro Rating ($MRTC_{it}$) and Broad Ratings ($BRT_{it}$)

Micro Rating ($\mathbf{MRTC_{it}}$) represents issuer-specific ratings along with their signs. Changes in them indicate movement in a firm's creditworthiness within a group of ratings

and across group ratings. Changes in them such as from AA to AA- or AA+, AA+ to BBB+, BBB, or BBB- indicate whether a firm's creditworthiness is deteriorating or improving. For example, a downgrade to A- from A shows that firm is struggling to maintain its credit quality and can expect to move to BBB+ class if it does not improve its creditworthiness.

We use $\mathbf{MRTC_{it}}$ as a starting point to verify the general notion that firms with a higher rating are more likely to raise finances from public capital providers and vice versa. Further, this classification also allows verifying how the firms are likely to behave given their micro-credit ratings and what happens as we move along from lowest to highest scale in credit ratings.

Broad ratings ($\mathbf{BRT_{it}}$) are composite ratings usually comprised of three micro ratings and represent the broad classes of creditworthiness. For instance, AA represents AA+, AA, and AA. This specification of credit ratings allows us to amalgamate a bigger sample of firms in one class and compare them. Kisgen (2006) notes that regulators often overlook signs associated with micro ratings; hence, firms and investors often focus on broader rating classification.

#### 3.6.3.2. Plus, or Minus ($PoM_{it}$)

Kisgen (2006) notes that signs attached to credit ratings indicate the susceptibility of a firm's broad rating to imminent change. He argues that such firms ought to be conservative in issuing debt as the change in their debt level may result in an unwarranted downgrade or inhibit a sought-after upgrade.

Kisgen (2006) notes that credit rating signs such as plus or minus are a statistically significant determinant of firms borrowing levels. However, there are two broad issues with his treatment of credit rating signs as the determinant of capital structure decisions. Firstly, Kisgen (2006) tests are highly sensitive to debt issuance size or equity offering signs.

Secondly, he observes that the significance of plus signs reduces by excluding large equity offerings. Therefore, this study proposes that instead of debt levels, we should use the choice of capital providers to assess the implications of credit rating signs.

We argue that credit rating signs such as plus or minus may only be relevant in determining the types of capital providers rather than debt ratios. These signs may indicate a firm's strategic orientation towards renegotiation and restructuring if their ratings are subject to change. This argument is in line with the arguments of Kemper and Rao (2013), Drobetz and Heller (2014), and Agha (2011), who note that the debt conservatism of firms is difficult to be linked to firms' credit ratings directly. Instead, they argue it is the mediating factors such as the relationship of firms with their private lenders and banks, sample construction, financial flexibility, and debt issuance size and structure.

We argue that firms whose credit ratings have plus or minus signs do not translate their concerns into debt levels adjustments or security issuance decisions. These signs do not indicate an immediate change in the ratings unless the new debt issuance changes a firm's financial strengths fundamentally. In such a case, even a firm with a stable rating (e.g., credit rating without any sign) can face rating adjustment, let alone a firm with a plus or minus sign.

Firms that can establish a special relationship with their capital providers are not concerned with the prospective implications of their signs. Therefore, we argue that a priori implications of credit rating signs are only pertinent to firms' desired capital provider mix. Drobetz and Heller (2014) find confirming evidence for this in the context of Germany and but fail to reject Kisgen (2006) hypothesis.

#### 3.6.3.3. Rating Anchor $(RA_{it})$

Issuer credit ratings are generally stable and exhibit minimum variance in short to medium run. Nonetheless, these ratings manifest important ante hidden information that managers may prefer to rely upon for their capital structure decision-making. Gilson, John, and Lang (1990) argue that firms that structure their capital composition based on known future risks can deal with the unknown situation or shocks better once they may emerge. They argue that firms with ante capital structure tailored to deal with ex-post outcomes survive tough times better than others. Similarly, Dougal et al. (2015) also note that investors anchor the credit spread of firms to their historical risk profiles, which are proxied by credit ratings. Therefore, there emerges a case where firms and investors may tend to base their financial contracts using the previous years' credit ratings of firms.

In line with these assertions, we ought to assess whether the credit ratings in a preceding period are meaningful in determining firms' financing preferences. We are going to construct rating anchors as lagged credit ratings. Rating anchor will comprise two-yearly lag terms. We hypothesise that rating anchor may enable us to identify the role of historical credit ratings on firms' attempts to adjust the composition of their capital providers.

We expect firms to be more sensitive to the credit ratings in immediate periods than credit ratings of the distant past. Credit ratings of last year may be more influential in determining firms' capital structure than the credit ratings of the distant past. We argue that the indifference of firms to ratings belonging to the distant past is due to strategic hysteresis in firms' decision-making process (Dixit,1986). Dixit (1986) defines the hysteresis in the managerial process as the economic inefficiency if firms choose to change their decisions too often or in the short run. Further, if the cost considerations are not paramount for

managers, it takes time to delay or re-adjust their financial decisions after a specific external shock.

This study argues that firms financing preferences are more sensitive to recent rating changes than those in the distant past. We argue this for several reasons. Firstly, the rating changes that took place two years or three years ago are already ought to be reflected in firms' decisions. Secondly, the decisions that have been taken based on old rating changes are costly to be reversed. Thirdly, it is more economical for the firm to adjust its capital structure based on rating changes that took place recently.

For instance, firms may rarely want to retire a long-term debt just after three years of its offer just because of a change in their credit rating. Similarly, repurchasing two years after the issue of a new share does not sound compelling or cost-effective just. An early repurchase may results in wealth destruction of those investors who have been with the firm for long period. Further, the relationship between firms and their investors generally exists in a longer time frame; therefore, prima facie, it is better if the financial contracts are allowed to mature

This study argues that historical credit ratings influence firms' preferences if they are not already factored in decision-making. Firms may prefer to adjust their capital structure, and capital providers in line with recent changes in the ratings and the effect will decline as time elapses.

Rating anchors are constructed using micro rating variables; hence, we expect the influence of lag rating will be synonymous with micro-ratings, and as the lag period will increase, the influence will decline. Firms with a higher rating in the first lag will prefer public over private and debt over equity. However, as the lag period increases, we expect this effect to decline or disappear and make the changes permanent.

To understand why we hypothesise this relationship, let us consider this example. For instance, a firm that historically has a lower credit rating has earned an increase in its previous year rating. Given that this firm may have avoided public capital providers because its lower credit ratings may now seek to raise capital from public capital providers and vice versa. However, once such a switch has been taken, firms may find it costly to reverse this decision if a subsequent downgrade in their credit rating next year. It can also be an essential indicator of hidden information for outsiders as managers know more about their firms' prospects. Their response to recent rating changes can indicate their firms' future creditworthiness or prospects.

However, if we do not find significant evidence for this, it can also indicate that managers do not view recent rating changes as an accurate depiction of the creditworthiness of their firm. Therefore, even If an agency posts a decline in a firm's creditworthiness, the management need not respond to it if management feels otherwise and can maintain stability in the composition of capital providers.

Here, it is essential to mention that information possessed by managers can be of two types: positive or negative. The first type of information indicates that managers expect growth in the future. The second type of information indicates that managers expect volatility in their earnings or is not confident about their growth prospects. Managers with negative information whose firms have received an upgrade recently may still prefer private borrowing over public borrowing or even raising funds from existing shareholders. If they decide to go public and then in case of subsequent downgrade, implications would be more costly and eliminate the savings made by firms. On the contrary, if management feels optimistic about its firm and receives a downgrade in a recent rating change, they may still prefer to seek financing from public investors to convey the positive hidden information.

#### 3.6.3.4. Realised Ratings

We argue that in addition to anticipated rating changes (as indicated by signs), firms' financing decisions are also influenced by realised rating changes. We define realised rating changes as Rating Upgrade (RU) and Rating Downgrade (RD). RU refers to the event if the firm's current rating has increased from the previous year. RD refers to the event if the current rating of the firm has downgraded from the previous year.

The anticipated[18] rating change arguments note that firms are sensitive to expected upgrades and downgrades in their credit ratings. Kisgen (2006), Drobetz and Heller (2014), and Aktan et al. (2019) note the symmetric effect of expected rating changes on firms financing behaviour. As per this hypothesis, firms that expect or are near to downgrade or upgrade are more likely to issue less debt than other firms (Kisgen, 2006). These firms are on the hypothetical cusp of observing a change in their creditworthiness, and they use adjustments in the capital structure to minimise the adverse effects of such change. Hung, Banerjee, and Meng (2017) and Aktan et al. (2019) confirm this hypothesis and note the importance of expected rating changes in determining the capital structure and issuing decisions.

However, this importance is not universal as Drobetz and Heller (2014) argue that firms who are listed in a market economy such as the United States are more likely to be sensitive to expected rating movements. They argue that such importance is reduced once we consider bank-based economies where firms have unique relationships with their capital providers, such as Germany.

[18] Kisgen (2006) notes that plus or minus signs and relative position of the firm within a rating class indicates the future direction of a firm's credit rating. This anticipated rating change causes firms to adjust their debt levels, such as it minimises their costs and optimising their wealth.

Furthermore, these studies ignore how firms behave after receiving a change in their rating. These studies do not consider how the realised rating changes influence firms' posterior financing choices. A relationship between realised change and financing behaviour is bound to exist due to reverse causality argued by Kisgen (2009). He argues that ex-post rating changes financing choices of firms indicate the existence of a target credit rating. Kisgen (2006) finds that firms who receive downgrades are more likely to react and do so at a fast pace; the question is why? Kisgen (2009) notes that firms tend to adjust their leverage such as it reverses their downgrade or inhibits further downgrades.

This can be true for firms that have severely affected the rating downgrades. Firms that see a shift from investment to speculative-grade may align with Kisgen (2009) assertions. Nevertheless, Drobetz and Heller (2014) contradict this by arguing that it can only be valid for the public market-dependent firms for their capital sourcing.

The importance of realised rating changes can be inferred from the pre-emptive efforts by the firm to mitigate the effects of adjustment in models that predict these ratings. For example, Kisgen (2012) notes that firms are responsive to the increase in theoretical leverage levels due to Moody's adjustments in the rating model. He notes that these firms tend to borrow less and grow slowly. This debt conservatism is irrespective of actual leverage ratios of firms based on financial statements.

This study argues that (without downgrading the importance of anticipated credit ratings) realised changes in firms' credit ratings are essential determinates of capital providers' mix. We accept that realised rating change may influence leverage levels, but we argue that the effects must be more pronounced in terms of the choice of capital providers. The basis for this argument is that realised changes play a direct role in determining the access of firms to certain types of investors in money markets and capital markets (Kisgen (2006, 2009), and Drobetz and Heller (2014)). This study argues that when a firm receives

an upgrade or suffers from a downgrade, the actual effect takes place through a change in the composition of a firm's capital provider, not their debt issuance or reduction.

This study also asks why firms whose realised rating is an upgrade do not try to issue more debt. As per the hidden information hypothesis, these firms would signal their creditworthiness and prospective financial strengths by borrowing at a lower cost. Doing so would not only convey hidden information at a very low cost to the outsiders, but firms may also benefit from tax savings and efficiency brought upon by market discipline.

Similarly, the concerns associated with negative realised rating change are also questionable as these firms are argued to lower debt to prevent further deterioration of credit rating and maintain their existing credit rating. This assertion ignores the fact that these firms may need to restructure their capital structure and refinance their assets to meet their cash shortfall, which should have resulted in their downgrade in the first place. Therefore, if such firms reduce their public debt issuance, how can they meet their financing needs without being subject to constraints imposed by credit ratings. Therefore, downgraded firms are made subject to the unnecessary dichotomy of objectives. Firms are expected to issue less debt as it is costly to do so, and they are also expected to restructure their capital without having any impact on their creditworthiness.

Drobetz and Heller (2014) add another dimension that financing behaviour of firms' ex-post rating change is a function of their macro rating (i.e., investment-grade versus speculative grade). They argue that effects indicated by Kisgen (2009) are more pronounced for the firm if their rating change reclassifies them from investment grade to speculative grade or vice versa. This adjustment is essential as it creates regulatory detriment for some firms, and it opens new sources of capital providers for other firms. Therefore, we expect that the behaviour of firms after receiving rating change should be more oriented towards capital providers rather than debt and equity mix.

Drobetz and Heller (2014) confirm this orientation and note that firms who have a special relationship with their capital providers respond to the realised rating changes differently than the other firms. Although, they note this in the context of a bank-based economy such as Germany. Therefore, credit rating changes that result in making firms fall below the regulatory threshold may force firms to change their capital providers from public to private. We argue that we may notice this behaviour in the context of the market-based economy such as the United States.

We will construct three dummy variables to assess the impact of realised rating changes. A rating upgrade would indicate that if the current micro rating of the firm is an upgrade from the previous period. A rating downgrade would indicate that if the current micro rating of the firm is lower than the previous period. Rating upgrade and downgrade would indicate if the current micro rating of the firm is different from the previous period. These variables will take the value of 1 if there is any change and 0 otherwise.

#### 3.6.3.5. Macro Rating ($MacR_{it}$)

Macro Ratings are of firms' general creditworthiness. Macro ratings are generally classified into investment-grade $INV_t$ and speculative-grade ($Spec_t$). . Investment-grade refers to any firm rated above BBB by S&P and Fitch and Ba3 by Moody's. Speculative grade refers to any firm rated below BBB by S&P and Fitch and Ba3 by Moody's. Macro ratings often set benchmarks for large investors, including banks and financial institutions, to rations their investments. These ratings, along with micro ratings, determine the capital requirements of different investments (Kisgen (2006), (2009), Boot et al. (2006), and Aktan et al. (2019)) Therefore, it becomes imperative for firms to maintain a favourable macro rating status and be able to access the capital and money markets.

Generally, macro ratings in capital structure decisions are treated as a categorisation variable. Macro ratings of a firm overall are very stable as it takes a long time for a firm that is classified as investment grade with AAA rating to downgrade to BB level to become speculative grade. However, macro ratings are more important for a firm on the borderline of investment-grade and speculative-grade ratings. Kisgen (2006) notes that the effects of credit rating changes are most significant when they change firms' macro ratings from investment grade to speculative grade. Furthermore, Drobetz and Heller (2014) identify another use of macro rating by using them as a grouping variable. They use macro ratings to categorise firms into investment-grade and speculative-grade firms. Within each group, they note a significant difference between the effects of plus and minus signs and anticipated rating changes.

This study argues that macro ratings are an instrumental tool in analysing the impact of financial distress on firms financing choices. Following Kisgen (2006) and Aktan et al. (2019), we will use macro ratings to analyse how firms behave, which are on the borderline of investment-grade and speculative. In addition to this, we also aim to discern the differing behaviour within investment-grade and speculative-grade. We further argue that firms in investment grade are more likely to access public capital providers and use debt than firms in speculative grade. The reason for this is that large institutional investors are major debt holders in financial markets are likely to invest in firms with invest grade status. These investors may prefer a firm that offers a lower premium for their capital but possess an investment grade rating (Stiglitz & Weiss, 1981). Therefore, the macro rating will test whether their broader rating status influences firms' choice of capital providers.

#### 3.6.3.6. Firm Classification ($FC_{it}$)

Following Dasilas and Papasyriopoulos (2015)[19], we construct four dummy variables to indicate the classification of firms based on their credit ratings. According to Dasilas and Papasyriopoulos (2015), firms can be divided into four categories: healthy companies, balanced companies, vulnerable companies, and risky companies. Healthy firms have a credit rating between AAA to A[20]; which indicates that they can meet their financial obligations and face no solvency concerns. Balanced companies are firms rated between BB and BBB. Although these companies have robust financial health, they are vulnerable to endogenous and exogenous shocks that impact their financial standing. Dasilas and Papasyriopoulos (2015, p. 225) note that such "…companies may face some ongoing uncertainties or exposure to adverse business and economic conditions."

On the other hand, vulnerable companies are the ones rated between B and CCC and exhibit signs of financial fragility and would be severely affected by systematic and idiosyncratic shocks. The last group is risky firms rated between CC and D, and they suffer from high financial risk. Dasilas and Papasyriopoulos (2015) find a significant difference between the debt issuance behaviour of firms across these four classes and note that the higher the credit rating status higher the debt issuance. These findings align with the pecking order theory, which asserts that firms would always prefer debt over equity given a firm's creditworthiness.

In this study, we will assess that such classification also influences firms' preferences of their capital providers. We argue that healthy firms should be more likely to raise finances from public sources than from private as these firms will be subject to a lower required rate

[19] Dasilas and Papasyriopoulos (2015) note that the Amadeus database provides these classifications. However, as we have used the Bloomberg database to collect rating data; therefore, we will construct this variable for ourselves as per the classification given by Dasilas and Papasyriopoulos (2015).

[20] I presume that these ratings include the plus and minus signs.

of return. Following, Dasilas and Papasyriopoulos (2015), I will rank these statuses on a scale of 1 to four, where 1 represents the risky firms and 4 is the healthy firms. four dummy variables will be created to analyse the individual impact along with the composite variable.

#### 3.6.3.7. Information Asymmetry

The discussion, hitherto, attempts to lay out how credit ratings can act as a reliable indicator of information asymmetry. To verify this empirically, it is imperative to use hidden information variables to net the effects of credit ratings in econometric models. Hidden information encourages managers to select an optimal mix of capital providers that will minimise adverse implications of monitoring, disclosure, and renegotiation of financial contracts (Diamond (1985), MacKie-Mason (1990), Diamond (1991), and Lemmon and Zender (2019)). Managers also use different signals to minimise information asymmetry between them and investors. However, managerial methods to convey hidden information and their advantages are unknown. Therefore, academic literature uses dividends payment, forecast variance, and research and development as a proxy for information asymmetry.

Dividend payments in isolation are puzzling indicators of hidden information as Easterbrook (1984) argues that there are many more direct and reliable tools to relay hidden information. However, dividends become an effective indicator of hidden information when issued by financially active firms as it instigates capital market monitoring and gathers the interest of new investors (Easterbrook (1984) and Noronha, Shome, and Morgan (1996)). MacKie-Mason (1990) notes that the sticky nature of dividends dictates that firms and investors are more sensitive to changes in dividend policy rather than their tax implications. Therefore, firms which pay dividends are more likely to issue more equity and avoid private debt to maintain favourable relationships with capital markets.

MacKie-Mason (1990); (1990) notes forecast variance as an essential indicator of information asymmetry. He argues that if the forecast variance is higher than the previous period, investors know significantly less than managers. It may result in investors demanding higher premiums irrespective of the creditworthiness of firms. Following his approach, I estimate forecast variance as the standard deviation of the first difference of firms accounting earnings. The larger the variance, the higher the information asymmetry that would see management preferring private sources of financing.

MacKie-Mason (1990) argues that Research and Development (R&D) is an important indicator of information asymmetry. He argues that firms that are active in R&D may prefer internal financing over external and private over the public to minimise the information asymmetry costs. Aboody and Lev (2000) note that management of R&D intensive firms try to capitalise on the anticipated gains which firms may enjoy after the success of their R&D. Therefore, R&D indicates hidden information about a firm's prospective growth, and optimistic managers may prefer the capital providers who would cost the least such as private investors.

#### 3.6.3.8. Control Variables

A set of control variables is included to minimise omission errors and any other bias that could lead to type I, type II, or type III errors. These variables have been used by Titman and Wessels (1988), MacKie-Mason (1990), Rajan and Zingales (1995), Kayhan and Titman (2007), and Gomes and Phillips (2012) as reliable indicators of firms financing preferences.

Starting from the size of firms, James (1987) notes that large firms with good credit ratings prefer public lenders over private lenders. ZPROB estimates a firm's distance from the bankruptcy and projects the visible threat to new investors. Firms with higher ZPROB

scores will not only struggle to access public capital markets but will be vulnerable to undue rent expropriation by lenders in the event of restructuring. Therefore, such firms would prefer investors who can exhibit flexibility in financial distress. Growth indicates the prospects of firms to its investors; firms with a positive rate of change should, except the public capital market, offer favourable terms and lower premiums. Growing firms assets size is increasing that ensures public debt and equity investors about the return of the investment.

Time has been used as a dummy variable to estimate the effect of business cycles on firms financing choices. For our sample period, I have divided the entire period into three cycles, pre-financial crisis, during the financial crisis, and post-financial crisis. Three dummy variables are created to account for their effects.

We will also use yearly dummies to ensure another time-specific effect on firms financing choices. Ab initio assumption is that the time variable carries 0 effects on firms' capital providers' choice. However, if they are more than zero, then they indicate that choice of capital providers is influenced by the economic environment of firms. For instance, Alp (2013) notes that credit rating agencies indulged in inflating credit rating right up to financial crisis; therefore, such inflation is bound to distort firms financing choices.

We will also use the target cash balance as a control variable. Leary and Roberts (2010) note that firms prefer to reserve a minimum cash balance. They argue that this preference results in firms deviating from expected financing behaviour as postulated by pecking order and trade-off theories. I argue that having a cash reserve requires firms to raise capital externally even if they have internally funded available. However, the implications of this are unknown on the actual choice made by firms.

| Expected Effects of Variable of Capital Providers Choices | | |
|---|---|---|
| Variables | Public | Debt |
| Required rate of return | 0 | + |
| Control and monitoring | 0 | + |
| Tax considerations | 0 | ? |
| Micro Rating ($MRT_{it}$) | + | + |
| Micro Rating Upgrade ($MRTU_{it}$) | - | + |
| Micro Rating Downgrade ($MRTD_{it}$) | + | - |
| Broad Rating ($BRT_{it}$) | + | + |
| Broad Rating Upgrade ($BRTU_{it}$) | - | + |
| Broad Rating Downgrade ($BRTD_{it}$) | + | - |
| Rating Anchor ($RA_{it}$) | ? | ? |
| Rating Anchor High ($RAH_{it}$) | - | + |
| Rating Anchor Low ($RAL_{it}$) | + | - |
| Rating Plus, or Minus ($RPoM_{it}$) | ? | ? |
| Rating Plus ($RP_{it}$) | ? | + |
| Rating Minus ($RP_{it}$) | ? | - |
| Investment Grade ($INV_t$) | + | + |
| Speculative Grade ($Spec_t$) | + | - |
| Firm Classification ($FC_{it}$) | + | - |
| Research & Development | - | - |
| Dividend Payment | + | 0 |
| Forecast Variance | + | - |
| Size of the firm | - | + |
| ZPROB | + | - |
| Growth | - | + |
| Profitability | ? | + |
| Time | ? | ? |
| Target Cash Balance | ? | + |

Table 3: Expected Sign of Variables

## 3.7. Data Collection and Issues

Bloomberg ® and Osiris ® are used to collect data for firms' financials, securities issuance, and credit ratings. Given that the data sources are not uniform, there are noticeable differences in the availability of different variables. Further, we have used revealed preference theory to infer financing decisions of the firm; hence, this also results in some

methodological issues. I categorize these limitations into two broad types: mechanical and methodological.

Mechanical limitations are those issues that purely arise from the availability of data, its form, and its size. Three problems that are noteworthy for this study are the matching issue, survival bias, and missing observations:

The matching problem is that often if the data is available on one source (i.e., Bloomberg) for a firm, it may not be available for the other and vice versa. This issue is managed by creating our dataset using an ordered id system, and firms are identified using that id. This id system is irrespective of the firms' size or sector and ensures no selection bias.

Our data collection suffers from survival bias; firms often enter and leave the sample throughout the sample period. Hence, fewer firms remain part of the population for the entirety of the period.

We primarily focus on public firms; therefore, a firm only remains in the sample if it has remained a publicly quoted firm irrespective it exists or not exists. This issue is common to corporate finance studies (Welch, 2007); hence, I do not expect it to affect our results different from the existing studies.

The issue of missing observations in the data; is due to lack of disclosure by firms or the instances where the database did not collect the data field for the given period.

The second type of limitation is methodological, which is ascribable to how this study interprets the data and uses it to construct independent and dependent variables. Firstly, we study incremental financing decisions rather than percentage changes in debt ratios. For our analysis, we use changes in absolute levels of different financing sources at year-end as indicators of whether a firm has chosen a particular financing decision or not.

This approach allows us to minimize the mean tendency of the data and enables us to focus on the strategic contents of the financing decisions. Nonetheless, there are two issues with this approach. Firstly, MacKie-Mason (1990) notes that such an approach requires us to assume that firms only make financing decisions once a year. There are also instances where it is notable that firms often make more than one choice, and secondly, there are also instances where firms made no financing choice during the period.

It is essential to mention here that the duplicity of financing decisions is more endemic in the use of bank loans and internal funds, not in the issuance of public securities such as bonds and stocks. Therefore, we observe severe opacity and an unpredictable selection of financing choices. In addition to this, establishing the link between incremental financing and investment decisions is also not possible due to the opacity of data (MacKie-Mason, 1990). However, Welch (2007) notes that these issues are common to the capital structure research; hence, we should not negatively expect them to affect our results. The following discussion will further outline that how the datasets have been constructed and provide a rationale for the approaches adopted throughout.

### 3.7.1. Financial Data: Sample selection and data imputations

A total of 1766 publicly listed firms of the United States of America (USA) were selected for this study initially. The sample was constructed using one threshold: the availability of financial data for the whole sample period, which is 1999 to 2018. Following convention, financials and utility firms are omitted as their capital structure is rate regulated (MacKie-Mason (1990) and Fama and French (2005)). Secondly, the data on credit ratings are collected from Bloomberg terminal from 1970 to 2018. This sample comprised all the firms awarded a corporate issuer rating by Standards & Poor (S&P), Moody's, and Fitch.

Finally, firms selected priorly are compared to the Bloomberg sample and are only retained if they were given an issuer rating during the period.

A total of 629 firms were retained in the sample and provided us with a total observation of 12,580 years, and we were able to have a balanced panel. An issue of concern was that we might end up with a selection bias as larger firms are more likely to be in both samples. Hence, the final sample could manifest uniformity of subjects and inhibit the variance necessary for running models.

However, a sample distribution of firms represented by their respective Identification Number (ID) and average values of assets of every firm for the entire period is given in Figure 5 below. The exhibit confirms that our final sample comprises small to large scale firms. An average firm has total assets of $13.78 billion, whereas the smallest firm has total assets of $ 71.225 million, and the largest firm's total assets are worth $600 billion. This dispersion ensures that our results are not influenced by anyone category of firms' behaviour.

Secondly, a similar analysis of firms' average debt levels is also conducted; firms that issue more debt or their overall debt ratio is very high are more likely to receive credit ratings. Although computation wise, it should not lower the quality of results; however, it may skew our results in one direction: rated firms may behave alike. Graph B exhibits that these firms are also very diverse in their borrowing behaviour. The average debt level of a firm for the sample period is $9.15 billion and with the largest firms having an average debt level of $511 billion. Other than absolute debt level, graph C shows that these firms' debt ratios are also normally distributed and do not exhibit any trend or bias. For the sample period, the average debt ratio of firms is 43.5%, and the maximum ratio of 118.5%.

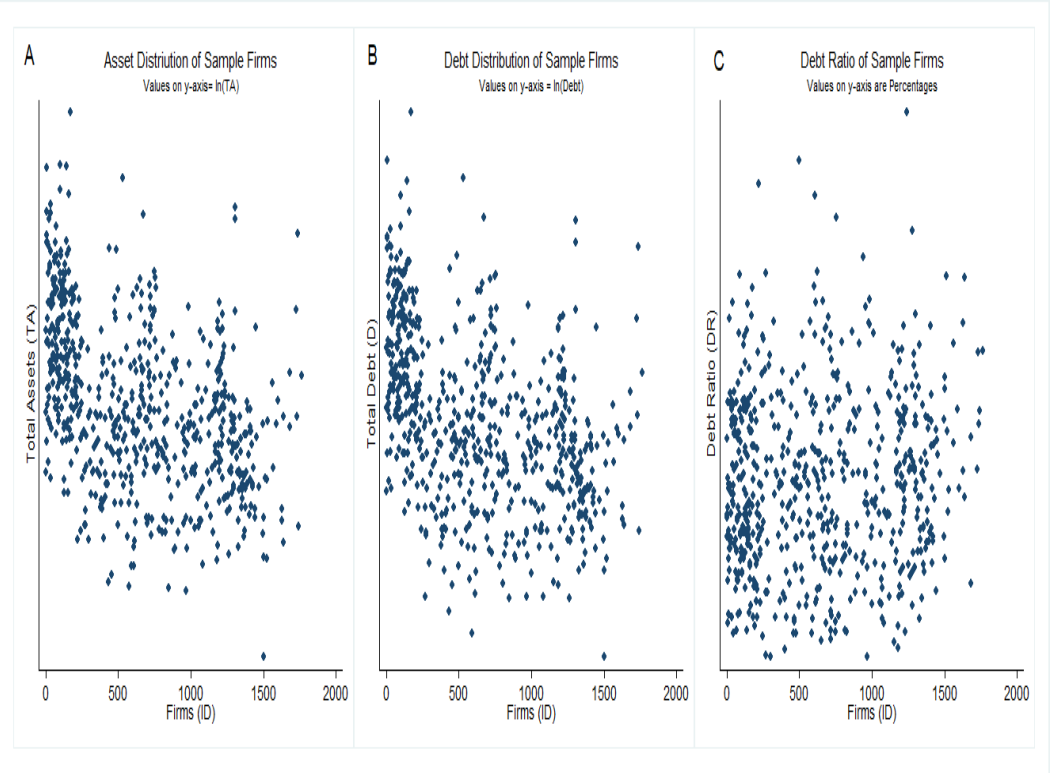



Figure 5: Sample distribution of Firms' Total Assets, Total Debt, and Debt ratio

There is also the issue of missing observations in our data. However, this issue is more of an issue of the reporting structure of databases than the actual availability of data. Of 629 firms, 201 firms had one or more years of missing observations. Out of these 201, 77% of the firms only had one year of missing data, and the remaining firms have missing data from two to eight years of data. Table 5 summarises the count of firms and the number of missing years in detail, and it shows that nearly 96% of the 201 firms have three or fewer missing observations per data field. A three-step strategy was adopted to complete the data fields. Firstly, databases were cross-checked, such as that if the data is not available on Osiris, then Bloomberg was used to collect data. Secondly, if the data was not available on both sources, firms' annual reports were used to collect the data and fields were manually filled. Thirdly, if annual reports were not available due to the company being a private company or not registered in that year, the most recent figures were used to complete the

data. Using this strategy, I was able to achieve a balanced panel that enabled me to construct a comprehensive nested logit choice dataset.

| No. of Years data is missing | Firms | Percentage |
|---|---|---|
| 1 | 154 | 77% |
| 2 | 15 | 7% |
| 3 | 24 | 12% |
| 4 | 2 | 1% |
| 5 | 2 | 1% |
| 6 | 1 | 0.5% |
| 8 | 3 | 1.5% |
| Total | 201 | |

Table 4: Missing Data Summary

Now in the next section, I will briefly summarise the credit rating data and its treatment before moving on to tests and results.

### 3.7.2. Credit Ratings Data: collection and organisation

The second main data category used in this research is credit rating data issued by Bloomberg®. The data is templated as historical credit rating changes that show the current rating of a firm and the last credit ratings of the firm. Hence, the data point of firms is not yearly, but it is when a change takes place in the data issuance of firms. For instance, if Moody's announced a change of the rating of a firm in 2005, Bloomberg will report the new credit ratings and previous rating of the firm. Furthermore, these changes are not very frequent as firms may not see a change in their credit ratings for years; hence, I had to manually use the noted change event to complete the data for previous and subsequent years.

As an example, let us say that company A notes their first credit rating change in the year 2008 along with the last rating, and there are no other records of the firm's credit ratings. Therefore, I will use the last credit rating as credit rating from 1999 to 2007, and from 2008 onwards, the new credit rating will be used until a new change is announced by S&P, Moody's, and Fitch.

The rationale behind using these three main credit ratings of the firm is that it allows us to have the maximum sample. Further, ratings issued by these firms are comparable and interpreted alike in decision-making. A detailed description of these ratings sign and symbols have been provided in chapter 2 of this thesis for further reading. Appendix A summarises the ratings, their coding signs, and how they are matched. The ratings issued by S&P and Moody's are often suffixed or prefixed by (P) or u, respectively. The first sign means provisional rating subject to meeting further criteria, and the latter means unsolicited. However, these ratings, especially provisional ratings, should become permanent and are significantly less likely to be downgraded. Because it is against the business interest of rating firms and the subject firms to evidence that issued ratings can be inflated through the solicitation process. Lastly, usage of credit ratings as an independent variable also requires us to construct scales to account for variations in credit ratings. It is also noteworthy that these ratings are usually very stable and tend to stick around their mean figures. Therefore, our research will analyse credit ratings from five broad perspectives: micro ratings, broad ratings, signs of ratings, and macro ratings. Detailed discussion on the usages of credit ratings is given in section 4.

# 4. Chapter-Four: Data Analysis, Results and Findings

## 4.1. Introduction

This chapter comprises two broad sections. In the first half, we will analyse data using descriptive statistics and visualisation methods. Our aim is to highlight the persistent regularities and irregularities that are largely unexplained by the existing finance theories and models. We will also discuss the *prima facie* basis for our hypotheses using observed financing behaviour of firms. Furthermore, the data analysis will also enable reader to meaningfully interpret our results.

In the second half of this chapter, we are going to present the results of our tests. The results presented here comprise three broad categories of tests. Firstly, we have conducted joint tests using all credit rating variables, hidden information indicators, and control variables. Secondly, individual constructs of credit ratings are tested with indicators of hidden information to assess their reliability as indicators of hidden information. Thirdly, tests are run using alternative model specifications to check the robustness of our results.

## 4.2. Data Analysis

In this section, we present the data on financing choices of firms and observe usages of different sources of long-term debt. In addition to this, data on credit ratings of firms will also be presented to analyse their ostensible implications for financial decisions. Data are averaged over years and over firms to detect any trends or co-movement of variables. Further, data on financing decisions are summarised as frequencies, whereas financing choices on debt and bank loans are further analysed using balance sheet figures. The next few paragraphs would elaborate that why we have chosen to use observed frequencies of

financing choices instead of proportional changes in the balance sheet as the basis of our analysis.

In capital structure literature, certain conditions are imposed to qualify financing decisions of firms for being valid financing decisions. For instance, some studies note that for a valid financing choice, change in debt or equity must be greater than a certain percentage. Similarly, some studies argue that a firm must have a deficit in financing each year before it can be allowed to raise external funds. We consider these to be unnecessary impositions and argue that we should consider every observable financing decision as a valid financing decision. Because any change in the capital structure of firms, irrespective of its size or timing, is ought to carry unobservable costs and benefits for the firm. Unless we assume that these unobservable costs and benefits of financing choices are irrelevant to managerial preferences; therefore, it makes no sense to ignore any financing choice.

Further, it is also in line with the hidden information hypothesis which argues that any financing choice (especially external) made by managers is bound to emit signals to outsiders. We also argue that such assumptions ignore the instances of restructuring where firms may shift reliance from one source of funds to another source. Moreover, the statistical implications of using thresholds such as 1% or 5% change in Capital Expenditure (Capex) are found to be indifferent (Shyam-Sunder and Myers (1999) and Leary and Roberts (2010)). Therefore, if the size of the threshold is not important then why insist on having any threshold at all.

The basis of these arguments is also manifested in the traditional evidence. For example, some studies link debt financing to firms' profitability (Rajan & Zingales, 1995). However, these studies do not discuss that such behaviour coincides with a deficit of financing or meeting the percentage threshold. Also, they do not mention that what type of debt is preferred by profitable firms: do they prefer private or public. Because, after having

imposed the conditions of financing deficit and greater than 5% change in Capex, these studies aggregate debt financing. In this aggregation, the difference between source of debt is overlooked. Using an aggregate estimate of debt may provide us with the joint probability of both events occurring (i.e., financing deficit and firm choosing to borrow); but it does not provide the conditional and marginal probabilities of firms' financing choices.

Furthermore, these studies struggle to justify that why profitable firms with surplus cash still may prefer external financing. In fact, it's noted that profitable and larger firms often do not act according to the pecking order hypothesis (Lemmon & Zender, 2010). For instance, profitable firms often defy the usual course of the pecking order. Despite having extra cash at disposal, they still prefer external sources of financing and prefer public debt over private as it is cheaper for them to issue public securities (James (1987) and Diamond (1991)). Therefore, in this study an attempt is made to look at actual decisions first, ignore the sizes of financing issue, and focus on their incremental effects without imposing any conditions. Any change in them is treated as a direct indication of the choice of a financing source.

### 4.2.1. Financing Choices

Starting with financing decisions, Table 6 summarises the annual financing decisions made by firms. The table comprises two panels; panel A summarises the actual decisions made by firms in a year, which shows firms often choose multiple sources of capital at one point in time. Panel B summarises financing decisions designed as per choice models' requirements where firms are not allowed to make more than one choice per year[21].

[21] Conditional logit model based on McFadden (1973) and McFadden (1981) work require each individual to make one choice per event and then we have duplicated by combining them into nests.

The details of the approach are explained above in section 2 of part 4 for further clarifications.

Financing decisions in panel b show slight changes in all decisions other than public equity. We have kept public equity frequencies fixed because the information content of public equity is ought to be higher than all other decisions. Secondly, numbers of public bond issuances are also kept as they are; except for the years were public bonds issuance

| | Panel A | | | | | Panel B | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| This table summarises the number of times sample firms have chosen financing alternative. Panel A summarises the actual number of choices as observed in the data. Panel B summarises number of financing decisions as per nested logistic regression model design. The nested logit model, following conditional logit specification allows the respondent to make one choice per event. Therefore, we have imposed a hierarchy of choice as a function of information asymmetry. Following Mackie-Mason (1990) If a firm choses public equity in year than other choices are ignored as new shares issue manifest the highest level of information problem. If public equity= 0, and firm has issued bonds then its public debt and other options are ignored. If the change in bank loan is greater than 0% then it's private debt and if deficit in financing is greater than 0 and no other source have been used than it's coded as public equity. | | | | | | | | | | |
| | **Observed Financing Decisions** | | | | | **Selected Financing Decisions** | | | | |
| Years | Private Equity | Private Debt | Public Debt | Public Equity | Total | Private Equity | Private Debt | Public Debt | Public Equity | Total |
| 1999 | 0 | 0 | 145 | 89 | 234 | 0 | 0 | 120 | 89 | 209 |
| 2000 | 74 | 302 | 119 | 68 | 563 | 30 | 187 | 103 | 68 | 388 |
| 2001 | 130 | 338 | 199 | 89 | 756 | 37 | 166 | 170 | 89 | 462 |
| 2002 | 116 | 302 | 184 | 98 | 700 | 45 | 146 | 156 | 98 | 445 |
| 2003 | 78 | 299 | 224 | 93 | 694 | 27 | 133 | 182 | 93 | 435 |
| 2004 | 52 | 260 | 170 | 102 | 584 | 27 | 128 | 137 | 102 | 394 |
| 2005 | 53 | 276 | 157 | 71 | 557 | 22 | 152 | 131 | 71 | 376 |
| 2006 | 52 | 314 | 158 | 69 | 593 | 17 | 180 | 136 | 69 | 402 |
| 2007 | 82 | 356 | 194 | 67 | 699 | 33 | 178 | 169 | 67 | 447 |
| 2008 | 119 | 339 | 131 | 61 | 650 | 56 | 202 | 115 | 61 | 434 |
| 2009 | 128 | 252 | 227 | 96 | 703 | 44 | 85 | 191 | 96 | 416 |
| 2010 | 65 | 292 | 220 | 49 | 626 | 25 | 131 | 198 | 49 | 403 |
| 2011 | 62 | 342 | 184 | 56 | 644 | 16 | 186 | 164 | 56 | 422 |
| 2012 | 79 | 358 | 249 | 52 | 738 | 25 | 155 | 229 | 52 | 461 |
| 2013 | 76 | 338 | 226 | 75 | 715 | 30 | 137 | 196 | 75 | 438 |
| 2014 | 78 | 345 | 200 | 63 | 686 | 31 | 177 | 172 | 63 | 443 |
| 2015 | 117 | 352 | 210 | 62 | 741 | 39 | 167 | 191 | 62 | 459 |
| 2016 | 108 | 331 | 215 | 74 | 728 | 39 | 161 | 179 | 74 | 453 |
| 2017 | 88 | 356 | 242 | 55 | 741 | 23 | 169 | 218 | 55 | 465 |
| 2018 | 87 | 309 | 164 | 49 | 609 | 38 | 180 | 145 | 49 | 412 |
| Total | 1644 | 6061 | 2818 | 1438 | 12961 | 604 | 3020 | 3302 | 14538 | 8364 |
| Average | 82 | 303 | 191 | 72 | 648 | 30 | 151 | 165 | 72 | 418 |

Table 5: Firms Financing Choices

coincides with public equity issuance. Thirdly, private debt use is only noted if the change in private debt levels is positive and given no public security issuances have been made. Lastly, private equity use is recorded if in that year there is a deficit in financing and no other funds have been used.

On average, 629 firms are observed to make 648 decisions within a year; that confirms the assertions that firms have an irregular pattern of financing decisions. Panel A also shows that on average firm chooses 385 times *private sources* (i.e., private debt plus private equity) of financing and 263 times *public sources* (i.e., public debt plus public equity), per year. That highlights firms' tilt towards private financing sources against public sources of financing.

Whereas similar aggregation for debt versus equity choices shows that firms choose *debt* (i.e., private debt plus public debt) as a financing source 494 times and *equity* (i.e., private equity plus public equity) 154 times, per year. This confirms the overall tilt of firms toward long-term lenders in favour of using the equity. Among all sources, private debt can be considered as the most preferred source of financing and public equity is the least preferred source. This is in line with the hidden-information hypothesis, that firms view public sources of capital as the costliest sources of financing.

In econometric models, these financing choices are assumed to be distributed such as they meet I.I.D and IIA conditions. However, graphing annual averages show that an unobserved portion of their utilities seems to be correlated and a firm's choice of one source is not independent of the other financing choices. Therefore, a nested logit model is better than using simple logit models. In the robustness tests of models, we will assess in further detail the weaknesses of nested models as well. However, for the sake of simplicity, we recommend the reader to assume the nested logit models are reliable alternatives to IID and IIA assumptions.

To capture the trend and relationship between different financing sources; two graphs of annual averages are plotted below. Figure 6 plots the actual financing decisions and figure 7 plots the decisions which remained after aligning them to nested logit model requirements. The observed choices indicate that whenever firms make an external financing choice, they prefer private debt over all other available choices. In addition to this, the use of private debt has increased from 2000 onwards, which coincides with the Basel II implementation period. Therefore, it seems that established publicly listed firms prefer private debt over other means of financing. Figure 6 also shows that firms prefer to use public debt and if they still need more external funds then public equity is used as a last resort. Now, this might sound in line with the pecking order theory; however, the theory does not distinguish between private and public lenders. Secondly, it also imposes the condition on the firm to use internal funds. That necessitates higher use of private equity, which we do not observe in our sample.

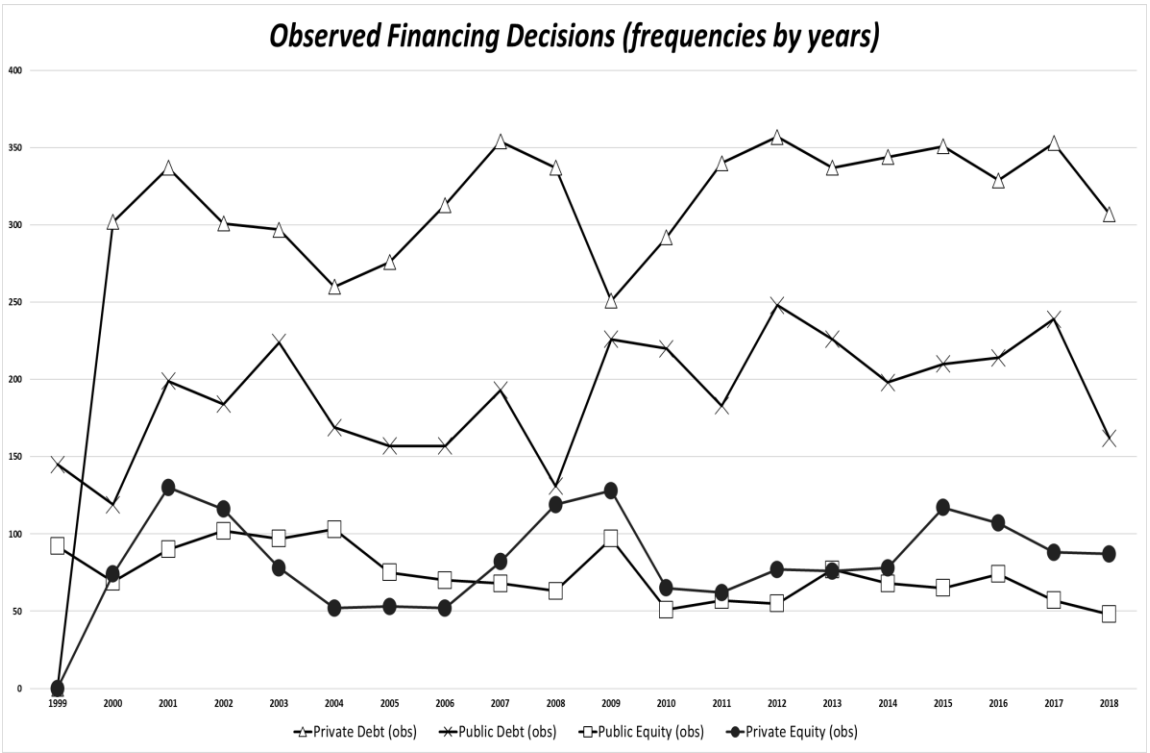



Figure 6: Observed Financing Choices

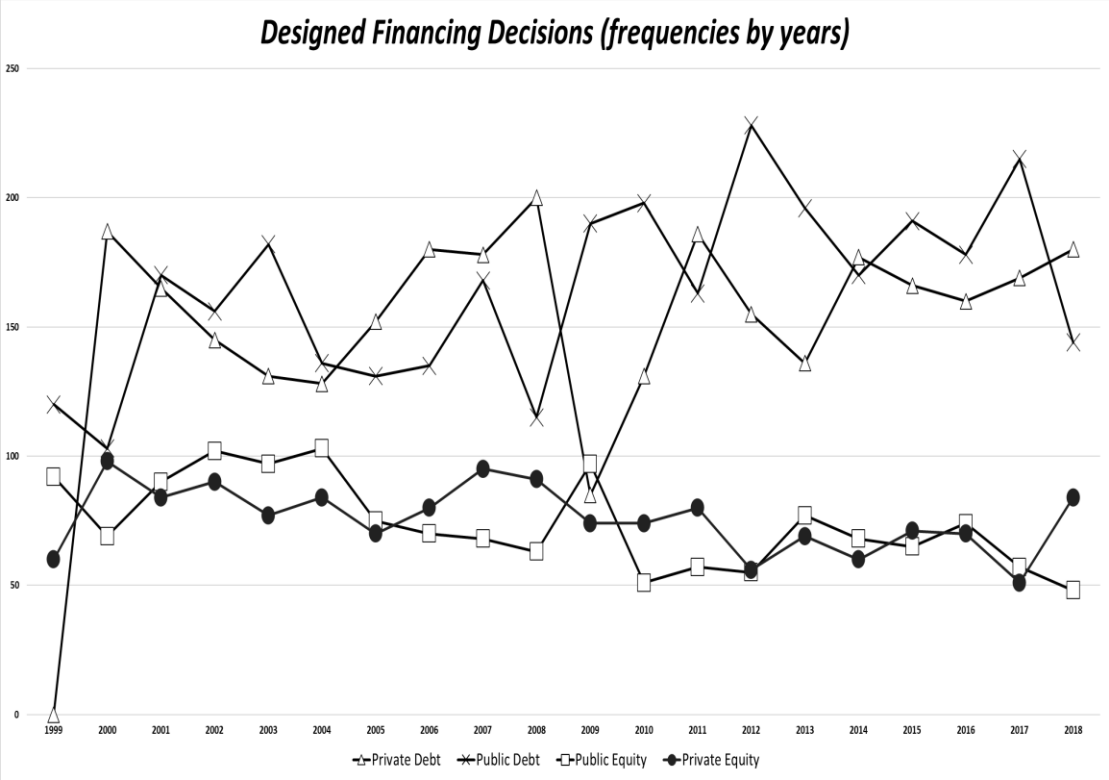



Figure 7: Designed Financing Choices

However, data shows that firms do not take retained earnings for granted and instead would use them if they don't find private and public debt as optimal choices. In the graph, it is also visible that firms use retained earnings before they are ought to use any other source. However, the line is below private and public debt that indicates the use of retained earnings is more linked to the use of public equity. In case firms cannot raise capital by issuing new shares they use retained earnings.

One thing that is visible in both graphs is that the conditional means of observed financing choices may not be independent of each other. For instance, annual choice frequencies of private debt and public debt behave in opposite directions to each other. As when in any given year firms are observed to use more private debt, their use of public debt decreases and vice versa.

This contrasting behaviour indicates that a firm's choice of one source is not independent of other available alternatives that is in violation of the IIA assumption. *Prima facie*, one can argue from figure 6 that once firms have used private debt sources then they seem to decrease their use of public debt as a finance source.

This can also be considered as an indicator that firms may view it as a negative signal to use private and public debt providers together. As private lenders might view this as an attempt to avoid closer scrutiny and public lenders might view it as an emergence of distrust between firms and their private lenders. James (1987) and James and Wier (1988) note that when firms borrow more from private lenders (especially banks); it indicates the trust of the informed lenders to public lenders. Therefore, the firm may avoid reducing its reliance on private lenders and increasing public borrowing simultaneously.

These choices also make sense, when the hierarchy of decisions changes from capital providers to capital types such as debt and equity. For instance, after choosing debt as the preferred type of capital firms are likely to prefer private debt rather than public debt. An interesting fact that our data shows is the interdependence between private and public equity.

In the observed choices graph, firms are seen to be preferring private equity (i.e., retained earnings) over public equity that is in line with existing theories. However, the frequencies of private and public equity are not noticeably different from each other. Sampled firms are seen using public equity and private equity at a similar level. This behaviour is little explained by the traditional pecking order theory. According to the pecking order theory public equity and private equity are very dissimilar due to their different information asymmetry costs. However, this ignores the fact these both sources belong to the same type of capital providers namely shareholders or public equity.

Using either source is bound to result in increased scrutiny from shareholders as internal funds belong to the shareholders. And if firms are seen to be overinvesting retained earnings rather than returning it to the shareholders then this may result in increased premium demanded by shareholders. Hence, we may argue that firms prefer not to use both in combination. Figure 7 confirms that even after accounting for the double decisions made by firms, interdependence between these sources remains valid. Considering these assertions, it now seems valid to combine these sources in nests and analyse which choice structure is more reliable than the other. The choice trees are discussed in detail in chapter 3.

Table 7 summarizes the aggregate number of selections of financing alternatives. We find in our data is that firms are often making multiple choices in one year and each choice made is strategically different from the other. 3016 firm years observation indicate at least 2 decisions per year, 716 firm years observation indicate three decisions, and 44 events of 4 choices per year. The years in which firms are not observed to use any financing source is primarily due to the absence of using external finances such as private debt, public debt, public equity. Non-disclosure by firms of their use of internal funds also limits our ability to differentiate how firms finance their capital needs. We can see from our data that there are at least 1050 yearly observations where firms did not choose any means of financing. It is this coarse nature of data that inhibits researchers to consider financing decisions as choices rather than proportional adjustments.

| Observed Decisions | | Breakdown by choices | |
|---|---|---|---|
| Financing Decision | Chosen | Multiple Decisions | Count |
| Private Debt | 6038 | Greater Than 1 | 3776 |
| Public Debt | 3804 | Equal to 2 | 3016 |
| Public Equity | 1478 | Equal to 3 | 716 |
| Private Equity | 1641 | Equal to 4 | 44 |
| Total | 12961 | One choice | 4605 |
| Available decisions | 12580 | No choice | 4199 |

Table 6: Summary of Financing Choices

### 4.2.2. Marginal Financing Behaviour

One thing that stands out in the previous discussion is that firms financing choices are neither linear nor binary. They may choose only one source, but more than often they choose more than one type of capital provider. In corporate finance literature this poses methodological problems. Pecking order and trade off theories try to minimise this problem by aggregating all financing decision into one estimate such change in debt levels. Whereas choice models such as logistic regression need to impose I.I.D and IIA assumptions. Similarly, advanced variations of logistic regression models also require the respondent (firm) to make one choice per year or event. Although, to run our model in STATA we have omitted nearly one third of final observation, but the marginal analysis of these financing decisions indicate that the preference order remains intact.

This study argues that to study financing preferences of firms, one should prioritize the more informative financing decisions over least informing decisions. For example, public equity is more meaningful choice of financing source than use of retained earnings; hence, in any event where both choices are made together, we should retain use of public equity as the main choice. Table 8 summarizes the frequencies of firms' choices and their relative percentages. The rows represent the financing decisions that are selected for final models and the columns represent observed choices. You can see in the first row that nearly 35% of all decisions are observed but we had to ignore these decisions. Especially, the use of private debt and private equity are subjected to this oversight the most. Nearly 4% of public debt choices have been ignored because they occur in the years when firms chose public equity.

However, despite discarding a large number of private debt and public debt their marginal probabilities of being observed and being selected remain the highest for private

debt and public debt. The marginal probability of private debt being observed as a financing decision is 46.6% and being selected is 23.2%; whereas, for the public debt they are 29.3% and 25.4% respectively. This overall tilts in favour of debt and then within debt category tilt in favour of private debt underscores the importance of firms' concerns about their potential investors.

If we combine the marginal probabilities of a firm choosing private only sources, then it amounts to nearly half of the total probability. Therefore, one can argue that firms do distinguish between the type and nature of capital providers. Lenders over shareholders and private over public. The joint probabilities tilt the balance in favour of debt rather than private only means as the joint probability of a firm using private debt and public debt is 14% and private equity and private debt is 6%.

Table 7 Contingency Table of Financing Choices as observed and as selected for the final model

This table summarises the total financing choices made by firms. Other than the four main options, the not-selected alternative indicates that how many observations w.r.t a financing alternative have been ignored. In our final model, 35.5% of total financing choices are overlooked due to data specification requirements of nested logit models. However, despite such manoeuvre overall preference of firms is not altered significantly. Private debt is the largest used source, public debt is the second largest, private equity is the third and private equity is the fourth.

| | **Frequencies** | | | | | | **Joint and Marginal Probabilities** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Selected** | **Observed** | | | | | **Selected** | **Observed** | | | | |
| **Financing Choices** | **Private Equity** | **Private Debt** | **Public Debt** | **Public Equity** | **Total** | **Financing Choices** | **Private Equity** | **Private Debt** | **Public Debt** | **Public Equity** | **Marginal Probabilities** |
| **Not Selected** | 1,040 | 3,041 | 516 | | **4,597** | **Not Selected** | 0.080 | 0.235 | 0.040 | | **0.355** |
| **Private Equity** | 604 | | | | **604** | **Private Equity** | 0.047 | | | | **0.047** |
| **Private Debt** | | 3,020 | | | **3,020** | **Private Debt** | | 0.233 | | | **0.233** |
| **Public Debt** | | | 3,302 | | **3,302** | **Public Debt** | | | 0.255 | | **0.255** |
| **Public Equity** | | | | 1,438 | **1,438** | **Public Equity** | | | | 0.111 | **0.111** |
| **Total** | **1,644** | **6,061** | **3,818** | **1,438** | **12,961** | **Marginal Probabilities** | **0.127** | **0.468** | **0.295** | **0.111** | **1.000** |

This may raise the question that should private equity be treated as an indicator of the so-called *private capital sources? and are retained earnings is a good estimate of private equity use?* the answer to this question is that private equity is a call option of existing shareholders which they can claim at any time. Management may prefer to ensure that shareholders take a long position in the company and prevent them from early selling. This also put their accumulated wealth at the risk of corporate raiders. Therefore, the manager can use retained earnings as equity injections of existing shareholders and inhibit short-selling behaviour on firms' stocks. Having established the revealed preferences of firms, now let's analyse these choices in more detail and determine the trends in them if there are any.

### 4.2.3. Private Debt and Credit Ratings

In this study, we define private debt as Total Long-term Interest-Bearing Debt (TLIBD) minus Debentures and Convertibles (DC). Appendix C summarizes different balance sheets items which indicate the debt usage of firms and Table 9 presents their pair-wise correlation. Our data suggest that Bank Loans (BL) represents the majority chunk of private loan used by firms. The change in debt levels of firms is perfectly collinear with Total Long-term Interest-Bearing Debt (TLIBD), the correlation coefficient is 0.9997 and is significant at a 1% level. On Average 99% of TLIBD is comprised of BL, whereas 57% of Noncurrent Liabilities (NCL) is sourced from banks. Figure 8 shows the trend lines for NCL and BL, BL moves in direct proportion to NCL that indicates the overwhelming reliance of firms on banks for their capital needs.

This extensive use of bank loans manifests two important considerations of firms; one is credit quality (Denis and Mihov (2003) and Arena (2011)) and second is the signalling quality (Ma, Stice, and Williams (2019), Billett et al. (2006), Best and Zhang (1993), Slovin et al. (1992), Diamond (1991), and James and Wier (1988)). The conventional view on the

relationship between credit quality and bank loans suggests two distinct firms' behaviour. One view argues that those firms who have medium credit ratings are more likely to use bank loans as good quality firms find it cheaper to issue public debt (Denis and Mihov (2003) and Diamond (1991)). Arena (2011) contradicts this finding, first by further subdividing firms into high-rated firms which do not access the public market and separate bank borrowing from 144 A debt and traditional private placements.

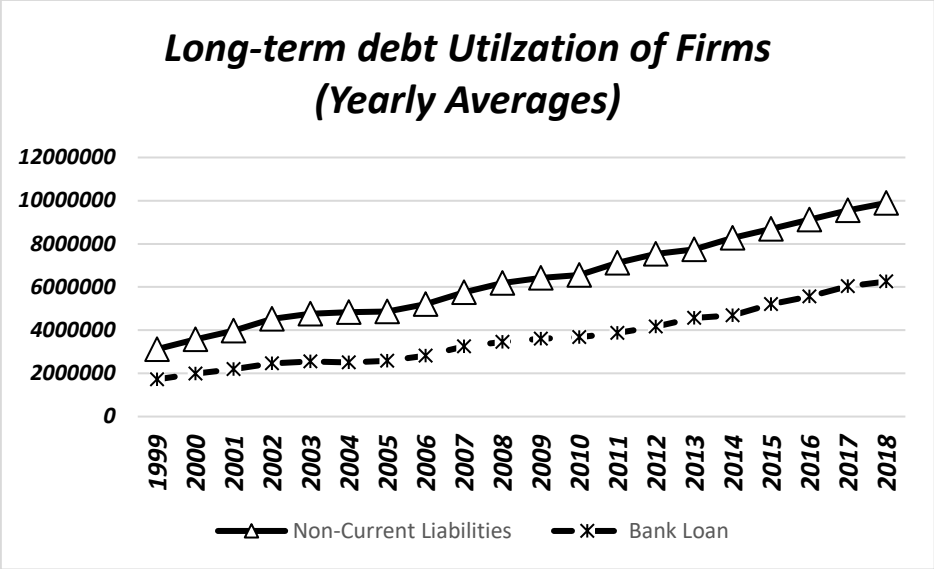



Figure 8: Long-term Debt utilisation & Bank loans (£000)

Table 8: Pairwise correlation coefficients

Pairwise correlation coefficients are present below for the key types of debt used by firms. The debt types used below are as follows: Non-Current liabilities (NCL); Total long-term interest-bearing debt (TLIBD); Bank Loan (BL); Debentures & Convertibles (DC); Lease Liabilities (LL).

| | NCL | TLIBD | BL | DC | LL |
|---|---|---|---|---|---|
| NCL | 1 | | | | |
| TLIBD | **0.958** | 1 | | | |
| Sig | 0.000 | | | | |
| BL | **0.958** | **1.000** | 1 | | |
| Sig | 0.000 | 0.000 | | | |
| DC | **-0.003** | **-0.004** | **-0.005** | 1 | |
| Sig | 0.721 | 0.667 | 0.588 | | |
| LL | **0.072** | **0.103** | **0.077** | **-0.001** | 1 |
| Sig | 0.000 | 0.000 | 0.000 | 0.872 | |

Our data confirms the findings of Denis and Mihov (2003); however, unlike them, we have scaled our data by the total assets of firms. If we use the absolute numbers, then the

outliers tilt the balance in favour of highly rated firms as our sample includes few very large-sized firms. Figure 9 present the average bank loan usage by credit ratings and it's obvious that the use of bank loan increases as firms rating moves away from AAA rating towards C rating. Previous studies suggest a diminishing role of bank loans as firms' credit ratings move towards junk status (Denis and Mihov (2003) and Arena (2011)). However, our data do not suggest this, but it highlights that bank loan remains a valued source of financing for firms with lower credit ratings.

The use of bank loans declines for firms with CC and D ratings, nevertheless, overall junk status firms rely on private lenders such as banks. We also find that the use of non-bank loans estimated as Total long-term interest-bearing debt excluding bank loans and debentures and convertibles is high among low-rated firms (figure 10). But this does not discard the fact these firms still prefer to use bank loans as an important source of financing their investments.

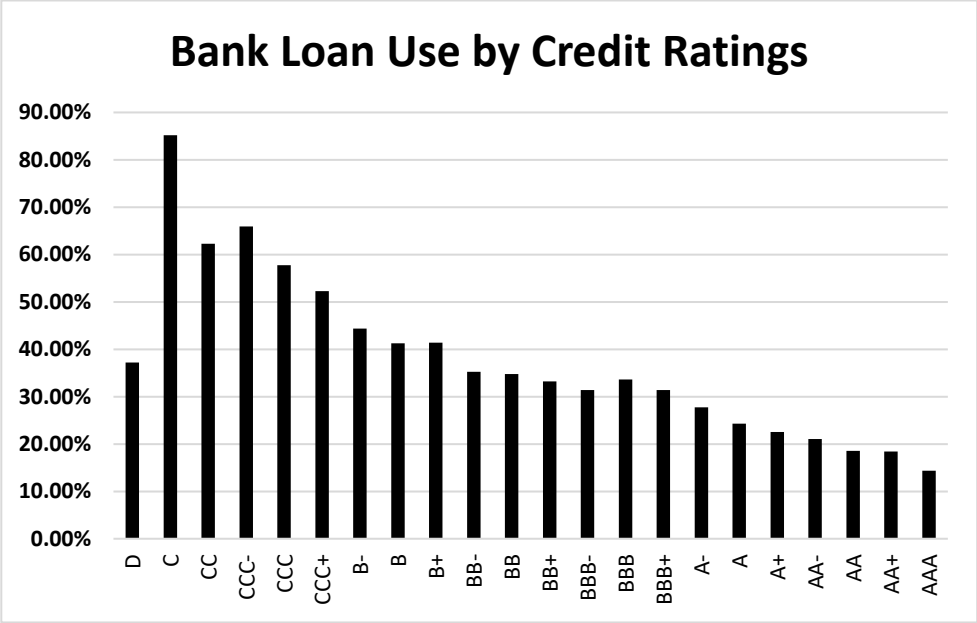



Figure 9: Bank loan as a percentage of Total Assets

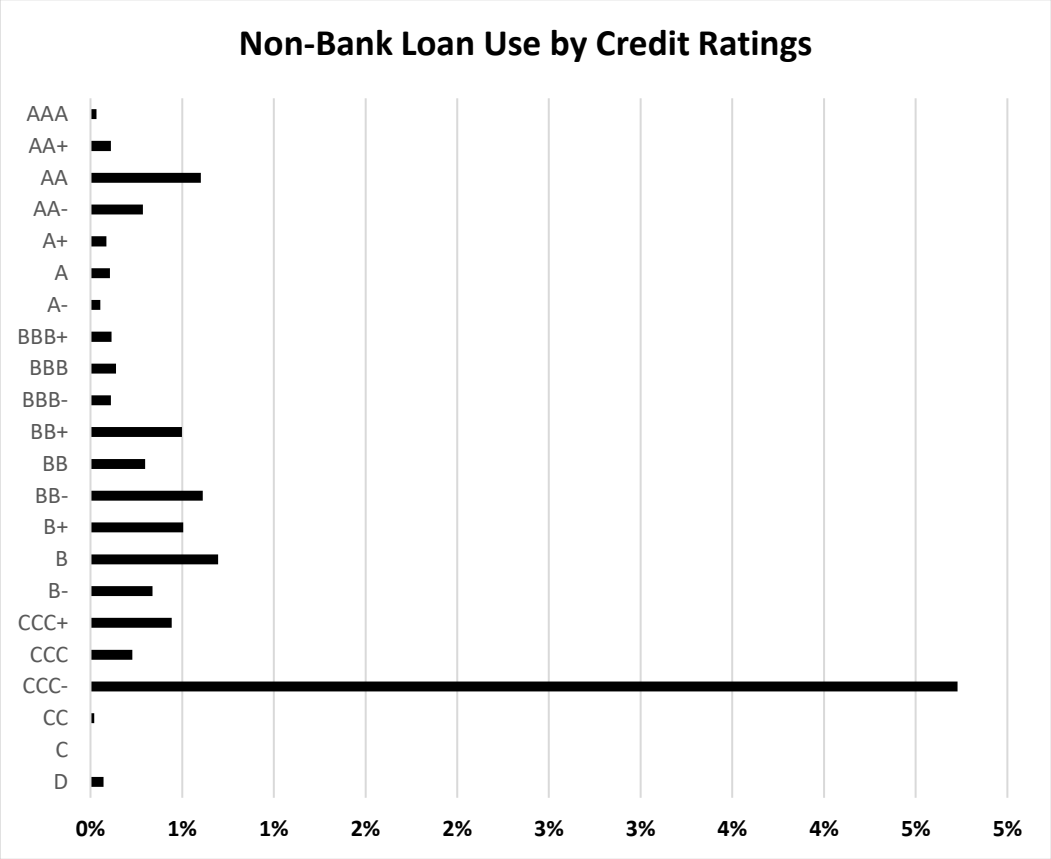



Figure 10: Non-Bank loan use by Credit Ratings

This persistence indicates two realities, firms view banks as reliable capital providers. Secondly, borrowing from banks helps the poorly rated firms to exhibit strong creditworthiness quality to outsiders by maintaining the trust of their bank (James & Wier, 1988). Banks act as unbiased agents that can collect and verify privileged information without posing the risk of disclosure to external parties. Therefore, firms, particularly with lower credit ratings, may find bank loans effective in sourcing capital from banks as it will indicate to outsiders about the firm's financial reliability and trust of an independent party.

Figure 11 summarise the average bank loan for the firm by their respective credit ratings' category e.g., plus, or minus, and investment or speculative. Interestingly, firms

with negative signs and firms in speculative grade borrow smaller amounts from banks than the firms with the plus sign and investment grades. Therefore, we argue that firms' preference to use bank loans also varies by the outlook of their credit ratings.

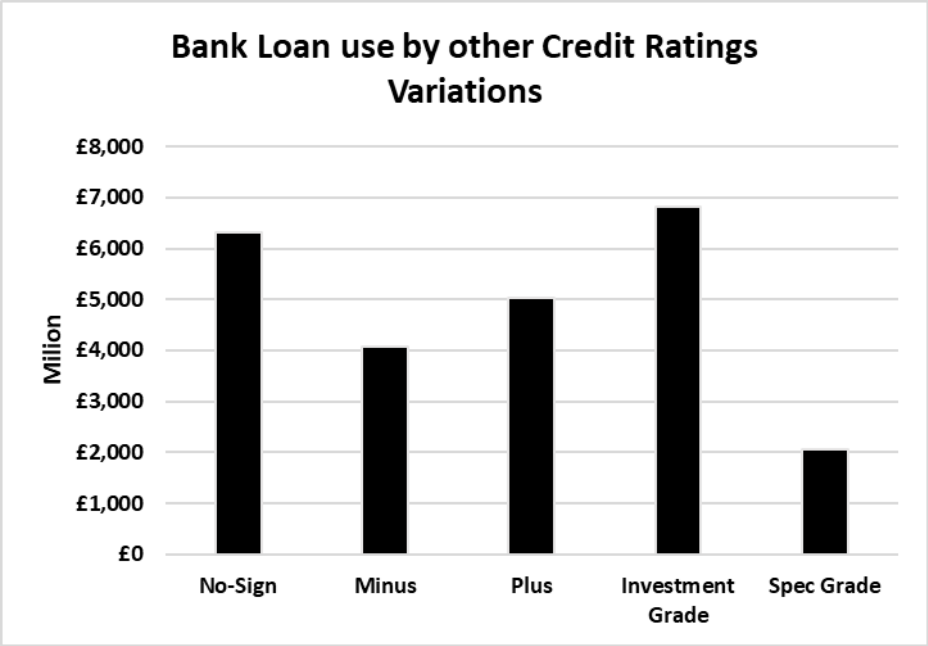



Figure 11: Bank loan use by Credit Ratings Variations

## Public Debt and Credit Ratings

Public debt represents 29.3% of total observed financing decisions made by firms. The likelihood of firms being present in our final model and used public debt is 25.4% (See table 8). Both numbers suggest that firms view public debt as the preferred mean of financing over public equity and private equity. Data on public debt issuance has been collected from Bloomberg that reports bond issuance as a corporate action. However, it does not include the total value of the placements, which limits our ability to compare them with other sources directly.

Table 6 gives the detailed overview of yearly public debt issuance; here, we are going to summarize the use of public debt with respect to the credit quality of firms. The average frequency of public debt uses in our sample is nearly one-third of the sample period.

We observe the use of public debt is relatable to the credit quality of firms as firms with higher ratings are more likely to use public debt. This use is further concentrated in investment-grade firms as 2,435 public debt issuances are recorded by investment-grade firms. Figure 12 shows that within investment-grade fuse of public debt use is concentrated with firms who are rated between BBB and A family of ratings. Firms that have the highest credit quality are not as a frequent user of public debt as is argued by (Denis and Mihov (2003) and Arena (2011)).

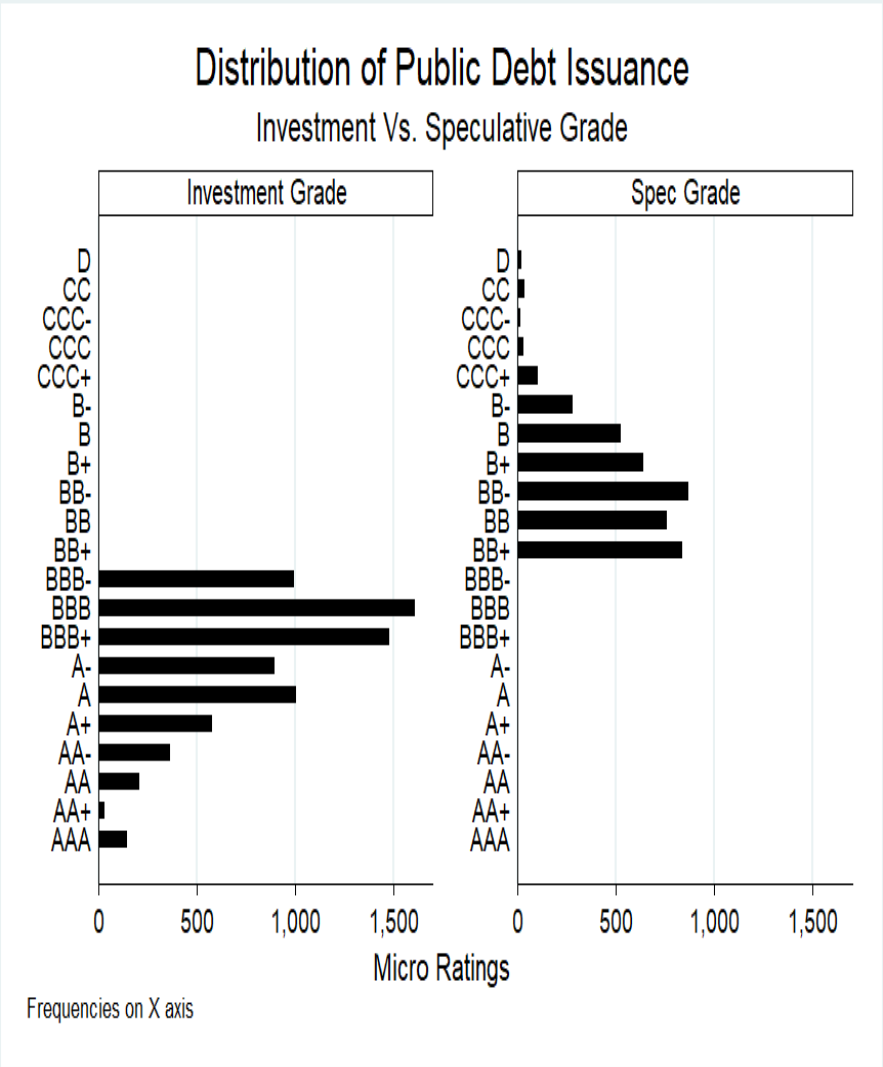



Figure 12: Use of Public Debt by Credit Ratings

Predominant understanding about public debt usage is that it's cheaper for large and high-rated firms to access the public debt markets and hence, firms may prefer them (Diamond, 1991). Our evidence does not disagree with the fact, we find the average use of public debt is around 18% among AAA and AA-rated firms that is well below the overall average of 32.69%. However, we note that highly rated firms do not issue bonds as frequently as medium and low rated firms. This could be possible because these high-rated firms do not feel the need to get their creditworthiness verified by testing the market trust very often. On the contrary, medium-rated issuers and low-rated issuers are compelled by their desire to vet the market trust in their financial position.

We also argue that firms who are in the middle spectrum of credit rating try to use public debt issuance as a tool to optimize the effects of their credit ratings on their cost of borrowing. Table 10 summarize the number of issues made by firms and their respective credit rating categories. It is obvious that 38% of public debt issuance is made by firms that have stable credit ratings (no sign). Whereas firms with plus or minus signs that anticipating the change in their credit rating behave in line with the expectations of Kisgen (2006). Firms that have minus signs and they have an investment-grade rating are twice as likely to issue bonds concerning their counterpart in speculative grade. Within investment-grade firms with plus signs use public debt less frequently than minus signs. This could be because these firms are aiming to avoid any downgrade they may incur if they issue public debt. Whereas firms with the minus sign may like to use their credit ratings to enjoy the lower cost of borrowing before any expected downgrade in their ratings. Within speculative-grade firms with a plus sign are more likely than negative signs to issue bonds; that shows these firms may want to enjoy and exhibit their creditworthiness by accessing public markets.

Kisgen (2006) notes that the influence of rating signs on debt issuances is independent of other credit rating attributes such as their macro-orientations. He notes that

that firms with Plus or Minus Signs issue 1% less debt than firms with no sign and 0.6% when they have a plus sign and 0.5% when they have minus signs.

Table 9: Public Debt Issuance by Rating Categories

This table summarises the total bond issuance events for our sample firms. These observations are categorised by two categories of credit ratings: rating signs (plus, minus or no sign) and macro ratings (investment grade and speculative grade).

| Rating Sign | **Investment Gr** | | **Spec Gr** | | | |
|---|---|---|---|---|---|---|
| | **Public Debt Issuance** | | | | **Total** | |
| | Number | Percentage | Number | Percentage | Number | Percentage |
| No Sign (stable) | 988 | 25.97% | 456 | 11.99% | 1444 | 37.96% |
| Minus | 751 | 19.74% | 386 | 10.15% | 1137 | 29.89% |
| Plus | 696 | 18.30% | 527 | 13.85% | 1223 | 32.15% |
| Total | 2,435 | 64.01% | 1,369 | 35.99% | 3,804 | 1 |

This may be because firms with plus or minus signs may view public debt issuance as a threat to their existing credit ratings. Hence, firms with the minus sign may prefer to avoid issuing more debt to inhibit a downgrade in their rating. Firms with plus may issue less debt to get an even higher rating. Although, table 10 notes that firms with no sign are frequent users of public debt, especially if they are investment-grade issuers. However, if we combine the firms for having any sign then the trend reverses. In our data firms with rating signs use more public debt to raise capital.

One commonly cited fact in capital structure discussion is that firms that have higher credit ratings enjoy lower average coupon rates. Because of the lower coupon rate, they are more tempted to use public debt. We observe that the relationship between coupon rate and credit ratings is as hypothesized; however, its impact on bonds issuance is not exactly as predicted. Figure 13 shows that high-rated firms have very low coupon rates; however, this does not result in more frequent bond issuance by these firms. This indicates that these firms despite enjoying the market trust and abundant supply of debt capital at lower cost, are not willing to frequently change their public debt providers. On the other extreme, low-rated firms which are subject to very high coupon rates as a result struggle to tap public debt

markets. Therefore, public debt seems to be the preferred source for the firms with credit quality between the middle upper (A) to lower upper (B) favourite capital sources for the firms which these firms are noted to be using more private debt rather than public debt (see figure 14).

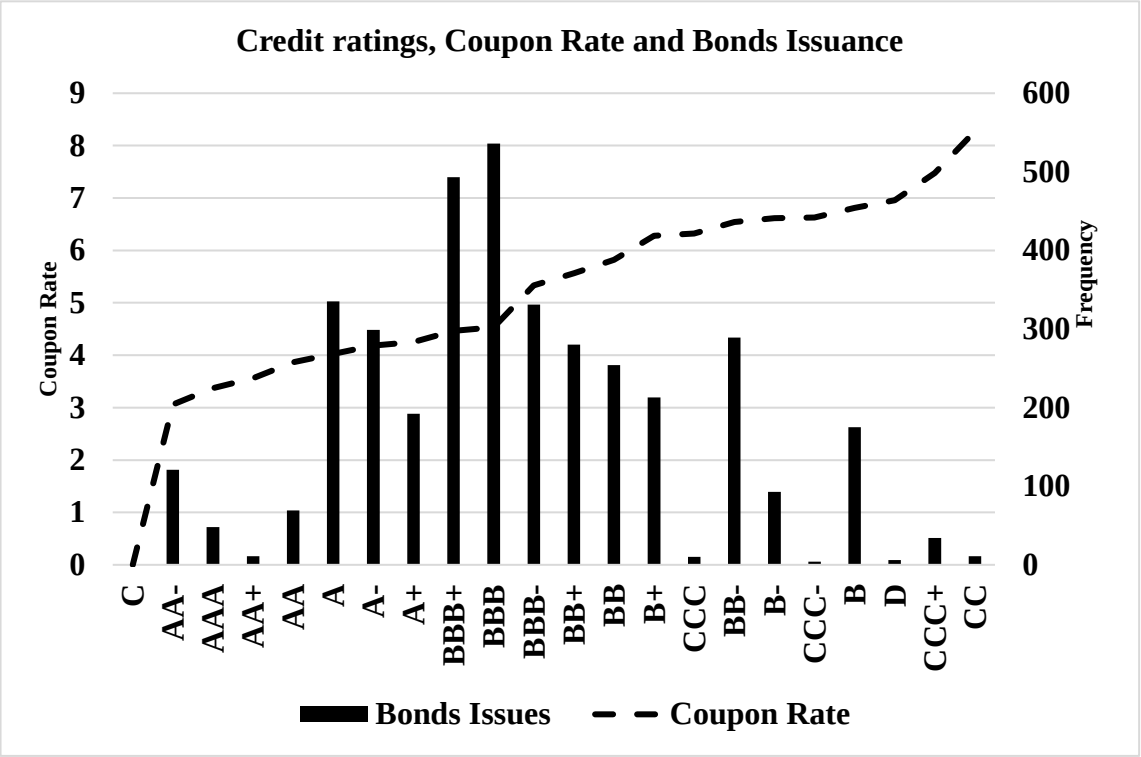



Figure 16: Credit ratings, Coupon Rate and Bonds Issuance

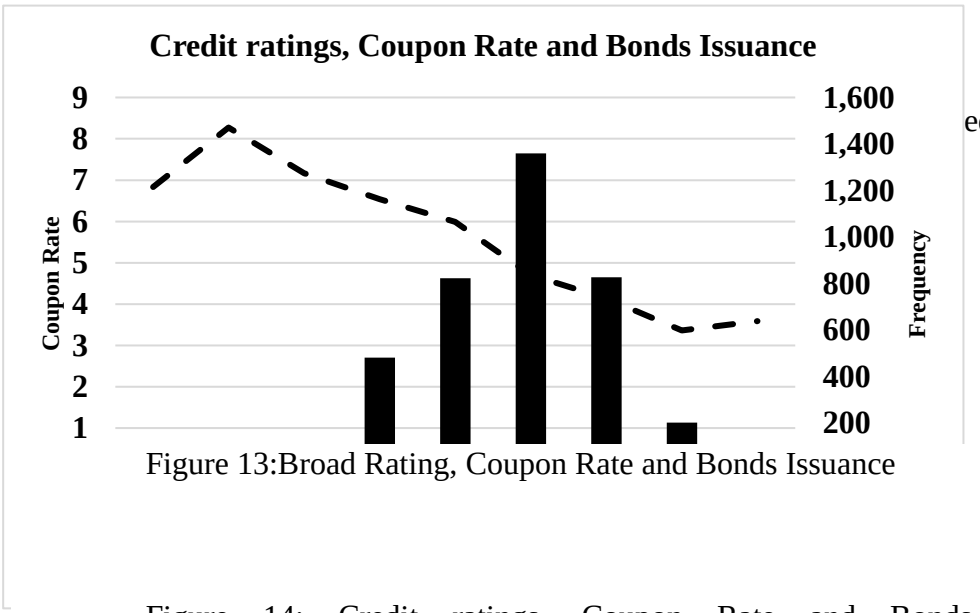



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Figure 13:Broad Rating, Coupon Rate and Bonds Issuance

Figure 14: Credit ratings, Coupon Rate and Bonds IssuanceFigure 15:Broad Rating, Coupon Rate and Bonds Issuance

### 4.2.4. Public Equity and Credit Ratings

Generally, credit ratings and capital structure studies consider equity financing as a possible alternative financing behaviour of firms, when their credit ratings are low or near change (Kisgen, 2006). Safer firms irrespective of their size or other characteristics are noted to be using more debt and firms with lower rating exhibit debt pessimism. BAGHAI, SERVAES, and TAMAYO (2014) continue to find this trend and note that not only current ratings, but historical ratings also determine the use of equity as means of financing. Therefore, equity issuance becomes a rare event conditional on the existing and historical trend of firms' credit ratings.

Our data notes the rarity of equity issuance and notes it to be the least preferred choice which is in line with existing theories. During the sample period firms register a total of 1438 equity issues. Out of 1438 issues, 1123 issues register new equity, 157 register right offerings and 158 are equity spins-off. The average worth of each equity issue is £345 Million the amount generally varies by the size of firms. Figure 15 shows that the use of public equity seems to be more pronounced in firms with medium and high credit quality. This is indicative of the fact that these firms despite the high cost of equity view shareholders as more reliable investors. Whereas firms on both extremes of the credit rating scale seem to be reluctant in using public equity.

High-quality firms may prefer public debt over public equity as public debt is cost-effective for these firms (Diamond, 1991). Lower credit quality firms may not be able to attract public equity and debt investors and hence may have to use private lenders and equity as a source of funds.

In addition to usage, the credit quality of firms seems to influence the average amount firms raise using shares, as firms with the highest quality raise equity in large sums.

Table 11 summarise the equity issuance and macro ratings of the firms. Investment-grade rated firms register more public equity issues than speculative-grade rated firms that evidence of the fact that rating quality act as a rationing tool between firms and investors.

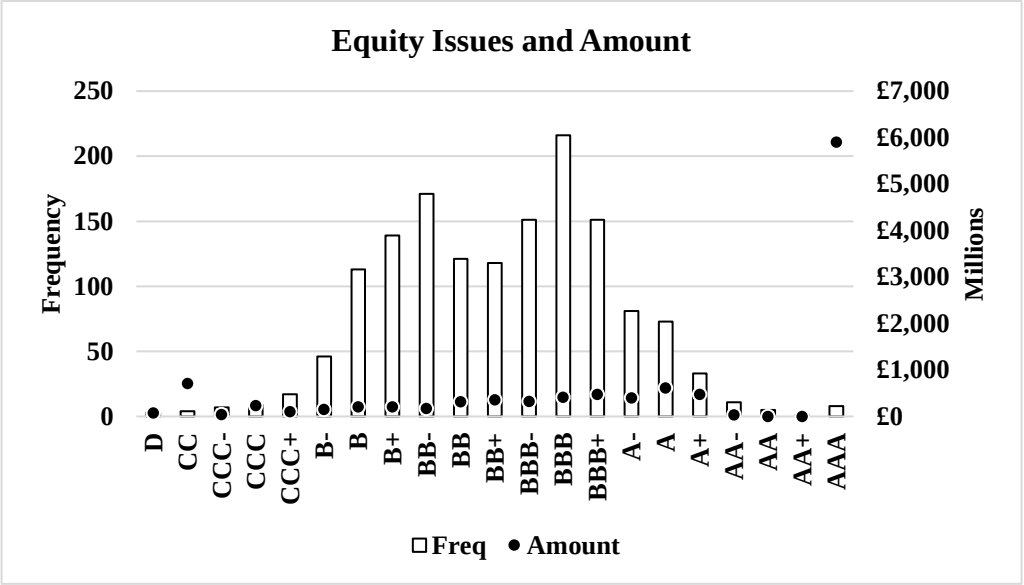


Figure 19: Equity Issuance and Credit Ratings

Figure 20: Equity Issuance and Credit Ratings

Table 10: Equity Issuance and Rating Categories

This table summarises the total equity issuance events for our sample firms. These observations are categorised by two categories of credit ratings: rating signs (plus, minus or no sign) and macro ratings (investment grade and speculative grade).

| Rating Signs | Investment Grade | Speculative Grade |
|---|---|---|
| | Public Equity Issuance | |
| No-Sign | 302 | 250 |
| Minus | 243 | 224 |
| Plus | 303 | 156 |
| Total | 848 | 630 |

### 4.2.5. Corporate Financing and Firms Characteristics

Table 12 (panel A) presents the mean and median of the firms characterizes over their financing choices throughout the sample period. These estimates are for firms that use

private equity, private debt, public debt, and public equity. The mean (median) total assets of firms that select public debt are £25,100 million (£8,170 million). The mean (median) equity and debt of these firms are £8,109 million (£2,390 million) and £17,000 million (£5,390 million) respectively. This is consistent with academic literature that cites larger and well-established firms prefer public debt providers (James and Wier (1988) and Arena (2011)). The average maturity of these issues is 8 years and the average coupon rate on bonds is 5.5%.

One interesting fact that we further notice is that these firms have the highest Current Portion of Long-term Liabilities (CPLL). The mean (median) CPLL of these firms is £1,021 million (£51 million) that may be indicative of the fact that these firms need to replenish their existing stock of bonds more frequently. Regression[22] estimates indicate that firms that issue bonds are going to have £760 million more CPLL than firms that use private equity and £850 million more CPLL than firms that use private debt. Our sample also observes that firms using public debt providers as a source of capital have the highest accumulated retained earnings and cash equivalents on the balance sheets. The mean (median) of retained earnings and cash and cash equivalent are £6,972 million (£1,410

[22] These estimates are not reported but the equation is ln(CPLL) = constant + B1(i. Financing choice). Only public debt is significant in determining the CPLL level and is significant at a p-value of 0.003.

## Table 11: Descriptive Statistics - Financing Choice and Firm Characteristics

The table summarises descriptive statistics of financial indicators for firms. Panel A summarize the statistics for absolute numbers and Panel B summarize ratio. TLIBD= Total long-term interest-bearing debt, CPLL= Current Portion of Long-term Liabilities, Debt Ratio1= long-term liabilities, ZPROB= 3.3 EBIT/(Total assets)+1.0 Sales/(Total assets)+1.4 RE/(Total assets)+1.2 WC/(Total assets). Debt Ratio 1= Total liabilities/Equity, Debt Ratio 2= Long-term Liabilities/Equity.

| | **Private Equity** | | **Private Debt** | | **Public Debt** | | **Public Equity** | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Median | Mean | Median | Mean | Median | Mean | Median |
| **Panel B** | | | | | | | | |
| Total Assets | 10,600 | 2,780 | 9,511 | 3,033 | 25,100 | 8,170 | 12,400 | 3,540 |
| Equity | 3,843 | 1,030 | 3,089 | 998 | 8,109 | 2,390 | 3,777 | 1,286 |
| Debt | 6,717 | 1,561 | 6,422 | 1,890 | 17,000 | 5,390 | 8,617 | 2,163 |
| TLIBD | 2,515 | 528 | 2,891 | 852 | 6,780 | 2,390 | 4,208 | 1,312 |
| Bank Loan | 2,489 | 517 | 2,853 | 840 | 6,725 | 2,374 | 4,197 | 1,312 |
| CPLL | 260 | 10 | 166 | 5 | 1,021 | 51 | 461 | 4 |
| Retained Earning | 2,675 | 686 | 2,035 | 374 | 6,972 | 1,410 | 1,734 | 31 |
| Cash Equivalent | 735 | 150 | 547 | 104 | 1,401 | 329 | 560 | 79 |
| Target Cash Balance | 724 | 194 | 552 | 163 | 1,289 | 383 | 565 | 139 |
| **Panel B** | | | | | | | | |
| Forecast Variance | 0.265 | 0.117 | 0.179 | 0.090 | 0.151 | 0.082 | 0.191 | 0.101 |
| ZPROB | 0.901 | 0.746 | 1.072 | 0.836 | 1.034 | 0.794 | 0.982 | 0.635 |
| Growth | -0.081 | -0.060 | 0.168 | 0.068 | 0.122 | 0.053 | 0.207 | 0.071 |
| Profitability | -0.011 | 0.003 | 0.036 | 0.039 | 0.047 | 0.046 | 0.018 | 0.030 |
| Debt Ratio 1 | 1.377 | 0.893 | -0.006 | 1.018 | 1.049 | 1.142 | 0.477 | 1.122 |
| Debt Ratio 2 | 0.849 | 0.568 | -0.468 | 0.715 | 0.495 | 0.796 | 0.337 | 0.876 |
| EBITDA/TA | 0.099 | 0.093 | 0.124 | 0.114 | 0.134 | 0.125 | 0.102 | 0.094 |
| Debt to TA | 0.583 | 0.602 | 0.660 | 0.636 | 0.678 | 0.653 | 0.634 | 0.622 |
| Tangibility | 0.566 | 0.582 | 0.679 | 0.699 | 0.672 | 0.687 | 0.745 | 0.818 |

million) and £1,401 million (£329 million) respectively. Further, the mean (median) of the target cash balance of these firms is £1,289 million (£383 million). This aligns with the arguments of Leary and Roberts (2010) who argue that firms have a cash management policy and prefer to use internal funds only if they are above the minimum desired cash level. Hence, these firms despite having large cash equivalents and retained earnings balances uses external sources as their desired cash balance for the sample periods are very high i.e., mean (median) of £1,289 million (£383 million). The mean (median) of public equity issues is £345.08 million (£184.5 million) and these firms are the second largest in terms of Total Assets, Debt, TLIBD, and Bank Loans. On one side, it may affirm the assertions that firms with large assets and scale of operations are more confident in tapping public investors than private investors (Helwege & Liang, 1996).

This finding is also in line with observations that well-established and larger firms have less information asymmetry (Gomes & Phillips, 2012) and investors, irrespective of their access to privileged information, feel confident investing in such firms. Firms using public equity are more leveraged firms that use private debt and private equity as means of financing (Gomes and Phillips (2012) and Helwege and Liang (1996)).

Their overall debt level, bank loans, and TLIBD are lower than firms using public debt that indicates a debt conservatism in these firms. CPLL of these firms is also lower showing that these firms usually prefer a stable capital provider base that does not require more frequent replenishing or adjustments. An interesting feature, we observe is that the cash levels of these firms and their target cash levels are in the lowest quartile in the sample. Firms that use private debt are smaller in size have the second-highest use of bank loans that evidence of their preference of private lenders over public lenders.

We argued above that firms that expect their cost of hidden information higher is more likely to use private capital providers rather than public capital providers. These firms

have the lowest CPLL which means these firms need not issue private debt to replenish their long-term liabilities. Rather, they may be using private debt to raise new capital.

Panel B of the table presents the control variables used in this study. We have used three different estimates of leverage ratios to assess that what type of coverage concerns firms more. Debt ratio 1 and debt ratio 2 uses equity as the denominator and debt to TA uses Total Assets (TA) as the denominator. Estimates of Debt to TA show a consistent leverage pattern in firms over the four types of financing choices available. Further, the mean and median estimates also indicate symmetry between firms as the difference between two numbers is not very high. This symmetry may also mean that firms prefer to have stable leverage at an aggregate level and rather prefer to adjust their debt providers.

Debt ratio 1 and debt ratio 2 present a different picture as they show that firms whose overall liabilities are higher with respect to equity prefer to use private equity and public debt. Whereas firms with lower debt ratios prefer public equity. Interestingly, firms using private debt have on average negative equity. Similar trends persist when we only use long-term debt to estimate leverage. An important observation is that the mean and median of these numbers show that firms greatly differ from each other. The levels of debts are skewed among some firms and some firms use the lower level of debt. It is this reason we chose not to use the debt ratios as a predictor of financing choices as the irregularities do not rationalize the financing patterns of firms.

We have used two estimates of firms' financial performance: profitability and EBITDA/TA. The first one is estimated as net profit over sales and the latter is estimated by dividing EBITDA over total assets. In line with conventional evidence, we note that profitable firms are more prone to use public capital providers over private capital providers. Within, the public we observe more profitable firms choose public debt over public equity.

We have used earnings forecast variance and ZPROB as indicators of information asymmetry between firms and investors (MacKie-Mason (1990) and MacKie-Mason (1990)). The mean (median) of forecast variance exhibits a declining trend as we move from firms that use private equity to firms that use public equity. Ostensibly, this is in line with the arguments that firms with higher forecast variance suffer from the highest costs of information asymmetry. Hence, the management of these firms prefers using private capital providers over public capital providers. We observe that firms that use private equity and private debt have the highest mean and median forecast variance.

Similarly, ZPROB also estimates evidence that firms that have higher default probability prefer to use equity as means of financing. Mean (median) estimates of ZPROB for firms using private equity and public equity are 0.901(0.746) and 0.982(0.635) respectively. Whereas firms using both sources of debt have a score greater than 1. We have used dividend payments as another indicator of hidden information of firms and argued that firms issuing public equity are more likely to pay a dividend to indicate their competence in wealth generation. We note that in the total sample 5606 firms pay a dividend and nearly half of them use private and public debt as means of financing. It is also noteworthy that firms issuing public debt are most likely to pay dividends and firms using private equity are least likely to pay a dividend.

Table 13 summarize firms financing choices periodically. It shows that pre-crisis firms were financially more active, and a higher proportion of new financing comes from external resources combined. Public debt and private debt seem to be very popular among firms as sources of capital providers. Whereas, during the period from 2008 to 2012 firms lost their financial activism and appear to be hesitant to finance their growth using external capital. Post-Crisis number shows that firms financing activism has recovered but the

recovery is strong in public and private debt not in the public equity. This indicates a cyclical nature of financial choices made by firms.

Table 12: Financing Choices and Time Effect

This table summarizes financing events as per the time dummy variable created for our study. Pre-crisis period is dummy variable takes value of 1 if the period is between 1999 to 2006, during financial crisis takes value of 1 if the period is between 2007 to 2012, and post financial crisis period is from 2012 to 2018.

| | Private Equity | Private Debt | Public Debt | Public Equity | Total |
|---|---|---|---|---|---|
| Pre-Crisis | 238 | 1,270 | 1,304 | 746 | 3,558 |
| During Crisis | 141 | 604 | 668 | 262 | 1,675 |
| Post-Crisis | 200 | 991 | 1,101 | 378 | 2,670 |

In the next section, we are going to summarize firms' characteristics over their credit ratings would aim to identify if there are any patterns.

### 4.2.6. Credit Ratings and Firms Characteristics

Credit ratings of firms are not a stochastic variant rather they ought to behave, adjust and stabilize at levels desired by firms. They are achieved through active negotiations between firms and rating agencies. Boot et al. (2006) argue that their role is very important in coordinating the capital exchange between firms and their investors. The question, this study begs to asks is that whether the credit ratings at any point in time indicate what type of investors firms may prefer over others. Therefore, we expect to see some relationship between firms' credit ratings and their financing choices, as well as financial attributes.

We have noted previously that firms' use of different capital providers differs significantly based on their creditworthiness. For instance, if we use the firm classification (Table 14) based on their credit ratings as suggested by Dasilas and Papasyriopoulos (2015). We note that firms' use of capital providers is not homogenous across all classifications. Firms' classification is a broad indicator of firms' creditworthiness[23]. Table 14 summarizes

[23] The classification is explained in section 4.2.2 in detail.

the frequencies for different financing alternatives and their distribution across firm classification categories. One can notice that firms that are classified as balanced firms and vulnerable firms are the most financially active. these firms overwhelmingly prefer debt over equity as they account for more than half of instances of issuance of bonds and use of private debt. Furthermore, it is also notable that balanced firms are the most frequent issuer of new shares and users of private equity.

Table 13: Firms' Credit Quality and Financing Choices

This table summarizes financing events as per the firm classification dummy variable created for our study. Firm Classification variable represents classification of firms into four categories based on their credit ratings. These four classifications are: healthy companies, balanced companies, vulnerable companies, and risky companies. These classifications are recorded on a scale of 1 to 4; where, 4 refers to the heathy companies and 1 to risky companies.

| **Firm Class** | **Private Equity** | | **Private Debt** | | **Public Debt** | | **Public Equity** | | **Total** | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Healthy Firms** | 102 | 1.22% | 494 | 5.91% | 986 | 11.79% | 203 | 2.43% | 1,785 | 21.34% |
| **Balanced Firms** | 398 | 4.76% | 1,913 | 22.87% | 1,880 | 22.87% | 906 | 10.83% | 5,097 | 60.94% |
| **Vulnerable Firms** | 104 | 1.24% | 593 | 7.09% | 423 | 7.09% | 323 | 3.86% | 1,443 | 17.25% |
| **Risk Firms** | 0 | 0 | 20 | 0.24% | 13 | 0.24% | 6 | 0.07% | 39 | 0.47% |
| **Total** | 604 | 7.22% | 3020 | 36.11% | 3302 | 39.48% | 1438 | 17.19% | 8364 | 1 |

Interestingly, the financing behaviour of risky firms seems to be most constrained. Although, our sample comprises firms who have been listed for a very long period, hence, we do not have many firms that can be classified as risky firms. Nonetheless, it does indicate that even for well-established firms it is harder to attract capital providers once they are downgrade to the lowest category. On the contrary healthy firms are frequent users of public debt and private debt. These firms which are rated AA and above seem to be capitalizing on the lowest premium they are required to pay. Highly rated firms seem to be reluctant users of private equity which is against the rationale of pecking order theory as well. Healthy firms are ought to have large cash reserves as that is an indicator of their financial strength reflected in their credit ratings. Nonetheless, these firms still prefer using external finances

then internal funds. This indicates that a firm's choice of capital providers is the function of factors other than cash availability.

Table 15 summarize the distribution of firms' characteristics across different credit qualities. There seems to be a linear trend in firms' size their place on the credit quality spectrum. As the credit quality of firms increases from risky firms to healthy firms, they become larger (higher total assets). Table 15 exhibits a very strategic approach of firms with respect to their debt and equity consumption. In contrast to general thinking that firms with larger size use more debt, it seems firms' use of debt is linked to their perception of their creditworthiness and how debt may affect it in the future. Healthier firms on average have £27,400 million in debt outstanding which is understandable that these firms are larger and are highly creditworthy. This is nearly double the total equity these firms have which shows highly rated firms view lenders as a more reliable source of their capital. Whereas firms who come second in our place with respect to debt consumption are risky. This affirms the hypothesis that junk status issuers are least likely to attract equity investors. These firms have £-144 million of negative equity and outstanding debt of £10,500 million debt.

We also observe that the Current Portion of Long-term Liabilities (CPLL) also increases as the credit rating of firms improves. This is indicative of the fact that healthier firms prefer to borrow for the short-term and prefer to reissue or renew their debt contract more often. On average a healthier firm has £1,923 million of debt classified as CPLL. On the contrary, balanced, and vulnerable firms have very low outstanding debt designated as CPPL. This indicates that these firms prefer long-term stable sources of debt.

Our data finds evidence in favour of assertions made by Leary and Roberts (2010). They argue that firms have a target cash balance that results in the surplus firm using external financing irrespective of the fact that these firms have a cash surplus. We note that mean (median) target cash balance of healthy firms is £2,435 million (£972 million).

Whereas these firms do have the highest average outstanding debt that shows firms prefer to have idle cash and are willing to take a financial risk by borrowing. Furthermore, this strategy may showcase two other concerns. Firstly, these firms prefer to make tax savings ascribable to debt, and secondly, debt enables these firms to institute market discipline in the firm.

Debt ratios across these firms show a negative trend where healthy firms tend to have a larger equity base and despite the high frequency of debt usage have a lower debt ratio. We observe that vulnerable and risky firms have higher debt ratios due to lower equity and negative equity levels. Tables 16 and 17 summarize the financial characteristics of firms over their broad rating categories. The numbers largely confirm our hitherto discussion and it can be seen firms' financial characteristics vary as their credit ratings change.

## Table 14: Firms Characteristics and Credit Quality (£ Million)

Firms' financials are present as per their credit quality indicated by the firm classification dummy variable. Firm Classification variable represents classification of firms into four categories based on their credit ratings. These four classifications are: healthy companies, balanced companies, vulnerable companies, and risky companies. These classifications are recorded on a scale of 1 to 4; where, 4 refers to the heathy companies and 1 to risky companies. TLIBD = Total long-term Interest-Bearing Debt, CPLL= Current Portion of Long-term Loan, CSHE= Cash and Cash Equivalent, ZPROB is estimated as Altman Z-score and is estimated using the following equation: $ZPROB = 3.3\frac{EBIT}{Total\ assets} + 1.0\frac{Sales}{Total\ assets} + 1.4\frac{RE}{Total\ assets} + 1.2\frac{WC}{Total\ assets}$. EBITDA= Earnings before Interest, Tax, and debt amortization. Debt to TA represents the leverage level of firms. Tangibility is defined as Fixed Assets / Total Assets. Profitability is defined as $\frac{EBT\ pluc\ depriciation\ and\ amortisation_{it}}{Total\ Assets}$. Where EBT is Earnings before Tax.

| | Healthy Firms | | Balanced Firms | | Vulnerable Firms | | Risky Firms | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Median | Mean | Median | Mean | Median | Mean | Median |
| Total Assets (TA) | 42,000 | 16,900 | 10,800 | 4,458 | 3,756 | 1,347 | 10,400 | 1,924 |
| Equity | 14,600 | 6,110 | 3,356 | 1,472 | 490 | 302 | - 144 | 53 |
| Debt | 27,400 | 9,917 | 7,437 | 2,780 | 3,266 | 829 | 10,500 | 1,390 |
| TLIBD | 10,000 | 3,296 | 3,530 | 1,380 | 1,812 | 461 | 5,448 | 621 |
| CPLL | 1,923 | 119 | 212 | 9 | 107 | 4 | 729 | 13 |
| Retained Earning | 14,400 | 5,103 | 1,582 | 548 | - 291 | - 23 | - 1,808 | - 760 |
| CSHE | 2,540 | 707 | 495 | 136 | 307 | 73 | 791 | 75 |
| Target Cash Balance | 2,435 | 972 | 462 | 190 | 312 | 104 | 624 | 122 |
| Forecast Variance | 0.120 | 0.069 | 0.164 | 0.090 | 0.299 | 0.158 | 0.282 | 0.115 |
| ZPROB | 0.874 | 0.672 | 0.965 | 0.735 | 1.430 | 1.109 | 1.757 | 1.552 |
| Growth | 0.096 | 0.062 | 0.139 | 0.054 | 0.191 | 0.039 | 0.032 | - 0.030 |
| Profitability | 0.072 | 0.068 | 0.034 | 0.036 | - 0.014 | 0.008 | - 0.022 | - 0.015 |
| EBITDA/TA | 0.155 | 0.146 | 0.119 | 0.108 | 0.097 | 0.095 | 0.061 | 0.075 |
| Debt to TA | 0.611 | 0.612 | 0.644 | 0.633 | 0.751 | 0.702 | 1.050 | 0.991 |
| Tangibility | 0.657 | 0.653 | 0.702 | 0.741 | 0.627 | 0.664 | 0.676 | 0.701 |

## Table 15: Descriptive statistics-- Credit Ratings and Firm Characteristics (£ Million)

Firms' financials are present as per their credit quality indicated by the micro ratings of the firms. TLIBD = Total long-term Interest-Bearing Debt, CPLL= Current Portion of Long-term Loan, CSHE= Cash and Cash Equivalent, ZPROB is estimated as Altman Z-score and is estimated using the following equation: $ZPROB = 3.3\frac{EBIT}{Total\ assets} + 1.0\frac{Sales}{Total\ assets} + 1.4\frac{RE}{Total\ assets} + 1.2\frac{WC}{Total\ assets}$. EBITDA= Earnings before Interest, Tax, and debt amortization. Debt to TA represents the leverage level of firms. Tangibility is defined as Fixed Assets / Total Assets. Profitability is defined as $\frac{EBT\ pluc\ depriciation\ and\ amortisation_{it}}{Total\ Assets}$. Where EBT is Earnings before Tax.

| | | Total Assets | Equity | Debt | TLIBD | Bank Loan | CPLL | Retained Earnings | CSHE |
|---|---|---|---|---|---|---|---|---|---|
| D | Mean | 4830 | 594 | 4236 | 1727 | 1680 | 20 | -1679 | 368 |
| | Median | 1775 | 369 | 1385 | 352 | 350 | 13 | -221 | 118 |
| C | Mean | 24200 | 165 | 24000 | 20900 | 20900 | 0 | -1239 | 8 |
| | Median | 20800 | 149 | 20700 | 17500 | 17500 | 0 | -1480 | 4 |
| CC | Mean | 14900 | -660 | 15600 | 7033 | 7033 | 1981 | -1604 | 1574 |
| | Median | 654 | -113 | 850 | 446 | 446 | 19 | -508 | 60 |
| CCC | Mean | 4687 | -48 | 4735 | 3047 | 2847 | 197 | -1577 | 288 |
| | Median | 1329 | 107 | 1059 | 621 | 621 | 2 | -319 | 91 |
| B | Mean | 3694 | 547 | 3147 | 1703 | 1681 | 99 | -165 | 312 |
| | Median | 1390 | 327 | 838 | 466 | 460 | 5 | -6 | 73 |
| BB | Mean | 5831 | 1680 | 4151 | 2224 | 2192 | 110 | 417 | 345 |
| | Median | 2695 | 864 | 1678 | 821 | 808 | 8 | 246 | 104 |
| BBB | Mean | 14600 | 4636 | 9944 | 4516 | 4501 | 289 | 2503 | 614 |
| | Median | 6551 | 2284 | 4045 | 1995 | 1992 | 13 | 1044 | 175 |
| A | Mean | 28400 | 10100 | 18300 | 7076 | 7053 | 676 | 8595 | 1652 |
| | Median | 14400 | 5038 | 7858 | 2816 | 2796 | 67 | 3952 | 550 |
| AA | Mean | 77300 | 26900 | 50400 | 18400 | 18000 | 3335 | 31000 | 5863 |
| | Median | 31900 | 11400 | 17800 | 5203 | 5146 | 525 | 12700 | 2220 |
| AAA | Mean | 181000 | 57200 | 124000 | 36500 | 36400 | 23100 | 66600 | 6868 |
| | Median | 111000 | 53600 | 48900 | 7102 | 6924 | 1123 | 29800 | 4353 |

## Table 16: Descriptive Statistics- Credit Ratings and Firm Characteristics

Firms' financials are present as per their credit quality indicated by the broad ratings of the firms. TLIBD = Total long-term Interest-Bearing Debt, CPLL= Current Portion of Long-term Loan, CSHE= Cash and Cash Equivalent, ZPROB is estimated as Altman Z-score and is estimated using the following equation: $ZPROB = 3.3\frac{EBIT}{Total\ assets} + 1.0\frac{Sales}{Total\ assets} + 1.4\frac{RE}{Total\ assets} + 1.2\frac{WC}{Total\ assets}$. EBITDA= Earnings before Interest, Tax, and debt amortization. Debt to TA represents the leverage level of firms. Tangibility is defined as Fixed Assets / Total Assets. Profitability is defined as $\frac{EBT\ pluc\ depriciation\ and\ amortisation_{it}}{Total\ Assets}$. Where EBT is Earnings before Tax.

| | | Forecast Variance | ZPROB | Growth | Profitability | EBITDA/TA | Debt/TA |
|---|---|---|---|---|---|---|---|
| D | Mean | 0.375 | 1.735 | 0.182 | 0.022 | 0.050 | 0.810 |
| | Median | 0.133 | 1.806 | -0.004 | -0.028 | 0.069 | 0.678 |
| C | Mean | 0.046 | 0.649 | 0.281 | -0.012 | 0.136 | 0.990 |
| | Median | 0.042 | 0.696 | 0.260 | -0.009 | 0.145 | 0.993 |
| CC | Mean | 0.356 | 2.185 | -0.162 | -0.095 | 0.050 | 1.235 |
| | Median | 0.207 | 1.645 | -0.128 | -0.004 | 0.078 | 1.117 |
| CCC | Mean | 0.416 | 2.070 | 0.124 | -0.056 | 0.086 | 0.942 |
| | Median | 0.224 | 1.438 | -0.005 | -0.038 | 0.087 | 0.894 |
| B | Mean | 0.290 | 1.369 | 0.198 | -0.010 | 0.098 | 0.732 |
| | Median | 0.157 | 1.090 | 0.043 | 0.009 | 0.096 | 0.691 |
| BB | Mean | 0.203 | 1.118 | 0.155 | 0.026 | 0.118 | 0.651 |
| | Median | 0.116 | 0.932 | 0.062 | 0.033 | 0.110 | 0.633 |
| BBB | Mean | 0.134 | 0.845 | 0.127 | 0.041 | 0.119 | 0.638 |
| | Median | 0.074 | 0.588 | 0.050 | 0.038 | 0.106 | 0.633 |
| A | Mean | 0.120 | 0.851 | 0.100 | 0.066 | 0.148 | 0.609 |
| | Median | 0.072 | 0.646 | 0.065 | 0.062 | 0.138 | 0.616 |
| AA | Mean | 0.120 | 1.023 | 0.073 | 0.094 | 0.185 | 0.626 |
| | Median | 0.058 | 0.836 | 0.048 | 0.089 | 0.179 | 0.610 |
| AAA | Mean | 0.128 | 0.700 | 0.106 | 0.093 | 0.172 | 0.611 |
| | Median | 0.060 | 0.657 | 0.079 | 0.102 | 0.191 | 0.527 |

## 4.3. Results and Findings

### 4.3.1. Hidden information tests

We will start the multivariate analysis with the testing for the role of hidden information in determining the choice of capital providers. Our objective is to establish whether hidden information plays any role in the type of capital providers firms choose. Therefore, our initial models will evaluate the effects of hidden information on firms' financial preferences. Three different models are run to test how hidden information affects a firm's choice of capital providers. Each of these models deploys a different specification of capital providers. Model one assesses debt providers versus equity sources, model two assess public investors versus private investors, and model three establishes preference of public and private capital providers against private equity. This study hypothesizes that hidden information variables indicate firms' preference of capital providers, not securities preference. Therefore, we expect these variables to be statistically and economically significant. The following utility functions are constructed to test this hypothesis:

$$V_{Debt\ Vs\ Equity} = \beta_j f(\text{Hidden information Variables}) + \beta_k f(\text{Control Variables}) + \epsilon_{it} \quad \ldots\ldots. 1$$

$$V_{Public\ vs\ Private} = \beta_j f(\text{Hidden information Variables}) + \beta_k f(\text{Control Variables}) + \epsilon_{it} \quad \ldots\ldots. 2$$

$$V_{Private\ debt\ vs\ Private\ Equity} = \beta_j f(\text{Hidden information Variables}) + \beta_k f(\text{Control Variables}) + \epsilon_{it} \quad \ldots\ldots. 3$$

$$V_{Public\ vs\ Private\ Equity} = \beta_j f(\text{Hidden information Variables}) + \beta_k f(\text{Control Variables}) + \epsilon_{it} \quad \ldots\ldots. 4$$

In the presence of control variables, we expect that $\beta_j \neq 0$ , $j = 0,1,2,3$. If we fail to reject the null hypothesis ($\beta_j = 0$) then it would allow us to conclude that hidden information does not play a meaningful part in determining the capital provider choice of firms.

**Hidden Information and Financing Choices (Nested Logit Model level 2 results)**

The base choice in model 1 is equity, model 2 is private, and model 3 is private equity. In model 1, Debt=1 if firms have chosen private debt and bonds; Equity=1 if firms have issued new shares or used Private equity. In model 2, Public =1 if firms have chosen public equity and bonds; Private =1 if the firm has chosen private debt and private equity. In model 3, Private debt=1 if there is a positive change in bank loan, Private Equity= 1 if firms have used internal funds, Public= 1 if firms have issued bonds or issued new stocks. Size = ln(TA), Growth is estimated as growth in growth in total assets, profitability is estimated as $EBT\ pluc\ depriciation\ and\ amortisation_{it}/_{TA}$. Estimates the long-run average cash balance for the sample period of individual firms. The formula for its calculation is CSH&E/n. Where n = years in-sample period. Time dummies comprise three periods: pre-crisis, during crisis, and post-crisis and the base level is pre-crisis.

| | **Model 1** | | **Model 2** | | **Model 3** | | | |
|---|---|---|---|---|---|---|---|---|
| | Debt Vs Equity | exp(b) | Public Vs Private | exp(b) | Private Debt Vs Private Equity | exp(b) | Public (bonds and shares) Vs Private Equity | exp(b) |
| Research & Development | -0.00037 | 0.9996 | -0.00042 | 0.9996 | -0.02087*** | 0.97935 | -0.00790* | 0.99213 |
| | (-0.09990) | | (-0.11067) | | (-4.26824) | | (-1.83839) | |
| Dividend | 0.08981** | 1.094 | 0.01846 | 1.0186 | 0.15125*** | 1.16329 | 0.10210** | 1.10749 |
| | -2.11212 | | -0.41415 | | (2.7344) | | -2.02159 | |
| Forecast Variance | -1.59268** | 0.2034 | -1.20245* | 0.3005 | -0.5933 | 0.5525 | -1.65115** | 0.19183 |
| | (-2.52074) | | (-1.89256) | | (-0.63032) | | (-2.26822) | |
| Size | 0.34712*** | 1.415 | 0.55699*** | 1.7454 | 0.20486*** | 1.22736 | 0.65852*** | 1.93193 |
| | -15.4192 | | -23.11469 | | (7.1532) | | (23.78867) | |
| ZPROB | 0.05065*** | 1.052 | 0.07481*** | 1.0777 | -0.0357 | 0.96493 | 0.07571*** | 1.07865 |
| | -2.67899 | | -3.76184 | | (-1.37014) | | (3.35462) | |
| Growth | 0.81496*** | 2.2591 | 0.58288*** | 1.7912 | 3.70378*** | 40.6004 | 3.72915*** | 41.6435 |
| | -10.5091 | | -8.73365 | | (23.0022) | | (23.20600) | |
| Profitability | 0.05741 | 1.0591 | -0.25934** | 0.7716 | -0.90063*** | 0.40631 | -1.18717*** | 0.30508 |
| | -0.48559 | | (-2.37899) | | (-5.50557) | | (-7.46973) | |
| Target Cash | -0.09048*** | 0.9135 | -0.15808*** | 0.8538 | -0.20495*** | 0.81469 | -0.24581*** | 0.78207 |
| | (-4.69776) | | (-7.84810) | | (-8.15592) | | (-10.48834) | |
| Time: | | | | | | | | |
| During Crisis | 1.35803*** | 3.8885 | -0.47312*** | 0.6231 | 3.89426*** | 49.1196 | -0.07565 | 0.92714 |
| | -10.22484 | | (-3.75652) | | (13.7494) | | (-0.55264) | |
| Post Crisis | 1.11504*** | 3.0497 | -0.84088*** | 0.4313 | 3.77660*** | 43.6673 | -0.44304*** | 0.64208 |
| | -8.36791 | | (-6.50599) | | (13.2012) | | (-3.20065) | |
| Required Rate of Return | -0.55122*** | 0.5763 | -2.70571*** | 0.0668 | -4.88311*** | 0.00757 | | |
| | (-4.39334) | | (-20.78130) | | (-22.22616) | | | |
| Debt tau | -6.24062*** | | | | | | | |
| Equity tau | 1.40347*** | | | | | | | |
| Public tau | | | 3.38255*** | | | | | |
| Private tau | | | 5.79681*** | | | | | |
| Public tau | | | | | 6.22245*** | | | |
| Wald -Chi (prob) | 843.95(0.000) | | 1065.95 (0.000) | | 2234.82(0.000) | | | |
| Test of IIA: Chi | 801.1 | | 589.70 | | 446.1 | | | |
| P-Value | 0.000 | | 0.000 | | 0.000 | | | |

z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Table 17: Hidden Information Tests excluding Credit Ratings

Table 18 presents the results of the three models, and these results suggest that the hidden information indicators are statistically significant determinants of firms' choice of capital providers. Starting from Research and Development (R&D), we observe that the signs on the R&D are negative in all three models, which are as expected. It shows that R&D intensive firms tend to exhaust their internal capital sources before raising capital from external providers. Although, in the first two models, we do not observe R&D as statistically significant; however, in the third model, R&D is statistically significant.

Focusing on the results of the third model, the coefficient of R&D on the choice between private debt versus private equity is significant at the 1% level. The odds of firms issuing private debt decrease by 2% as the level of R&D increases by a unit. The influence is significant at the 10% alpha level for public sources versus private equity. The second coefficients on R&D indicate that firms are 1% less likely to raise capital from public sources given a unit increase in R & R&D., Which indicates that R&D intensive firms follow strategic investors' rationing. These firms prefer internal capital in all circumstances; however, if they need to raise external capital, they prefer public investors over private investors. This is inferable from the fact that the decrease in probability for public sources is 1%, which is lower than the decrease in likelihood for private sources, which is 2%.

One reason for inclination towards public sources could be the lower information costs concerning public lenders. These lenders (i.e., bondholders) require lesser disclosure of their R&D activities. The case is also valid for equity investors as firms are not obliged to share more information than the regulatory requirements require.

The case of private lenders is contrary to both options, as private lenders have the capacity and negotiating power to seek access to privileged information. Therefore,

management of R&D intensive firms may prefer to avoid losing information to private lenders.

We observed that dividend is a more significant determinant of debt versus equity choice than public versus private choice. Dividends are a significant determinant of debt sources at 5%, and the coefficients indicate that firms paying dividends are 9.4% more likely to raise capital from lenders versus equity providers. This conforms to the theory that dividends paying firms prefer to absorb their capital needs by issuing more debt rather than more equity (Fama & French, 2002).

We do not find any significant effects of dividends on the overall choice between the public and private dichotomy. However, we argue that this issue could be due to the nesting structure we have used, as our nests place public equity and public debt on one limb and private equity and private debt in one nest. This imposition dictates that variance associated with both choices within a nest must be IID; therefore, the implications of dividends ought to be the same for public debt and public equity in branch the same for public debt and public equity in branch 2.

Mackie-Mason (1990) also notes these methodological issues and argues that the effects of dividends are better assessed when choices are assessed in comparison to private equity. He notes that firms' cash reserves determine firms' decisions to raise capital from external capital providers. As dividend-paying firms ought to generate enough cash above their capital expenditure needs. Therefore, we argue that to analyse, we need to look at the effects of dividends by treating private equity as a base alternative.

To test our argument and minimise concerns, we have run model 3 and tried to establish the comparative preferences of firms concerning private equity. We observe thatfirms are 16% more likely to borrow from private lenders and 11% more likely to use

public sources if they pay dividends. This indicates that dividends that ostensibly act as a strong determinant of debt issuance do not save firms from caring that from whom they are borrowing. Dividend-paying firms prefer private lenders more than public lenders when raising capital. It is essential to mention that our public capital providers nests combine public debt and public equity, and it is plausible that it is the public lender (bondholders) which are more preferred over the private source of equity.

Coefficients on forecast variance indicate that firms with high earning volatility and unstable cash flows are less likely to use debt and public sources of capital. The coefficients are statistically significant in their influence on debt versus equity, public versus private, and public versus private equity choice.

Starting with model one, the odds of raising capital from debt providers for firms with higher forecast variance are 80% lower than using equity sources. It is noteworthy here that equity sources comprise public equity and private equity. This means firms with higher forecast variance are more likely to use private equity than public equity. Hence, the choice may be more related to private equity.

However, to test this, we need to combine the interpretation of model one and model two results. In model two, the coefficient on forecast variance shows that the probability of firms using public sources against private sources is 70% lower and is significant at the 10% level. Therefore, we can conclude that firms with high forecast variance are more likely to use private equity than any other external means.

It is also confirmed by the results presented in model three, where we observe that signs of the coefficient on private debt versus private equity are negative. Although it is not statistically significant, that sign suggests that firms are more inclined towards private equity. The second beta in model three further confirms this and indicates that the

probability of firms using public sources of capital will decrease by 81%, given that the forecast variance increases by one unit. Therefore, firms with volatile earnings who face difficulty in indicating the strength of their expected future cash flows prefer to use private equity in all cases.

These three variables are used as the leading indicators of hidden information, and it is evident from the results that they are statistically significant in determining the structure of firms' firms' capital providers. The initial discussion on these three variables indicates that the hidden information problem of firms makes them more concerned about their capital providers rather than instruments of raising capital. In the next section, we will include credit ratings as well and expect them to lead us towards a similar conclusion.

The control variables included in our model also suggest that firms concerns about their capital providers are not unfounded. Results show that most of the variables are statistically significant, indicating that firms take great care when selecting their capital providers. Firms' size indicates that larger firms prefer external financing in all circumstances. This finding suggests that larger firms prefer to exploit their economies of scale in using low-cost capital available to them from external sources. The results show that the odds of raising capital from debt providers are 41.5% higher than using equity sources. Whereas large firms are 74.5% more likely to use public investors than private investors. Our findings on size and financing preferences confirm the findings of Diamond (1985), James and Wier (1988), Dasilas and Papasyriopoulos (2015), and Marshall et al. (2016). Model three, firstly, confirms that larger firms are 93.13% public capital providers. However, it also indicates that large firms are 22.74% more likely to rely on private debt providers for their capital needs.

Growth is statistically significant in affecting all financing choices made by the firms; it indicates that firms with higher growth rates prefer to borrow and take financial

risk. It also shows that these firms prefer public capital providers over private as it reduces their cost of capital and ensures they do not have to pay an extra premium to borrow from private lenders. However, the interesting pattern that emerges in model three is a clear hierarchal structure of capital providers preferences. After deciding to go to external sources, firms prefer to use private debt and then to public sources.

Coefficients on growth are very high in model three, suggesting that growing firms are more likely to use external lenders than internal sources. Firms are 39.5 times more likely to use private debt and 40.6 times more likely to use a public investor. Combining these results with hidden information variables highlights the fact that so-called determinants of capital structures are highly influential in determining the choice of capital providers.

We have also used target cash balance as a control variable. Leary and Roberts (2010) argue that firms target a minimum cash balance; therefore, their choice of using external financing is the function of how much cash they prefer to have rather than how much they need. The coefficients suggest that firms with a higher target cash balance are less likely to use external financing and prefer internal financing. This finding has two implications: one, it may suggest that these firms are either cash surplus or are aiming to use their above target cash balance. Secondly, it may also seem that these firms with higher cash reserves prefer to avoid the scrutiny of external investors. This points to the agency problem where firms, despite having positive NPV projects available, prefer to let such opportunities expire.

If we recall our discussion in section 2.3, we have observed that healthy firms, cash surplus firms are less active in raising external capital. Although these firms prefer using bonds and private debt, yet their total financing activity comprises only 17% of the total

sample. Hence, the coefficient signs in these models indicate that firms with surplus cash are less inclined to use external sources of capital.

We have used the time dummy to account for the influence of when firms raise external capital. We observe that firms prefer debt over equity and private capital providers over public capital providers during the crisis. The likelihood of firms issuing debt is 288% higher than issuing equity compared to the pre-crisis period. Firms are 38% less likely to use public lenders during a crisis than the pre-crisis period. This indicates that firms are more likely to use private debt during a crisis as a means of financing.

Coefficient indicates that the odds of firms issuing private debt are 48 times higher than issuing private equity. Model three reaffirms this as the coefficient on private debt versus private equity is positive and statistically significant. Cash strapped firms are more reliant on private lenders such as banks to raise capital during crisis years than in the pre-crisis period.

Interestingly, in the post-crisis period, the trend continues, and firms are reluctant to use public markets to raise their capital, especially in using public equity. Coefficients on post-crisis dummy in all three models are significant at 1% level, and the signs indicate firms' inclination towards private capital providers rather than public. The coefficient in model one indicates that the probability of firms using debt is 204% higher, and raising capital from public sources is 56.9% lower. In addition to this, model three suggest that firms are 42 times more likely to raise capital from private debt sources and 35.8% less likely to use public debt and equity. We conclude that the financial crisis period has expedited the eclipse of the public corporations, which is professed by Jensen (1989).

Before we proceed to further analysis, the next big question is about the validity of our model specifications. This study uses nested logit specification to relax the strong

assumptions of IID and IIA. We argue that the strong assumptions of IID and IIA ignore the utility maximising behaviour and the existence of a correlation between utilities of alternatives that are intrinsically similar. These assumptions also reject the notion that firms' choice of financing options is influenced by the availability or non-availability of other financing options.

Therefore, using nested logit model specification, we relax these assumptions and consider that utilities associated with different financing alternatives are correlated, and the selection of one alternative influences the choice of other alternatives. Nested logit specification allows us to combine alternatives with correlated utilities and error variance into one nest and analyse their impact on the upper-level choice.

Hensher (2005) notes that for a valid nesting structure, it is imperative that the dissimilarity parameter (tau) of a level 2 branch must be between 0 and 1 and must not be equal to one. They argue that meeting such a bound ensures that we do not observe wrong cross elasticities or counter factual coefficient signs.

Although, the IIA test at the bottom allows us to reject and conclude that these choices are not binary or distinguishable from each other. It is, however, noteworthy that the resultant dissimilarity parameters (tau) given in the table are more significant than one and hence requires further investigation.

Dissimilarity parameters (tau) greater than one indicate the existence of wrong cross-elasticity and may raise questions on the legitimacy of our tree structures. We want to point out that tests conducted using all variables (i.e., hidden information variables, credit ratings, and control variables) do not suffer from this problem. The problem arises with hidden information variables or the control variables used in this section. This indicates that the

control variables and financing choices are interdependent, and there could be the case of some endogeneity.

However, to ensure that we do not commit type I or type II errors, we have conducted further cross-check to see the signs of coefficients if we run the models with IIA assumptions. This will allow us to assess whether the signs are different or any specification error.

Table 19 comprises the results of the alternative specific model, which assumes the variance is IID and alternatives adheres to the IIA assumption. Results in the model show that the coefficients on these variables are as expected, and they are not different from models 1, 2 and 3.

**Hidden Information and Financing Choices (Alternative Specific Model (ASM) with I.I.D assumption)**

The ASM models is a conditional logit model that imposes the IID and IIA assumptions. These models require the utility of alternatives to be irrelevant from other alternatives. Base choice is private equity. Private debt=1 if there is a positive change in bank loan, Private Equity= 1 if firms have used internal funds, Public debt = 1 if firms have issued bonds and public equity = 1 if firm has issued new stocks. Size = ln(TA), Growth is estimated as growth in growth in total assets, profitability is estimated as $EBT\ pluc\ depriciation\ and\ amortisation_{it}/_{TA}$. Estimates the long run average cash balance for the sample period of individual firms. Formula for its calculation is: CSH&E/n. Where, n = years in sample period. Time dummies comprise three periods: pre-crisis, during crisis, and post crisis and the base level is pre-crisis.

| | Private Debt | Public Debt | Public Equity |
|---|---|---|---|
| Research & Development | -0.01924*** | 0.00058 | -0.03618*** |
| | (-3.98042) | (0.12472) | (-5.66451) |
| Dividend | 0.13740** | 0.13081** | 0.02842 |
| | (2.50838) | (2.30928) | (0.40892) |
| Forecast Variance | -0.32331 | -2.22950*** | 0.40878 |
| | (-0.34643) | (-2.89033) | (0.38121) |
| Size | 0.24830*** | 0.69650*** | 0.46850*** |
| | (8.56366) | (22.92660) | (12.68578) |
| ZPROB | -0.01908 | 0.11555*** | -0.05210 |
| | (-0.74177) | (4.77355) | (-1.48308) |
| Growth | 3.86238*** | 3.68283*** | 3.90022*** |
| | (23.98947) | (22.51322) | (24.04356) |
| Profitability | -1.06753*** | -1.06887*** | -1.50673*** |
| | (-6.10991) | (-5.51286) | (-7.92594) |
| Target Cash | -0.22299*** | -0.16433*** | -0.35284*** |
| | (-9.08755) | (-6.29546) | (-11.56589) |
| During Crisis | 0.17695*** | 0.06870 | -0.23758*** |
| | (2.68247) | (1.03575) | (-2.80691) |
| Post Crisis | 0.33555*** | 0.16268*** | -0.25850*** |
| | (5.82509) | (2.81406) | (-3.46858) |
| Constant | -1.83242*** | -9.50210*** | -3.89342*** |
| | (-5.92556) | (-29.70967) | (-9.87914) |
| Wald Chi2 (30) | 2060.09 | | |
| Prob > Chi2 | 0.000 | | |

z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1, base choice private equity

Table 18: Alternative Specific Model with IIA assumptions

In addition to alternative specific speciation, we have also used the multinominal logit model[24] and concluded that the issue of having counterfactual signs is not plausible. Further, MNL is used to test whether there are alternatives that can be combined and do the simple MNL violate IIA assumptions. To test the first possibility, we have conducted Wald tests and LR tests to assess whether different alternatives can be combined or not.

The next question is whether these independent alternatives are irrelevant in determining the utility of other financing choices for a firm or management. Two tests are usually conducted to analyse such possibility; one is Hausman and McFadden and other small-Hsiao tests.

Table 20 summarise the results for all these tests. Panel A and Panel B are tests of combining the base level alternatives that indicates the base level alternatives are not combinable and must be treated as a valid individual alternative.

Panel C and Panel D summarise the results of IIA tests. Both tests give us a mixed picture here. We find that the fourth run of the test (Public equity) indicates that given that we keep public equity and exclude another non-base category (i.e., other than private equity), the IIA assumption is violated. It allows us to conclude that firms and management utilities regarding financing alternatives are influenced by inclusions and exclusion of other alternatives.

One may argue that this influence is only significant with respect to public equity, not the other alternative. Nonetheless, it is still notable that public equity is the most important financing choice for any management when choosing capital providers.

After conducting these diagnostic and robustness checks to double-check, we conclude that our approach of combining alternatives is not flawed and robust. It can be improved much

[24] MNML results are attached in the appendix.

more if we can observe the firm's financing choices using stated preference methods rather than inferring them from accounting data. However, such data is neither available nor easily collectable.

We further argue that the violation of zero and one bound exhibited by our dissimilarity parameter could result from the innate collinearity in the control variables or coarseness of the data. Hence, we may be observing the tau to violate the 0 and 1 bound. Furthermore, Mason (1990) also argues that combining alternatives such as private equity and private debt to form private nests and private equity and public equity to create equity nests is also problematic. These issues can only be alleviated when firms disclose their private placements and model them as private sources instead of inferring from financial accounts.

We also want to mention that in the forthcoming tests in which we excluded the control variables from our model and only used credit ratings and hidden information variables, we observe that tau starts to adhere to 0 and 1 bound. This indicates that commonly used independent variables in capital structure are affected by firm-specific conditions (Kisgen, 2006). One possible solution is variable fishing and arriving at the desired outcome. However, it is noteworthy here that such an approach is against the letter and spirit of robust research. Therefore, we would rather live with less than perfect truth than a counterfeit outcome.

Lastly, Hensher (2005) and Long and Freese (2006) argue that finding the correct specification for nested logit models is a rather tricky process, and at best, it involves trial and error till one arrives at the best specification. Furthermore, McFaden (1974) also suggest that the IIA assumption is only plausible when one is confident about the distinctness of choice alternatives. Corporate finance theory argues that firms financing choices are often influenced by their previous financing choices or simultaneous choices made in a period. We conclude our discussion on the robustness of our model and tests of IIA by quoting Long

and Freese (2006 p,408*); "we do not believe that tests of IIA are useful,…, in our experience you can almost always obtain some tests that accept the null and other that reject the null when using the same model with the same data"* [25].

**Tests for Validity of the validity of Choice structure used in this Study**

These tests focus on two aspects: first, they test that whether IID and IIA assumption are valid. Second, they test that whether these alternatives can be combined.

**Panel A: Wald tests for combining alternatives (N=7475)**

Ho: All coefficients except intercepts associated with a given pair of alternatives are 0 (i.e., alternatives can be combined)

| | chi2 | df | P>chi2 |
|---|---|---|---|
| Private Equity Vs Private Debt | 457.261 | 10 | 0.000 |
| Private Equity Vs Public Debt | 598.667 | 10 | 0.000 |
| Private Equity Vs Public Equity | 486.709 | 10 | 0.000 |
| Private Debt Vs Public Debt | 589.852 | 10 | 0.000 |
| Private Debt Vs Public Equity | 145.591 | 10 | 0.000 |
| Public Debt Vs Public Equity | 438.727 | 10 | 0.000 |

**Panel B: LR tests for combining alternatives (N=7475)**

Ho: All coefficients except intercepts associated with a given pair of alternatives are 0 (i.e., alternatives can be combined)

| | chi2 | df | P>chi2 |
|---|---|---|---|
| Private Equity Vs Private Debt | 650.49 | 10 | 0.000 |
| Private Equity Vs Public Debt | 801.306 | 10 | 0.000 |
| Private Equity Vs Public Equity | 676.539 | 10 | 0.000 |
| Private Debt Vs Public Debt | 678.819 | 10 | 0.000 |
| Private Debt Vs Public Equity | 152.794 | 10 | 0.000 |
| Public Debt Vs Public Equity | 496.831 | 10 | 0.000 |

A significant result is an evidence against H0.

**Panel C: Hausman-McFadden test of IIA**

Ho: Odds (Outcome-J vs Outcome-K) are independent of other alternatives

| | chi2 | df | P>chi2 | | |
|---|---|---|---|---|---|
| Private Equity | -4.798 | 21 | . | | |
| Private Debt | 25.431 | 22 | 0.277 | | |
| Public Debt | 22.252 | 21 | 0.385 | | |
| Public Equity | 301.528 | 21 | 0.000 | | |

**Panel D: Small-Hsiao test of IIA**

Ho: Odds (Outcome-J vs Outcome-K) are independent of other alternatives

| | Ln L(full) | Ln L(omit) | chi2 | df | P>chi2 |
|---|---|---|---|---|---|
| Private Equity | -3372.52 | -3358.955 | 27.126 | 22 | 0.206 |
| Private Debt | -1814.2 | -1799.735 | 28.925 | 22 | 0.147 |
| Public Debt | -1859 | -1845.04 | 27.922 | 22 | 0.178 |
| Public Equity | -2516.18 | -2500.489 | 31.377 | 22 | 0.089 |

Note: A significant test is an evidence against Ho.

Table 19: Tests for Validity of the validity of Choice structure used in this Study

### 4.3.2. Full information tests

This section extends the previous section's discussion by adding credit ratings as an indicator of hidden information. We will test the relationship between credit ratings or their

[25] Further discussion on this topic is also available in Fry and Harris (1996, 1998) and Cheng and Long (2007).

variants and the financing preferences of the firms. To ensure that the effects of credit ratings are neither exaggerated nor minimised, we have also included the control variables. Two tests have been conducted using all the variables, and the utility function designed for these tests is as follows:

$$V_{Debt\ Vs\ Equity} = \beta_j f(\text{Credit Ratings}) + \beta_k f(\text{Credit rating variants}) + \beta_l f(\text{Hidden information Variables}) + \beta_m f(\text{Control Variables}) + \epsilon_{it} \quad \ldots\ldots\ldots 1$$

$$V_{Public\ vs\ Private} = \beta_j f(\text{Credit Ratings}) + \beta_k f(\text{Credit rating variants}) + \beta_l f(\text{Hidden information Variables}) + \beta_m f(\text{Control Variables}) + \epsilon_{it} \quad \ldots\ldots\ldots 2$$

In Equations 1 and 2, the credit rating variable indicates the original ratings issued to a firm by rating agencies. We have used broad ratings as the credit rating of the firm. Broad rating represents rating class such as AA = AA+, AA, and AA-. It is general practice that micro-credit ratings are not used as an explanatory variable because of lack of variance and prolonged stability. However, we have tried to use them to ensure that we do not commit the error of omission. Micro ratings are usually very stable and show minimal variance over time; hence, using them in the variational analysis is also not meaningful[26]. Credit rating variants represent the different constructs used in academic literature and some additional constructs as identified in section 3.5.3.

The main rating variants used are plus, minus signs, rating anchor, rating upgrade and downgrade, and firm classification. The purpose of these tests is twofold; firstly, we aim to assess whether credit ratings and their variants can jointly influence the firms financing choices. All credit rating variables will be analysed individually in detail in the coming sections; here, the objective is to control the other variables. We also wish to assess that in what form credit ratings carry influence and do the influence is in line with our expectations.

[26] Micro rating tests are not reported here as their p-values are in the region of 36% to 99%; hence, reporting them would not add anything to debate.

**Hidden information, Credit Ratings and Financing Choices (Nested Logit Model level 2 results)**

(Full information variables only)

The base choice in Model 1 is Private and in model 2 is equity. Public =1 if firms have issued bonds or new shares and private=1 if firms have used private debt or private equity. Debt=1 if firms have issued bonds or used Private debt and equity=1 if firms have issued new shares of used private equity. Broad ratings represent the broad category of variables such as AA+, AA, and AA-. Firm classification is defined as 4= healthy companies (firms with rating => A), 3= balanced companies (firms with the rating between BB and BBB), 2= vulnerable companies (firms with the rating between CCC and B) and 1= risky companies (firms with the rating between D and CCC). Investment-grade =1 if the firm has a rating equal to and above BB+ and speculative-grade if the rating is below BB+. Plus, and minus dummies indicate if firms' rating has a plus or minus signs. RU=1 if the current rating has increased and RD=1 if the current rating has decreased from the previous year. RUD = 1 if the firm rating has changed in the current period from the previous period. Rating Anchors 1 & 2 indicate the lagged ratings for the last two years. Dividends =1 if the firm pays dividends.
Size = ln (TA), Growth is estimated as growth in growth in total assets, profitability is estimated as $EBT\ pluc\ depriciation\ and\ amortisation_{it}/_{TA}$. Estimates the long-run average cash balance for the sample period of individual firms. The formula for its calculation is CSH&E/n. Where n = years in the sample period. Time dummies comprise three periods: pre-crisis, during the crisis, and post-crisis and the base level is pre-crisis.

| | **Model 1** | | **Model 2** | |
|---|---|---|---|---|
| | Public Vs Private | exp(b) | Debt Vs Equity | exp(b) |
| Broad Ratings | 0.10864 | 1.11476 | 0.07576 | 1.07871 |
| | (1.5626) | | (1.0744) | |
| Firm Classification | -0.15893** | 0.85305** | 0.06076 | 1.06265 |
| | (-2.05606) | | (0.8147) | |
| Investment Grade | -5.4661 | 0.00423 | -7.17524 | 0.00077 |
| | (-0.01640) | | (-0.03271) | |
| Speculative Grade | -5.39764 | 0.00453 | -7.24345 | 0.00071 |
| | (-0.01620) | | (-0.03302) | |
| Plus | 0.01355 | 1.01364 | 0.01145 | 1.01152 |
| | (0.2559) | | (0.2225) | |
| Minus | -0.00388 | 0.99613 | -0.05389 | 0.94754 |
| | (-0.07561) | | (-1.07619) | |
| Rating Upgrade (RU) | 0.19821 | 1.21921 | 0.07838 | 1.08153 |
| | (1.5422) | | (0.6225) | |
| Rating Downgrade (RD) | 0.27413*** | 1.31539*** | 0.07561 | 1.07854 |
| | (4.0607) | | (1.1236) | |
| Rating Anchor1 (1-Year Lag) | -0.0031 | 0.9969 | 0.00765 | 1.00768 |
| | (-0.12065) | | (0.2950) | |
| Rating Anchor2 (2-year lag) | -0.00523 | 0.99479 | -0.02222 | 0.97803 |
| | (-0.29078) | | (-1.32197) | |
| Research & development | -0.00032 | 0.99968 | -0.00184 | 0.99816 |
| | (-0.08279) | | (-0.49713) | |
| Dividend | 0.0485 | 1.0497 | 0.00499 | 1.00501 |
| | (0.9563) | | (0.1035) | |
| Forecast Variance | -1.32991** | 0.26450** | -1.41673** | 0.24251** |
| | (-2.07742) | | (-2.22856) | |
| Size | 0.55877*** | 1.74852*** | 0.31450*** | 1.36958*** |
| | (21.7858) | | (13.0706) | |
| ZPROB | 0.07297*** | 1.07570*** | 0.05673*** | 1.05837*** |
| | (3.6323) | | (2.9766) | |
| Growth | 0.59371*** | 1.81070*** | 0.83083*** | 2.29522*** |
| | (8.8125) | | (10.6828) | |
| Profitability | -0.19499* | 0.82285* | -0.02467 | 0.97563 |
| | (-1.73598) | | (-0.21530) | |
| Target Cash | -0.15677*** | 0.85490*** | -0.09166*** | 0.91242*** |
| | (-7.74449) | | (-4.74280) | |
| During Crisis | -0.4023 | 0.66878 | 1.60441*** | 4.97492*** |
| | (-1.35743) | | (4.9968) | |
| Post Crisis | -0.77752*** | 0.45955*** | 1.38013*** | 3.97542*** |
| | (-2.60067) | | (4.2775) | |
| Required Rate of Return | -0.71289 | 0.49022 | 0.14948 | 1.16123 |
| | (-0.00552) | | (0.0068) | |
| Public tau | 0.89123 | | | |
| Debt tau | | | 1.69246 | |
| Wald Chi2 (Prob) | 1140.21 (0.000) | | 857.35(0.000) | |
| Test of IIA: Chi2 (prob) | 73.89 (0.000) | | 316.15 (0.000) | |
| z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1. | | | | |

Table 20: Full information model

Table 21 summarise the results for models one and two. Each model uses broad ratings as the leading credit rating variable. We have not presented the micro-rating tests as the coefficient on micro-rating is very weak; however, signs are as expected.

Results in the above table indicate that at least two variants of credit ratings are significant factors influencing firms' choice of public versus private capital providers. The two variants are firm classification and rating downgrade. The first is an aggregate variable that groups firms into one class using their current broad ratings. Firms rated from AAA to A are classified as healthy firms. Firms rated from BBB to BB are classified as balanced firms. Firms rated from BBB to CCC are classified as vulnerable firms, and firms rated from CC to D are considered risky. These classifications are on a scale of 1 to 4; where, four refers to the healthy companies and 1 to risk companies. Rating downgrades represent realised rating change in the broad rating of a firm. It is the dummy variable that indicates whether the current broad rating is a downgrade from the previous year. Suppose the current rating is lower than the previous year than 1; otherwise, 0. We have hypothesised that firms react more to the realised rating changes than the anticipated rating changes as indicated by the plus or minus sign.

Before considering these two variables, let us analyse coefficients on broad ratings in models one and two. Coefficients in both models have positive signs that confirm the notion that firms with higher ratings are more likely to raise capital from public sources to benefit from the low cost of borrowing available to them (Diamond (1991) and Denis and Mihov (2003)). Broad ratings indicate that firms with higher ratings are 11% more likely to use public capital providers. Although the coefficient is only significant at 12%; still, it is significantly better than the p-value of 28% for debt versus equity in model 2. Broad rating coefficients in model 2 are not statistically significant; the coefficient indicates that companies are 7.87% more likely to use debt than equity. This study argues that firms with

a higher credit rating feel it imperative to raise capital from the public market. It allows firms to signal their creditworthiness as perceived by investors and shows managers confidence in future cash flows. The abovementioned results indicate firms overall tilt towards public bonds and suggest that credit ratings may play an important role in firms' choice of capital providers.

Moreover, a firm with the higher rating that uses more private sources may create a hidden information problem as thigh rate firms' decision to rely on private sources can be inferred in two manners:

Either the firm is trying to avoid public scrutiny and subjecting itself to market discipline.

Alternatively, the firm feels that its prospective financial conditions may deteriorate, resulting in short selling of its assets in the future.

Therefore, we argue that credit ratings as hidden information indicators are a better tool to predict sources of capital rather than instruments of capital. Bedendo and Siming (2020) also note that firms that have higher credit ratings and use more private debt are penalised by rating agencies, prima facie. Hence, higher credit ratings of a firm may be the compelling factor that induces firms to raise capital from public investors.

Following the same logic, we expected that the higher the firms is on the classification scale more likely they are to use public sources of capital. We observe that coefficient signs in model two on debt versus equity are as expected and confirm Dasilas and Papasyriopoulos (2015) but are not statistically significant. Contrary to that, we observe that the coefficient of firm classifications is negative for public versus private choice, which is statistically significant.

Results show that as firms move from risky to healthy firms, they are 15% less likely to use public capital providers. It contradicts our findings concerning broad ratings. However, we have run tests using firm classification as an indicator variable (presented later in 4.2.6). They indicate that the probability of using public sources increases as the firms move from a risky to healthy credit quality state. However, the results are only statistically valid for healthy firms.

We argue that these contradicting results could be due to the aggregation of firms into four main classes concerning their creditworthiness. To further explore this issue, we refer to the data presented in table 14. It indicates that balanced and vulnerable firms are more financially active than the other two categories. Furthermore, the balanced firms are most likely to use bonds, and the healthy firms follow them. Moreover, balanced firms prefer to use private debt over issuing new shares[27]. As the majority of financing decisions in our sample represent financing choices of balanced firms, that could have caused the tilt toward private capital providers.

Based on the data in table 14, we argue that highest rated firms are generally financially less active, and if they need raising more capital, then despite having extra cash, they are more likely to use public debt over any equity. Overall, healthy and balanced firms prefer debt sources compared to equity which could be due to lower cost, tax advantages, and lesser loss of control and information. The first category of firms prefers public debt providers, and the latter prefers private debt providers. Our finding contradicts Marshall et al. (2016), who find that bond issuance is favoured by lower credit quality firms, not the high rated firms. We cannot confirm or reject their additional finding reading the size or maturity of the issued private placement.

[27] Se figure 12, 14, and 15 in chapter 2.

Coefficients on investment-grade and speculative-grade ratings are statistically insignificant, and their signs also present no meaningful conclusion here. The sign on investment-grade ratings in model 1 is as expected, but we conclude that they are not highly influential in the presence of other variants of credit ratings. We will rediscuss the macro-ratings in their analysis section and try to appreciate their role, if there is any.

Coefficients of plus and minus indicators of credit ratings are also not statistically significant. We accept the notion that signs of credit ratings are not meaningfully influential in the presence of broad ratings and firms' classification. This can be a methodological issue because credit rating signs and respective broad and macro-ratings are cofounding realities. In a similar study, Kisgen (2006) uses these variables individually and found them significant. We will also conduct the individual tests in coming sections and assess if signs of credit ratings are of any importance.

We also note that rating anchors are not statistically significant in determining the choice of capital providers nor in debt versus choice equity. In case if they were significant, we observe that the economic impact on them would be minimal. A one-year lag shows 0.31% less likelihood of using public capital providers. Two-year lag indicates 0.52% less likelihood of using public sources. These minor effects do not suggest that rating anchors have any meaningful impact on a joint model.

In both models, we observe that research and development and dividends are statistically insignificant, and their economic significance has declined from models used in previous sections. Forecast variance is significant at the 5% level, and the coefficient suggests that the probability of firms relying on public capital providers will decrease by 75%, given the increase in forecast variance.

In addition to credit rating variants, we have also used other hidden information indicators and control variables. The signs and coefficients on these variables are not different from the results we find in the previous section. We note that firms with a larger size, higher ZPROB and higher growth rate are more likely to issue public instruments. Results show that their probability of raising capital from public providers will increase by 75%, 7.5% and 81%, respectively, with a unit increase in each factor. Nevertheless, these effects are considered when credit ratings coefficients are considered zero.

Results also suggest that the time dummy variable remains a highly significant variable in conjoint analysis. The coefficient on during crisis firms is negative in model one and positive in model 2. Although the first coefficient is statistically not significant; nonetheless, it indicates that firms show more tilt towards private means of financing. The coefficient in model 2 indicates that firms are more inclined to raise capital for debt providers during the crisis. It indicates that firms are 3 times more likely to use debt than equity during a crisis than the pre-crisis period.

Nonetheless, the coefficient on post-crisis is significant in both models and suggest that post-crisis firms are 54% less likely to raise capital from public capital providers and 3 times more likely to use debt. Therefore, it can be argued that post-crisis private debt has become a favourite financing preference of firms. This is in line with our hitherto discussion that firms are more likely private debt given they seek external financing.

Dissimilarity parameter on public versus private choice model adheres to zero and one bound. This satisfies behavioural assumptions that managers and firms act to maximise their utilities. The dissimilarity parameter on the debt versus equity choice model is greater than 1, indicating some issues in combining alternatives; however, the amount by which it differs from 1 is smaller this time. Tests of IIA reject the hypothesis that errors are independent of each other and suggest that the inclusion or exclusion of alternatives affects

the probability of other alternatives. Therefore, this specification is much more robust and allows us to conclude that the dissimilarity parameters are influenced by the explanatory variables along with the tree structures we used for our models.

### 4.3.3. Plus, or Minu tests

In this section, we evaluate the role of credit rating signs in determining the financial preferences of firms. We will test the effects of plus or minus signs on firms' choice of capital provider. Kisgen (2006) argues that plus and minus signs associated with firms' credit ratings manifest anticipated changes in these ratings. In anticipation of these changes, he argues that firms and managers try to tailor their capital structure to minimise their adverse effects. He finds conclusive evidence that firms with plus or minus signs are less likely to increase their debt levels.

This study argues that if plus or minus signs are indicators of hidden information, then their actual effect should be on the choice of capital providers. These rating signs manifest firms' concerns that an unnecessary change in their creditworthiness may result in investors seeking higher premiums or making free ride gains. Then firms should raise capital from sources that would be least costly in case of worst outcomes and the best place in case of a desirable outcome. Our arguments are also in line with the capital structuring issues surrounding restructuring and renegotiating financial contracts in case of financial distress. When a struggling firm needs to restructure its capital structure, having a reliable and long-established relationship is very helpful.

Therefore, this study argues that credit rating signs are insignificant when choosing between security instruments or deciding debt ratios. One reason for this indifference of firms is the limited implications of credit rating signs on large offerings (Kisgen, 2006). Firms making large issues discount the possibility of change in their credit ratings.

Similarly, firms that issue small to medium-sized debt securities are less likely to be concerned with future implications on their credit rating signs. In both circumstances, we argue that firms ought to be more interested in achieving other objectives such as replacing their existing debt providers, refinancing their existing loans, or meeting their short-term capital needs. None of these instances warrants firms to pay attention to rating signs as firms can use their disclosure policies and interim announcements to communicate this information effectively.

Even if there is Lemmon premium involved, firms may not be bothered due to its negligible costs. The issue is when firms decide to raise large capital amounts and ensure that they are not subject to erroneous premiums. Large offerings are not always bound to indicate financially sound firms, as noted by Kisgen (2006). Instead, they can be an attempt of the firm to restructure its financing at an early sign of financial distress. Therefore, credit rating signs are significant as they enable firms to choose capital providers requiring a lower Lemmon premium. Following Kisgen (2006), tests will be conducted using the following equations:

$$V_{Public\ Vs\ Private} = \beta_j f(Plus) + \beta_j f(Minus) + \beta_j \text{f(Hidden information Variables)} + \epsilon_{it} \quad \text{…. 1}$$

$$V_{Equity\ Vs\ Debt} = \beta_j f(Plus) + \beta_j f(Minus) + \beta_j \text{f(Hidden information Variables)} + \epsilon_{it} \quad \text{…. 2}$$

$$V_{Public\ Vs\ Private} = \beta_j f(Plus\ or\ Minus) + \beta_j \text{f(Hidden information Variables)} + \epsilon_{it} \quad \text{…. 3}$$

$$V_{Equity\ Vs\ Debt} = \beta_j f(Plus\ or\ Minus) + \beta_j \text{f(Hidden information Variables)} + \epsilon_{it} \quad \text{….. 4}$$

$$V_{Public\ Vs\ Private} = \beta_j f(Plus) + \beta_j f(Minus) + \beta_j \text{f(Hidden information Variables)} + \beta_m \text{f(Control Variables)} + \epsilon_{it} \quad \text{…. 5}$$

$$V_{Equity\ Vs\ Debt} = \beta_j f(Plus) + \beta_j f(Minus) + \beta_j \text{f(Hidden information Variables)} + \beta_m \text{f(Control Variables)} + \epsilon_{it} \quad \text{…. 6}$$

$$V_{Public\ Vs\ Private} = \beta_j f(Plus\ or\ Minus) + \beta_j \text{f(Hidden information Variables)} + \beta_m \text{f(Control Variables)} + \epsilon_{it} \quad \text{…. .7}$$

$$V_{Equity\ Vs\ Debt} = \beta_j f(Plus\ or\ Minus) + \beta_j f(\text{Hidden information Variables}) + \beta_m f(\text{Control Variables}) + \epsilon_{it} \quad \ldots\ldots .8$$

The first four equation tests the effects of plus or minus signs as hidden information variables, and the later four equations introduce the control variables to account for any unobservable effects. Table 22 summarises the results for the first four equations, and table 23 summarises the last four equations. Results in table 22 suggest low to the medium influence of plus and minus as indicators of hidden information.

Like Kisgen (2006), we observe that the coefficient on plus and minus signs in model 2 is positive for equity, which means negative signs for raising debt. It indicates that firms with rating signs are less likely to raise additional debt and more likely to use private equity or issue new shares. Firms with a plus sign are 2.5% more likely to raise capital from equity sources than debt, and firms with a minus sign are 6.1% more likely to use equity than debt. However, none of these coefficients is statistically significant and hence allows us to conclude that ratings are not a reliable predictor of debt versus equity choice when using hidden information indicators.

On the contrary, in model one, signs on plus and minus are negative, indicating firms' preference for private sources of capital rather than public sources. Firms with a plus sign are 3.98% less likely to use public sources, and firms with a minus sign are 8.02% less likely to use public sources. The coefficients associated with minus signs are statistically significant at the 10% alpha level. Therefore, one can argue that the importance of credit rating signs (especially minus signs) is more relevant to insider versus outsider choice than debt versus equity choice. Although, coefficients signs in these both models are as expected, and they indicate that firms with rating signs exhibit a concern concerning issuing debt or tapping public markets. However, we observe that credit rating signs are not strong hidden information indicators like other variables.

## Rating Signs and Financing Choices (Nested Logit with hidden information variables only– Level 2 results)

(Plus, or Minus with hidden information variables only)

The table presents the level 2 results for four models. Each model is run with different specification of financing choice. The base choice in Models 1 & 3 is Private and in models 2 & 4 is debt. Public =1 if firms have issued bonds or new shares and private=1 if firms have used private debt or private equity. Debt=1 if firms have issued bonds or used Private debt and equity=1 if firms have issued new shares of used private equity. Plus, or minus dummies indicate if firms' rating has a plus or minus sign. POM dummy indicates either of the plus or minus signs. Dividends =1 if the firm pays dividends. Time dummies comprise three periods: pre-crisis, during the crisis, and post-crisis and the base level is pre-crisis.

| | **Model 1** | | **Model 2** | | **Model 3** | | **Model 4** | |
|---|---|---|---|---|---|---|---|---|
| | Public Vs Private | exp(b) | Equity Vs Debt | exp(b) | Public Vs Private | exp(b) | Equity versus Debt | exp(b) |
| Plus | -0.03903 | 0.96172 | 0.02552 | 1.02585 | | | | |
| | (-0.86141) | | (0.57637) | | | | | |
| Minus | -0.08364* | 0.91977* | 0.05882 | 1.06058 | | | | |
| | (-1.83922) | | (1.32884) | | | | | |
| POM | | | | | -0.06124 | 0.9406 | 0.04215 | 1.04305 |
| | | | | | (-1.57824) | | (1.11250) | |
| Research and Development | -0.00319 | 0.99681 | 0.00095 | 1.00095 | -0.00321 | 0.9968 | 0.00096 | 1.00096 |
| | (-0.96674) | | (0.29504) | | (-0.97115) | | (0.29773) | |
| Dividend | 0.34827*** | 1.41662*** | -0.30163*** | 0.73961*** | 0.34977*** | 1.41874*** | -0.30274*** | 0.73879*** |
| | (8.62925) | | (-7.77780) | | (8.67318) | | (-7.81225) | |
| Forecast Variance | 5.81166*** | 334.17237*** | -2.96195*** | 0.05172*** | 5.80327*** | 331.38041*** | -2.95655*** | 0.05200*** |
| | (8.91653) | | (-4.83724) | | (8.90569) | | (-4.82887) | |
| ZPROB | -0.07378*** | 0.92888*** | 0.04369** | 1.04466** | -0.07406*** | 0.92862*** | 0.04386** | 1.04483** |
| | (-3.85900) | | (2.45275) | | (-3.87205) | | (2.46100) | |
| During Crisis | -0.06977 | 0.93261 | | 0.20173*** | -0.06872 | 0.93358 | -1.60156*** | 0.20158*** |
| | (-0.58158) | | (-12.31242) | | (-0.57293) | | (-12.31833) | |
| Post Crisis | -0.31334** | 0.73100** | -1.40842*** | 0.24453*** | -0.31131** | 0.73249** | -1.40991*** | 0.24416*** |
| | (-2.56401) | | (-10.84981) | | (-2.54787) | | (-10.86221) | |
| Required rate of return | -0.28463*** | 0.75229*** | -0.15303*** | 0.85811*** | -0.28517*** | 0.75188*** | -0.15320*** | 0.85796*** |
| | (-7.35563) | | (-4.26313) | | (-7.36921) | | (-4.26600) | |
| Public tau | 0.35584 | | | | 0.35652 | | | |
| Private tau | 0.6098 | | | | 0.61095 | | | |
| Debt tau | | | -1.73339 | | | | -1.73448 | |
| Equity tau | | | 0.3896 | | | | 0.39004 | |
| Wald statistics | 634(0.000) | | 444.15(0.000) | | 633.91(0.000) | | 443.68(0.000) | |
| Test of IIA: Chi | 92.000 | | 510.000 | | 91.540 | | 510.300 | |
| P-Value | 0.000 | | 0.000 | | 0.000 | | 0.000 | |
| (z-statistics in parentheses) (Model is Run with Year dummies) (*** p<0.01, ** p<0.05, * p<0.1) | | | | | | | | |

Table 21:Plus, or minus tests with hidden information variables only.

For instance, coefficients on dividends, forecast variance, and ZPROB are highly significant, and their signs are as expected, except for forecast variance. Similarly, our models 3 and 4 also indicate that plus and minus signs generally do not explain a significant portion of variations in firms' financing preferences. Instead, their importance is diminished only to a level where minus signs imply that firms prefer to have a more stable mix of capital providers if they expect financial distress or financial restructuring. Our results are robust and more generalisable as they are not firms' size-dependent, nor they are affected by the size of debt issuance or equity offering. Because we have coded our dependent variable as choices; hence, it does not matter if the issue size is small or negligible. We do not exclude firms based on their size or issuance and offering sizes. Hence our results are not dependent on the firm-specific conditions or their economic environment (Kisgen (2006) and Kemper & Rao (2013)).

One criticism of our models can be that we have unnecessarily relaxed the IIA and IID assumptions that can diminish the importance of credit ratings signs influence. Therefore, to further analyse this, we have respecified our model in two different tree structures and conducted the tests with imposing IIA structure[28][1]. The tests with different specifications of choice tress are not reported here because they do not meet the IIA conditions; hence, they make the nested logit model invalid. Whereas the model with IIA assumption also did not concave that indicates the parameters ought to be estimated do not achieve local minima.

[28] The first tree structure defines choice levels as Private Equity, Private Debt, Public sources: Public equity and Public debt. The second tree structure defines choices as Public debt, Private Debt, and Equity: Private Equity and Public Equity. Both results are not reported here; however, we again find contradictory evidence and prefer to stick to our initial findings. Further, the tests with IIA assumptions also suggest no relationship..

## Rating Signs and Financing Choices (Nested Logit with hidden information & Control Variables– Level 2 results)

The table presents the level 2 results for four models. Each model is run with different specification of financing choice. Base choice in Model 1 & 3 is Private and in model 2 & 4 is equity. Public =1 if firms have issued bonds or new shares and private=1 if firms have used private debt or private equity. Debt=1 if firms have issued bonds or used Private debt and equity=1 if firms have issued new shares of used private equity. Plus, or minus dummies indicate if firms' rating has a plus or minus signs. POM dummy indicates either of the plus or minus signs. Dividends =1 if the firm pays dividends. Size = ln(TA), Growth is estimated as growth in growth in total assets, profitability is estimated as $\boldsymbol{EBT\ pluc\ depriciation\ and\ amortisation_{it}/_{TA}}$. Estimates the long-run average cash balance for the sample period of individual firms. The formula for its calculation is **CSH&E/n**. Where n = years in-sample period. Time dummies comprise three periods: pre-crisis, during the crisis, and post-crisis and the base level is pre-crisis.

| | **Model 1** | | **Model 2** | | **Model 3** | | **Model 4** | |
|---|---|---|---|---|---|---|---|---|
| | Public vs Private | exp(b) | Debt vs Equity | exp(b) | Public vs Private | exp(b) | Debt vs Equity | exp(b) |
| Plus | -0.00678 | 0.99324 | -0.00961 | 0.99044 | | | | |
| | (-0.14446) | | (-0.21262) | | | | | |
| Minus | -0.00548 | 0.99453 | -0.01129 | 0.98877 | -0.00613 | 0.99389 | -0.01046 | 0.98960 |
| | (-0.11616) | | (-0.24961) | | (-0.15234) | | (-0.27018) | |
| Research & Development | -0.00046 | 0.99954 | -0.00043 | 0.99957 | -0.00046 | 0.99954 | -0.00043 | 0.99957 |
| | (-0.12020) | | (-0.11602) | | (-0.12002) | | (-0.11659) | |
| Dividend | 0.01832 | 1.01849 | 0.08952** | 1.09365** | 0.01830 | 1.01846 | 0.08956** | 1.09369** |
| | -0.41075 | | -2.10415 | | -0.41025 | | -2.10568 | |
| Forecast Variance | -1.20296* | 0.30030* | -1.59173** | 0.20357** | -1.20229* | 0.30051* | -1.59207** | 0.20350** |
| | (-1.89206) | | (-2.51757) | | (-1.89217) | | (-2.51959) | |
| Size | 0.55679*** | 1.74505*** | 0.34675*** | 1.41447*** | 0.55677*** | 1.74503*** | 0.34675*** | 1.41447*** |
| | -23.06130 | | -15.37158 | | -23.06620 | | -15.37455 | |
| ZPROB | 0.07468*** | 1.07754*** | 0.05042*** | 1.05171*** | 0.07469*** | 1.07755*** | 0.05041*** | 1.05170*** |
| | -3.75168 | | -2.66401 | | -3.75243 | | -2.66322 | |
| Growth | 0.58293*** | 1.79129*** | 0.81498*** | 2.25914*** | 0.58294*** | 1.79129*** | 0.81497*** | 2.25910*** |
| | -8.73456 | | -10.50967 | | -8.73455 | | -10.50973 | |
| Profitability | -0.25916** | 0.77170** | 0.05799 | 1.05970 | -0.25924** | 0.77164** | 0.05803 | 1.05974 |
| | (-2.37732) | | -0.49015 | | (-2.37816) | | -0.49051 | |
| Target Cash | -0.15794*** | 0.85390*** | -0.09027*** | 0.91368*** | -0.15795*** | 0.85389*** | -0.09026*** | 0.91369*** |
| | (-7.83363) | | (-4.68197) | | (-7.83460) | | (-4.68193) | |
| During Crisis | -0.47311*** | 0.62306*** | 1.35797*** | 3.88830*** | -0.47317*** | 0.62302*** | 1.35800*** | 3.88839*** |
| | (-3.75630) | | -10.22410 | | (-3.75688) | | -10.22454 | |
| Post Crisis | -0.84075*** | 0.43139*** | 1.11508*** | 3.04982*** | -0.84081*** | 0.43136*** | 1.11519*** | 3.05014*** |
| | (-6.50424) | | -8.36743 | | (-6.50548) | | -8.36896 | |
| Required RoR | -2.70352*** | 0.06697*** | -0.55006*** | 0.57691*** | -2.70341*** | 0.06698*** | -0.55005*** | 0.57692*** |
| | (-20.61684) | | (-4.38898) | | (-20.62870) | | (-4.38883) | |
| Public tau | 3.37984*** | | | | 3.37969*** | | | |
| Debt tau | | | -6.22932*** | | -6.22932*** | | | |
| Wald Chi2 (Prob) | 1065.98 (0.000) | | 844.03(0.000) | | 1065.98(0.000) | | 843.99(0.000) | |
| Chi | 575.330 | | 786.500 | | 576.290 | | 787.510 | |
| P-Value | 0.00000 | | 0.00000 | | 0.00000 | | 0.00000 | |
| (z-statistics in parentheses) (Model is Run with Year dummies) ( *** p<0.01, ** p<0.05, * p<0.1) | | | | | | | | |

Table 22: Plus, or minus tests with hidden information control variables.

We can conclude that plus and minus may influence firms' choice of debt level, but they are not reliable predictors of firms' financing behaviour under random utility models. Furthermore, we have run these tests using multinominal logit specification to ensure that we did not commit type I or II error. The results confirm the validity of our models presented, and they are presented in table 24. Coefficient signs are similar to those given by the nested logit model, and results confirm that firms with minus signs are less10.02% and 11.2% less likely to issue public debt and public equity. The decrease in likelihood is in comparison to private equity. However, the coefficients are not statistically significant except for the public dent and public equity.

**Rating Signs and Financing Choices (Multinominal Logit Model)**

The table presents Multinominal Nested Logit model test results. The base choice is private equity. Private debt=1 if there is a positive change in bank loan, public debt=1 if the firm has issued bonds each year, public equity is 1 if the firm has issued new equity. Time dummies comprise three periods: pre-crisis, during-crisis, and post-crisis. The base level is pre-crisis.

| | Private Debt | exp(b) | Public Debt | exp(b) | Public Equity | exp(b) |
|---|---|---|---|---|---|---|
| Plus | -0.06541 | 0.93669 | -0.03896 | 0.96179 | -0.11600 | 0.89047 |
| | (-1.13065) | | (-0.69445) | | (-1.58179) | |
| Minus | -0.07299 | 0.92961 | -0.10301* | 0.90212* | -0.12447* | 0.88296* |
| | (-1.26652) | | (-1.82622) | | (-1.70799) | |
| Research and Development | -0.03425*** | 0.96633*** | 0.00252 | 1.00252 | -0.06130*** | 0.94054*** |
| | (-8.01531) | | (0.62719) | | (-10.81353) | |
| Dividend | 0.13140*** | 1.14043*** | 0.53339*** | 1.70471*** | 0.13320** | 1.14248** |
| | (2.62781) | | (10.55565) | | (2.10412) | |
| Forecast Variance | -0.96581 | 0.38068 | 6.01573*** | 409.82584*** | 3.18424*** | 24.14899*** |
| | (-0.92832) | | (7.82157) | | (2.92081) | |
| ZPROB | -0.11368*** | 0.89255*** | -0.06599*** | 0.93614*** | -0.22200*** | 0.80092*** |
| | (-4.78766) | | (-2.88309) | | (-6.75869) | |
| Constant | -18.47296 | 0.00000 | -1.45011*** | 0.23454*** | -1.01834*** | 0.36119*** |
| | (-0.03239) | | (-12.01032) | | (-7.42516) | |
| Pseudo R2 | 0.0397 | LR chi2(75) | 1309.66 | Prob > chi2 | 0.0000 | |
| (z-statistics in parentheses) (Model is Run with Year dummies and time dummies) ( *** p<0.01, ** p<0.05, * p<0.1) | | | | | | |

Table 23: MNLM of Plus, and Minus signs

Therefore, we note that plus and minus do not play an essential part in deciding which securities to issue. Further, we also note that firms in all instances prefer private equity. However, if they need to raise external funds, they may choose public debt before public equity. Given these findings, we fail to find evidence supporting Kisgen (2006)

assertion that credit rating signs determine firms financing preference. Moreover, we also fail to conclude that anticipated rating changes play a significant role in determining the financing preference of firms. Our findings, on the contrary, suggest that firms prefer to absorb the effect of their signs adjustment by establishing a special relationship with their investors.

### 4.3.4. Rating Anchor (RA) tests

Rating Anchor (RA) are construed as yearly lag terms, rating anchor one represents one-year lag, and two represents two-year lag[29]. Each lag rating represents the micro-rating at the start of the previous year, i.e., the rating anchor of 2019 represents micro-rating as of January 2018. The following equations assess the effects of rating anchors:

$$V_{Public\ Vs\ Private} = \beta_j f(RA\ 1) + \beta_j f(RA\ 2) + \beta_j \text{f(Hidden information Variables)} + \in_{it} \quad \ldots\ldots. 1$$

$$V_{Equity\ Vs\ Debt} = \beta_j f(RA1) + \beta_j f(RA2) + \beta_j \text{f(Hidden information Variables)} + \in_{it} \quad \ldots\ldots. 2$$

These two equations test how the rating anchor influences the financing choices of firms. Results are presented in Table 25 to summarise the results for both models. Coefficients on rating anchor 1 are statistically significant at 1% in both models and indicate the existence of a rating anchor. Firms and their investors are highly likely to base their current financial contract on last year credit ratings. The prime argument of this study is that recent historical (i.e., one-year lag) credit ratings are more influential in determining firms financing choices. It is confirmed by the rating anchor one coefficient in both models. Coefficients suggest that the higher the past rating, the more likely firms are to raise capital from public sources than private sources. In model 2, the coefficient suggests that firms with a higher rating in the previous period are more likely to raise capital for debt providers than

[29] We have taken up to five-year lags, but we find no meaningful improvement in the model and do not find these lagged variables to be significant.:

equity sources. This evidence aligns with the conventional wisdom that higher rated firms are more likely to tap public capital markets. The coefficients indicate that firms and management identify recent past ratings as reliable indicators of firms' creditworthiness.

**Rating Anchors and Financing Choices (Nested Logit Models – Level 2 results)**
(Rating anchor with hidden information variables only)

The base choice in Model 1 is Private and in model 2 is equity. Public =1 if firms have issued bonds or new shares and private=1 if firms have used private debt or private equity. Debt=1 if firms have issued bonds or used Private debt and equity=1 if firms have issued new shares of used private equity. Research and development = ln(R&D) spending, dividends =1 if the firm pays dividends, and forecast variance is estimated as the standard deviation of the first difference of EBIT. Time dummies comprise three periods: pre-crisis, during crisis, and post-crisis and the base level is pre-crisis.

| | **Model 1** | | **Model 2** | |
|---|---|---|---|---|
| | Public Vs Private | exp(b) | Equity Vs Debt | exp(b) |
| Rating Anchor 1 | 0.05566*** | 1.05724*** | -0.08008*** | 0.92304*** |
| | -3.1914 | | (-4.91821) | |
| Rating Anchor 2 | 0.0168 | 1.0169 | 0.0094 | 1.0094 |
| | -0.9565 | | -0.5721 | |
| Research and Development | -0.00889*** | 0.99115*** | 0.00661** | 1.00664** |
| | (-2.64766) | | -2.0158 | |
| Dividend | 0.10162** | 1.10696** | -0.0484 | 0.9527 |
| | -2.1473 | | (-1.05585) | |
| Forecast Variance | 4.69012*** | 108.86596*** | -1.93698*** | 0.14414*** |
| | -7.3633 | | (-3.22889) | |
| ZPROB | -0.04196** | 0.95891** | 0.0128 | 1.0128 |
| | (-2.18522) | | -0.7117 | |
| During Crisis | -0.92333*** | 0.39719*** | -0.77045*** | 0.46280*** |
| | (-6.27015) | | (-5.01955) | |
| Post Crisis | -1.16511*** | 0.31189*** | -0.58276*** | 0.55836*** |
| | (-7.80603) | | (-3.79528) | |
| Required RoR | -0.24985*** | 0.77892*** | -0.14227*** | 0.86739*** |
| | (-6.73713) | | (-4.24804) | |
| Public tau | 0.3124 | | | |
| Equity tau | | | 0.3622 | |
| Test of IIA: Chi2 | 101.05 | | | 492.18 |
| P-Value | 0.000 | | | 0.000 |
| | | | | |
| (z-statistics in parentheses) (Model Run with Year dummies) (*** p<0.01, ** p<0.05, * p<0.1) | | | | |

Table 24: Rating Anchors and Financing Choices

We also observe that the coefficient on rating anchor 1 is statistically significant in both models and confirms our hypothesis that recent ratings are more significant in determining financing choices of firms. The coefficient on rating anchor 1 shows that firms whose credit ratings are a unit higher in the previous period than the current rating; are more likely to raise capital from public providers than private capital providers. Beta transformation allows us to conclude that the probability of choosing public capital providers increase by 5.7%, and the coefficient is significant at 1%. In model 2, rating anchor variables are of opposite signs and indicate that a higher rating two years ago would

result in the firm using more debt than equity. The coefficient on rating anchor 1 is statistically significant at 1% alpha and indicates that firms are 7.7% less likely to use equity.

The coefficient on rating anchor 2 is statistically insignificant and show the wrong sign. It confirms our argument that recent lag ratings are the more reliable determinant of financing preferences of firms. These findings endorse our observations in broad rating models where higher broad ratings indicate that firms are more likely to raise public capital providers.

Although signs on coefficients of rating anchor 2 are as expected, we do not find them significant. This insignificance also confirms our hypothesis that firms financing choices are more linked to recent credit ratings than older ratings. One reason for such indifference could be that firms may have already factored in the historical credit ratings in their capital structure decisions. It is also evident that rating anchors variables in models 1 and 2 are significant in the presence of the other indicators of hidden information variables.

Models one and two also identify that firms with higher credit ratings in the last year are more likely to use public bonds. As in model one, they are more likely to use public capital providers, and in model two, they are more likely to use debt. Therefore, public lenders or bondholders should be the most preferred means of financing for these firms. One reason for this preference could be the lower cost of borrowing in bond markets for firms, as Dougal et al. (2015) note that lenders in the public market link premium to the firms' historical credit ratings. Therefore, firms with lower ratings are likely to have lower spreads and a higher inclination towards issuing bonds.

Furthermore, the combined interpretation of model 1 and model 2 suggest that firms are 5.7% more likely to raise capital from public providers and 7.7% less likely to raise capital from equity providers. Therefore, given that the one-year lag rating is higher by one

unit, firms are more likely to raise capital from public lenders than any other type of capital provider. This fact stands valid given all other indicators of hidden information.

In addition to coefficients associated with rating anchors, we note that other indicators of hidden information asymmetry are also a significant determinant of financing choices. We observe an important change in model 1: forecast variance and ZPROB signs are unexpected. The forecast variance signs indicate that firms are more likely to raise capital from public investors if their earnings forecast variance is high. This occurrence contradicts our initial hypothesis; however, Mason (1990) has also noted similar findings. It shows that firms financing choices are highly susceptible to unobservable utilities of firms. Therefore, we can conclude that historical credit ratings play an essential part in determining the firm's financing choices.

Our results are robust in both models as the dissimilarity parameters (tau) associated with each nest adhere to 0 and 1 bound. It validates that the nests used in our models are valid and should identify the correct implication of credit ratings on firms financing choices. We further observe that test of IIA significantly reject the null hypothesis and allow us to conclude that likelihood of selecting an alternative is influenced by the presence and absence of other alternatives.

Although, the results indicate that firms with a higher rating in the last year are likely to prefer public over private and debt over equity. However, they do not specifically identify the likelihood of each choice. To further explore this, we have tested the base alternatives holding the level 2 choices constant, and tests results are presented in Table 26. The equation that tests this relationship is as follows:

$$V_{Private\ Debt\ Vs\ Private\ Equity} = \beta_j f(RA1) + \beta_j f(RA2) + \beta_j \text{f(Hidden information Variables)} + \in_{it} \quad \ldots\ldots \quad 1$$

$$V_{Public\ Debt\ Vs\ Private\ Equity} = \beta_j f(RA1) + \beta_j f(RA2) + \beta_j \text{f(Hidden information Variables)} + \in_{it} \quad \ldots\ldots \quad 2$$

$$V_{Public\ Equity\ Vs\ Private\ Equity} = \beta_j f(RA1) + \beta_j f(RA2) + \beta_j \text{f(Hidden information Variables)} + \epsilon_{it} \quad \ldots\ldots \quad 3$$

**Rating Anchors and Financing Choices (Nested Logit Models – Level 1 results)**

The table presents the results of nested logit model, in which elemental level choices can vary and branch level choices are allowed to vary. The base choice is private equity. private debt=1 if firms have used private debt, public debt =1 if firms have issued bonds, and public equity=1 if firms have issued new shares. Research and development = ln(R&D) spending, dividends =1 if the firm pays dividends, and forecast variance is estimated as the standard deviation of the first difference of EBIT. Time dummies comprise three periods: pre-crisis, during the crisis, and post-crisis and the base level is pre-crisis.

| | Private Debt | exp(b) | Public Debt | exp(b) | Public Equity | exp(b) |
|---|---|---|---|---|---|---|
| Rating Anchor 1 | 0.04587 | 1.04694 | 0.14912*** | 1.16081*** | 0.02177 | 1.02201 |
| | (1.33499) | | (3.72216) | | (0.25387) | |
| Rating Anchor 2 | -0.09005** | 0.91388** | 0.01553 | 1.01565 | -0.05291 | 0.94847 |
| | (-2.51735) | | (0.39278) | | (-0.60479) | |
| Research and Development | -0.09668*** | 0.90785*** | -0.01704** | 0.98310** | -0.20759*** | 0.81254*** |
| | (-7.53382) | | (-1.98132) | | (-7.55360) | |
| Dividend | -0.06033 | 0.94146 | 0.39467*** | 1.48389*** | 0.46207* | 1.58736* |
| | (-0.58993) | | (3.32349) | | (1.79949) | |
| Forecast Variance | -2.69765 | 0.06736 | 6.93962*** | 1,032.38278*** | 7.28631** | 1,460.17369** |
| | (-1.44940) | | (4.88107) | | (1.97696) | |
| ZPROB | -0.37384*** | 0.68808*** | -0.0084 | 0.99163 | -0.81279*** | 0.44362*** |
| | (-6.29405) | | (-0.20422) | | (-6.17627) | |
| During Crisis | 2.22506*** | 9.25401*** | -0.81053** | 0.44462** | 0.28881 | 1.33483 |
| | (5.51801) | | (-2.28683) | | (0.33609) | |
| Post Crisis | 1.96407*** | 7.12827*** | -1.41094*** | 0.24391*** | -0.88757 | 0.41166 |
| | (4.81409) | | (-3.69157) | | (-1.01110) | |
| Required RoR | -1.08031*** | 0.33949*** | | | | |
| | (-5.84290) | | | | | |
| Wald chi 2 (prob) | 563.4 (0.000) | | | | | |
| Test of IIA: Chi2 | 121.57 | | | | | |
| | 0.000 | | | | | |

Table 25: Rating Anchor and Financing Choices

The coefficient on rating anchor one confirms that public debt is the most preferred source of financing for firms. Coefficients on public debt as an alternative to private sources are positive and indicate that firms with a one-unit higher rating are 16.1% more likely to use public debt than private equity. Although the signs on private debt are positive and in line with the previous finding, we do not find the coefficient statistically significant. In comparison, coefficients on private debt and public equity are statistically insignificant. The results are robust such as that test of IIA rejects the possibility of tau equal to one.

We also observe that the coefficient of rating anchor two is statistically significant for private debt versus private equity choice. The coefficient indicates that the likelihood of firms using private debt given a higher rating two years ago will decrease by 9.9%. It further validates our argument that older ratings are not a significant determinant of firms' tendency

to use external sources of capital. Instead, we note that firms are keen on adjusting their capital structure based on recent ratings.

To further confirm whether the models' signs are wrong, we have run multinominal logit tests. Results are presented in table 27 and allow us to conclude that these signs are like signs produced by the nested logit model in table 25 and 26. Apart from the coefficient on forecast variance in the private debt column, all other signs are similar and project similar probabilities. Results extend the findings in table 26 and suggest that firms with a higher rating in the last year are more likely to meet their capital needs from debt sources. The likelihood of firms using private debt and public debt compared to private equity is 6.2% and 12.32% higher, respectively. These probabilities are significant at a 1% alpha level. Furthermore, the coefficients of rating anchor two on private debt is also significant at a 5% alpha level. Coefficient indicates that firms with a higher rating two years ago are 4.7% less likely to use private debt sources for their capital needs.

**Rating Anchor and Financing Choices (Multinominal Logit Model)**

The base choice is private equity. private debt=1 if firms have used private debt, public debt =1 if firms have issued bonds, and public equity=1 if firms have issued new shares. Research and development = ln(R&D) spending, dividends =1 if the firm pays dividends, and forecast variance is estimated as the standard deviation of the first difference of EBIT. Time dummies comprise three periods: pre-crisis, during the crisis, and post-crisis and the base level is pre-crisis.

| | Private Debt | Public Debt | Public Equity |
|---|---|---|---|
| Rating Anchor 1 | 0.06005*** | 0.11624*** | 0.01203 |
| | (2.99299) | (5.21315) | (0.44543) |
| Rating Anchor 2 | -0.04781** | 0.00127 | -0.03006 |
| | (-2.36354) | (0.05695) | (-1.10271) |
| Research and Development | -0.03513*** | -0.00773* | -0.05981*** |
| | (-8.12375) | (-1.88401) | (-10.43058) |
| Dividend | 0.08034 | 0.11991** | 0.19115*** |
| | (1.35547) | (2.02442) | (2.58392) |
| Forecast Variance | -1.16598 | 4.42559*** | 3.04014*** |
| | (-1.14895) | (5.94081) | (2.94155) |
| ZPROB | -0.10853*** | -0.01356 | -0.22860*** |
| | (-4.49495) | (-0.59582) | (-6.85252) |
| During Crisis | 17.9931 | -0.62592*** | 0.32333 |
| | (0.03893) | (-3.42486) | (1.38735) |
| Post Crisis | 17.79748 | -0.94043*** | -0.02488 |
| | (0.03851) | (-5.12171) | (-0.10384) |
| LR chi 2(75) | 1537.26 | | |
| Prob > chi2 | 0.0000 | | |
| Pseudo R2 | 0.0466 | | |

Table 26: Rating Anchor and Financing Choices

The analysis uses only hidden information variables as the control variable to ensure the validity of rating anchors coefficients. However, to ensure that our estimates are not partial explanations of financing behaviour, I have also run tests using all control variables used in the full information model. Results are presented in table 28 and provide a mixed picture. Although we observe that the statistical significance of public versus private choice is dropped; however, rating anchor 1 is still a significant determinant of the debt versus equity choice. We observe that the coefficient is significant at the 1% level and firms with a higher rating in the last year are 4.5% more likely to use debt than equity.

**Rating Anchor and Financing Choices (Nested Logit Model – with control variables)**

The base choice in Model 1 is Private and in model 2 is equity. Public =1 if firms have issued bonds or new shares and private=1 if firms have used private debt or private equity. Debt=1 if firms have issued bonds or used Private debt and equity=1 if firms have issued new shares of used private equity. Research and development = ln(R&D) spending, dividends =1 if the firm pays dividends, and forecast variance is estimated as the standard deviation of the first difference of EBIT. Time dummies comprise three periods: pre-crisis, during the crisis, and post-crisis and the base level is pre-crisis. Size = ln(TA), Growth is estimated as growth in growth in total assets, profitability is estimated as $EBT\ pluc\ depriciation\ and\ amortisation_{it}/_{TA}$. Estimates the long-run average cash balance for the sample period of individual firms. The formula for its calculation is CSH&E/n. Where n = years in-sample period. Time dummies comprise three periods: pre-crisis, during the crisis, and post-crisis and the base level is pre-crisis.

| | **Model 1** | | **Model 2** | |
|---|---|---|---|---|
| | Public vs Private | exp(b) | Debt vs Equity | exp(b) |
| Rating Anchor (1 Year lag) | -0.00306 | 0.99694 | 0.04401*** | 1.04499*** |
| | (-0.16858) | | -2.59198 | |
| Rating Anchor (2 Year lag) | -0.00294 | 0.99706 | -0.02003 | 0.98017 |
| | (-0.16418) | | (-1.19513) | |
| Research & Development | -0.00013 | 0.99987 | -0.00156 | 0.99844 |
| | (-0.03282) | | (-0.42462) | |
| Dividend | 0.03375 | 1.03433 | 0.02413 | 1.02443 |
| | (0.6817) | | (0.5105) | |
| Forecast Variance | -1.21459* | 0.29683* | -1.51293** | 0.22026** |
| | (-1.91057) | | (-2.38929) | |
| Size | 0.56236*** | 1.75480*** | 0.32331*** | 1.38169*** |
| | (22.2585) | | (13.6430) | |
| ZPROB | 0.07308*** | 1.07581*** | 0.05750*** | 1.05919*** |
| | (3.6451) | | (3.0227) | |
| Growth | 0.57942*** | 1.78500*** | 0.83358*** | 2.30155*** |
| | (8.6625) | | (10.7219) | |
| Profitability | -0.24586** | 0.78203** | -0.01784 | 0.98232 |
| | (-2.22190) | | (-0.15609) | |
| Target Cash | -0.15765*** | 0.85415*** | -0.09159*** | 0.91248*** |
| | (-7.82239) | | (-4.75723) | |
| During Crisis | -0.40375** | 0.66781** | 1.07636*** | 2.93399*** |
| | (-2.54061) | | (6.6280) | |
| Post Crisis | -0.77252*** | 0.46185*** | 0.84281*** | 2.32288*** |
| | (-4.80885) | | (5.2045) | |
| Required rate of return | -2.74184*** | 0.06445*** | -0.51076*** | 0.60004*** |
| | (-19.51469) | | (-4.35193) | |
| Public tau | 3.42781*** | | | |
| Debt tau | | | -5.78395*** | |
| Test of IIA: Chi | 498.84 | (0.000) | 645.72 | (0.000) |

Table 27: Rating Anchor and Financing Choices

The inclusion of control variables such as size, profitability, and growth of firms reduced the influence of hidden information variables and resulted in tau greater than one. One reason for their counterintuitive signs and redundant estimates could be that these variables are highly related to financial choices available to firms. For instance, Kisgen (2006) notes that small firms near rating change are more likely to use equity and issue large offerings. Similarly, larger firms are also likely to have higher ratings, and smaller firms are likely to have lower ratings. Therefore, such correlation will likely produce inflating (deflating) effects on cross elasticities.

Nevertheless, results suggest that even after including all the control variables, rating anchor one still significantly affects firms' choice of debt providers. Firms are 4.5% more likely to use debt providers over equity sources that affirms that the rating anchor of firms does indicate that firms are careful when it comes to selecting their capital providers.

### 4.3.5. Realised rating changes

In this section, we will evaluate the impact of realised rating changes on firms financing behaviour. We categorise realised rating changes into three categories: Rating Upgrade (RU), Rating Downgrade (RD), and Rating Upgrade and Downgrade (RUD).

We will test how firms react after receiving an upgrade or downgrade in their micro-credit ratings. These changes are estimated by comparing the current year ratings to the previous year. If the current rating is higher than the previous rating, then it is RU, and if it is lower than last year, it is RD. RUD represents any realised rating change associated with a firm's credit rating. This study argues that firms whose current rating differs from previous years are likely to exhibit concern by adjusting their capital providers composition. It contrasts with the argument of Plus and minus tests (which indicate anticipated rating

changes) proposed by Kisgen (2006), Drobetz and Heller (2014), and Aktan et al. (2019). They note that firms nearing a rating change are less likely to issue debt.

Kisgen (2009, 2012) argues that firms try to inhibit future negative rating changes and or preserve the positive rating changes through adjustments in their capital structure. However, according to Kisgen (2006), this behaviour is in anticipation of rating changes rather than after realising the rating change.

This study argues that if firms exhibit sensitivity to anticipated credit rating changes, they must exhibit similar or even heightened sensitivity to realised rating changes. We also argue that firms concern concerning their rating variance should be more profound when it comes to the choice of capital providers. As they are the prime users of these ratings, their perception of a firm's rating determines their expected risk premium and return firms' securities.

Although our objective in this study is not to falsify previous findings; nevertheless, if our hypothesis is confirmed, we expect rating movements to influence the public versus private choice more profoundly than the choice of securities. We also argue that the impact of rating changes on public versus private choices will be positive. The relationship will be tested using the following equations:

$$V_{Public\ Vs\ Private} = \beta_j f(RU) + \beta_j f(RD) + \beta_j \text{f(Hidden information Variables)} + \epsilon_{it} \quad \ldots\ldots 1$$

$$V_{Equity\ Vs\ Debt} = \beta_j f(RU1) + \beta_j f(RD2) + \beta_j \text{f(Hidden information Variables)} + \epsilon_{it} \quad \ldots\ldots 2$$

$$V_{Public\ Vs\ Private} = \beta_j f(RUD) + \beta_j \text{f(Hidden information Variables)} + \epsilon_{it} \quad \ldots\ldots 3$$

$$V_{Equity\ Vs\ Debt} = \beta_j f(RUD) + \beta_j \text{f(Hidden information Variables)} + \epsilon_{it} \quad \ldots\ldots 4$$

The first two equations would test the impact of rating upgrade and rating downgrade dummies on financing choice in the presence of other hidden information indicators. The latter two equations would assess the impact of firms rating movement irrespective of their

direction on financing choices in the presence of hidden information indicators. Tests results of all four models are presented in table 29. Model one and two tests the first two equations and confirms our hypothesis.

First, signs associated with rating upgrade and downgrade coefficients are as we expected in model one. Positive signs with coefficients mean that firms subject to rating upgrades or downgrades are more likely to raise public capital providers. As per our estimates, the probability of firms whose rating increased in the current period is 29.05% more likely to raise capital from public capital providers compared to other firms. The estimated coefficient is significant at 5% alpha, and our results are valid even if we do one-sided t-tests. The estimated coefficient on rating downgrade indicates that firms whose rating is downgraded in the current period are 32.35% more likely to use public capital providers. This estimate is also significant 1% level and endorses our hypothesis that change in credit ratings compel firms to adjust their capital provider mix.

One may question the uniformity of responses by firms as our results suggest that firms in both circumstances (i.e., upgrade and downgrade) are likely to tap public markets. Ostensibly, this seems strange; however, we counter this by arguing that in both circumstances, the firm is trying to achieve multiple distinct objectives using the same means for the reasons as follows:

1. In case of an upgrade, firms are trying to benefit from the lower costs of borrowing from public sources, especially by issuing the new bond and benefit from the increased creditworthiness.
2. In case of a downgrade, firms are trying to test the market perception about their rating downgrade and signal investors that management is confident about its future cash flows.

3. Similarly, firms may also consider issuing new shares after a downgrade to raise additional capital or exhibit managers' trust in the firms' future.

Although gathering evidence for such hypothetical assertions is not accessible yet, we argue that these reasons are as plausible as the reasons given by credit ratings and capital structure hypothesis proponents.

**Realised rating changes and Financing Choices (Nested Logit Model – Level 2 Results)**
(With hidden information variables only)

The base choice in Models 1 & 3 is Private and in models 2 & 4 is equity. Public =1 if firms have issued bonds or new shares and private=1 if firms have used private debt or private equity. Debt=1 if firms have issued bonds or used Private debt and equity=1 if firms have issued new shares of used private equity. Rating Upgrade =1 if the current rating has increased otherwise 0. Rating Downgrade =1 if the current rating has decreased otherwise 0. Research and development = ln(R&D) spending, dividends =1 if the firm pays dividends, and forecast variance is estimated as the standard deviation of the first difference of EBIT. Time dummies comprise three periods: pre-crisis, during the crisis, and post-crisis and the base level is pre-crisis.

| | **Model 1** | | **Model 2** | | **Model 3** | | **Model 4** | |
|---|---|---|---|---|---|---|---|---|
| | Public Vs Private | Exp(b) | Equity Vs Debt | Exp(b) | Public Vs Private | Exp(b) | Equity Vs Debt | Exp(b) |
| Rating Upgrade | 0.25501** | 1.29048** | -0.14295 | 0.86679 | | | | |
| | (2.2280) | | (-1.27731) | | | | | |
| Rating Downgrade | 0.2803*** | 1.3235*** | -0.00177 | 0.99823 | | | | |
| | (4.8723) | | (-0.03128) | | | | | |
| RUD | | | | | 0.2721*** | 1.31271*** | 0.00278 | 1.00278 |
| | | | | | (4.7406) | | (0.0493) | |
| Research and Development | -0.0027 | 0.99731 | 0.00076 | 1.00076 | -0.00269 | 0.99731 | 0.00076 | 1.00076 |
| | (-0.81797) | | (0.2350) | | (-0.81660) | | (0.2355) | |
| Dividend | 0.365*** | 1.4399*** | -0.307*** | 0.7355*** | 0.3595*** | 1.43257*** | -0.304*** | 0.7376** |
| | (9.0134) | | (-7.91608) | | (8.9057) | | (-7.85708) | |
| Forecast Variance | 5.6512*** | 284.62*** | -2.952*** | 0.0522*** | 5.6793*** | 292.753*** | -2.968*** | 0.0514*** |
| | (8.6784) | | (-4.81714) | | (8.7215) | | (-4.84384) | |
| ZPROB | -0.071*** | 0.9311*** | 0.04403** | 1.04501** | -0.070*** | 0.93246*** | 0.04328** | 1.04423** |
| | (-3.73451) | | (2.4687) | | (-3.66590) | | (2.4297) | |
| During Crisis | -0.10265 | 0.90244 | -1.596*** | 0.2027*** | -0.08978 | 0.91413 | -1.603*** | 0.2013*** |
| | (-0.85369) | | (-12.2582) | | (-0.74771) | | (-12.3218) | |
| Post Crisis | -0.354*** | 0.7019*** | -1.407*** | 0.2449*** | -0.346*** | 0.70752*** | -1.411*** | 0.2439*** |
| | (-2.8877) | | (-10.821) | | (-2.82479) | | (-10.8554) | |
| Required RoR | -0.306*** | 0.7362*** | -0.156*** | 0.855*** | -0.306*** | 0.73656*** | -0.156*** | 0.8554*** |
| | (-8.20566) | | (-4.28490) | | (-8.19641) | | (-4.28460) | |
| Public tau | 0.3828 | | | | 0.3822 | | | |
| Private tau | 0.6561 | | | | 0.6551 | | | |
| Debt tau | | | -1.7695 | | | | -1.7685 | |
| Equity tau | | | 0.3979 | | | | 0.3976 | |
| chi 2 | 88.51 | | 536.65 | | 88.61 | | 536.43 | |
| Prob | 0.000 | | 0.000 | | 0.000 | | 0.000 | |
| Wald Chi 2(26) | 633.21 | | 444.12 | | 629.51 | | 442.62 | |
| | 0.000 | | 0.000 | | 0.000 | | 0.000 | |

Table 28: Realised rating changes and Financing Choices

Model two tests the impact of rating movements on firms' preferences between equity and debt sources. We find that firms are more likely to use debt sources after receiving an upgrade or downgrade; this is in contradiction to the anticipated rating changes

hypothesis (Kisgen (2006) and Drobetz and Heller (2014)). Moreover, the coefficients are not statistically significant, in line with our expectations. As we argued before, realised changes are more likely to manifest themselves via the change in capital providers of firms instead of securities issued by firms.

Model three and four replicate models one and two. They test the expected influence of the RUD variable on firms' financing choices. We note that firms whose micro ratings have changed in the current year are likely to use public capital providers. The estimated coefficient sign is positive and significant at 1% alpha. It indicates that for the firms whose rating has changed in the current period, their probability of raising capital from public sources will increase by 31.27%.

In contrast, we do not find RUD coefficients significant in model four, and the signs are not as expected. It indicates that role of RUD is not reliable in predicting the choice between debt and equity.

All our estimates are robust, and the dissimilarity parameters (tau) adhere to 0, and 1 bound and allow us to conclude that the nests' structures are valid and as per our modelling expectations. To further ensure the robustness of our estimates and see if the rating movements are reliable determinants of financing choices. We have included firms' specific control variables such as size and profitability, among other things. The tests are conducted using the following four equations:

$$V_{Debt\ Vs\ Equity} = \beta_j f(RU) + \beta_k f(RD) + \beta_l f(Hidden\ information\ Variables) + \beta_m f(Control\ Variables) + \epsilon_{it} \quad \ldots\ldots\ldots 5$$

$$V_{Public\ vs\ Private} = \beta_j f(RU) + \beta_k f(RD) + \beta_l f(Hidden\ information\ Variables) + \beta_m f(Control\ Variables) + \epsilon_{it} \quad \ldots\ldots 6$$

$$V_{Debt\ Vs\ Equity} = \beta_j f(RUD) + \beta_l f(Hidden\ information\ Variables) + \beta_m f(Control\ Variables) + \epsilon_{it} \quad \ldots\ldots\ldots 7$$

$$V_{Public\ vs\ Private} = \beta_j f(RUD) + \beta_l f(Hidden\ information\ Variables) + \beta_m f(Control\ Variables) + \epsilon_{it} \quad \ldots\ldots 8$$

**Realised rating changes and Financing Choices (Nested Logit Model – Level 2 Results)**

(With hidden information and control variables)

The base choice in Models 1 & 3 is Private and in models 2 & 4 is equity. Public =1 if firms have issued bonds or new shares and private=1 if firms have used private debt or private equity. Debt=1 if firms have issued bonds or used Private debt and equity=1 if firms have issued new shares of used private equity. Rating Upgrade =1 if the current rating has increased otherwise 0. Rating Downgrade =1 if the current rating has decreased otherwise 0. Research and development = ln(R&D) spending, dividends =1 if the firm pays dividends, and forecast variance is estimated as the standard deviation of the first difference of EBIT. Time dummies comprise three periods: pre-crisis, during the crisis, and post-crisis and the base level is pre-crisis. Size = ln(TA), Growth is estimated as growth in growth in total assets, profitability is estimated as $EBT\ pluc\ depriciation\ and\ amortisation_{it}/_{TA}$. Estimates the long-run average cash balance for the sample period of individual firms. The formula for its calculation is CSH&E/n. Where n = years in-sample period. Time dummies comprise three periods: pre-crisis, during the crisis, and post-crisis and the base level is pre-crisis.

| | **Model 1** | | **Model 2** | | **Model 3** | | **Model 4** | |
|---|---|---|---|---|---|---|---|---|
| | Public vs Private | exp(b) | Debt vs Equity | exp(b) | Public vs Private | exp(b) | Debt vs Equity | exp(b) |
| Rating Upgrade (RU) | 0.21492* | 1.23976* | 0.09202 | 1.09639 | | | | |
| | (1.82452) | | (0.80859) | | | | | |
| Rating Downgrade (RD) | 0.2662*** | 1.305*** | 0.01741 | 1.01756 | | | | |
| | (4.44849) | | (0.29842) | | | | | |
| RUD | | | | | 0.259*** | 1.2961*** | 0.01445 | 1.01455 |
| | | | | | (4.34060) | | (0.24820) | |
| Research & Development | -0.00025 | 0.99975 | -0.00034 | 0.99966 | -0.0003 | 0.9997 | -0.00035 | 0.99965 |
| | (-0.06519) | | (-0.09223) | | (-0.07905) | | (-0.09693) | |
| Dividend | 0.02922 | 1.02965 | 0.09196** | 1.09632** | 0.02463 | 1.02493 | 0.09007** | 1.09425** |
| | (0.65341) | | (2.15833) | | (0.55166) | | (2.11720) | |
| Forecast Variance | -1.27923** | 0.2783** | -1.5994** | 0.20201** | -1.26754** | 0.28152** | -1.5957** | 0.20276** |
| | (-2.01129) | | (-2.53086) | | (-1.99334) | | (-2.52500) | |
| Size | 0.5549*** | 1.742*** | 0.347*** | 1.415*** | 0.5547*** | 1.7414*** | 0.3470*** | 1.4147*** |
| | (22.98596) | | (15.3965) | | (22.98777) | | (15.4019) | |
| ZPROB | 0.0749*** | 1.078*** | 0.0502*** | 1.0515*** | 0.0759** | 1.0789*** | 0.0507*** | 1.0520*** |
| | (3.75987) | | (2.65221) | | (3.81626) | | (2.68140) | |
| Growth | 0.5964*** | 1.816*** | 0.8152*** | 2.2597*** | 0.5982*** | 1.8189*** | 0.8161*** | 2.2616*** |
| | (8.86791) | | (10.4881) | | (8.88835) | | (10.4995) | |
| Profitability | -0.21328* | 0.80793* | 0.0617 | 1.06364 | -0.21448* | 0.80696* | 0.06081 | 1.0627 |
| | (-1.94400) | | (0.51669) | | (-1.95569) | | (0.50962) | |
| Target Cash | -0.1587*** | 0.853*** | -0.091*** | 0.9133*** | -0.1581*** | 0.8534*** | -0.091*** | 0.9135*** |
| | (-7.86327) | | (-4.70731) | | (-7.83779) | | (-4.69773) | |
| During Crisis | -0.5077*** | 0.6020*** | 1.3522*** | 3.8659*** | -0.4965*** | 0.6087*** | 1.3567*** | 3.8835*** |
| | (-4.02062) | | (10.1639) | | (-3.93716) | | (10.2076) | |
| Post Crisis | -0.8830*** | 0.414*** | 1.1106*** | 3.0362*** | -0.8757*** | 0.4166*** | 1.1132*** | 3.0441*** |
| | (-6.80852) | | (8.31923) | | (-6.75719) | | (8.34148) | |
| Required RoR | -2.694*** | 0.068*** | -0.551*** | 0.577*** | -2.6948*** | 0.0676*** | -0.551*** | 0.5765*** |
| | (-20.7075) | | (-4.39156) | | (-20.7165) | | (-4.39155) | |
| Public tau | 3.36786 | | | | 3.3691*** | | | |
| Private tau | 5.77147 | | | | 5.7732*** | | | |
| Debt tau | | | -6.2348 | | | | -6.23827 | |
| Equity tau | | | 1.40178 | | | | 1.40253 | |
| Test of IIA: Chi | 582.2 | | 798 | | 583.08 | | 799.74 | |
| Prob | 0.000 | | 0.000 | | 0.000 | | 0.000 | |
| Wald Chi 2(26) | 1080.34 | | 844.43 | | 1078.52 | | 843.87 | |
| Prob | 0.000 | | 0.000 | | 0.000 | | 0.000 | |

Table 29: Realised rating changes and Financing Choices

Table 30 summarise the four models based on these equations and confirms our findings that realised rating movements are more robust and statistically significant determinants of firms' choice of capital providers. Although the statistical significance of RU coefficients declines from 5% to 10% and increment to probability reduces by 5.1%, yet the estimates remain valid and as hypothesised. Coefficients on RD are still significant at

the 1% alpha level, and the likelihood only decreases by 1.5%. Therefore, a downgrade in rating can be treated as a more serious event with important implications for firms' financing choices. One noticeable variation we find is that forecast variance changes its signs from positive to negative, which shows the earning variance is not an as robust estimate of hidden information as dividends and research and development are.

Coefficient signs of RU and RD associated with debt versus equity choice are not statistically significant. These coefficients are not significant, but the signs indicate that firms prefer debt over equity given an upgrade or downgrade. We have noted that RU and RD indicate that firms strongly prefer the public over the private. The combined interpretations indirectly mean that firms are simultaneously inclined to use public sources (i.e., new shares or bonds) and debt sources (i.e., bonds and private debt).

It is worth further investigating that if firms prefer public sources of capital, then which type of public source is more preferred. Would firms prefer public equity or public bonds, and do the effects of rating movements remain the same as noted above? It will also allow us to conclude which source of debt is preferred when using debt and which source of equity is preferred when using equity. In line with our findings, we expect to find significant coefficients for public financing (issuing new shares and bonds) and insignificant results for private debt. We will test this by holding constant the limb level (level 2) and allowing the utilities to vary for alternatives at the base level. Utilities will be estimated using the following equations:

$$V_{Private\ Debt\ Vs\ Private\ Equity} = \beta_j f(RU) + \beta_j f(RD) + \beta_j \text{f(Hidden information Variables)} + \in_{it} \quad \ldots\ldots \quad 9$$

$$V_{Public\ Debt\ Vs\ Private\ Equity} = \beta_j f(RU) + \beta_j f(RD) + \beta_j \text{f(Hidden information Variables)} + \in_{it} \quad \ldots\ldots \quad 10$$

$$V_{Public\ Equity\ Vs\ Private\ Equity} = \beta_j f(RU) + \beta_j f(RD) + \beta_j \text{f(Hidden information Variables)} + \in_{it} \quad \ldots\ldots \quad 11$$

**Realised rating changes and Financing Choices (Nested Logit Model – Level 1 Results)**

(With hidden information only)

**Panel A**

The table presents the results of nested logit model, in which level 2 alternatives are held constant and elemental alternative are allowed to vary. The base choice in Models 1 & 3 is Private and in models 2 & 4 is equity. Public =1 if firms have issued bonds or new shares and private=1 if firms have used private debt or private equity. Debt=1 if firms have issued bonds or used Private debt and equity=1 if firms have issued new shares of used private equity. Rating Upgrade =1 if the current rating has increased otherwise 0. Rating Downgrade =1 if the current rating has decreased otherwise 0. RUD =1 if the firm rating has increased or decreased in the current year otherwise 0. Research and development = ln(R&D) spending, dividends =1 if the firm pays dividends, and forecast variance is estimated as the standard deviation of the first difference of EBIT. Time dummies comprise three periods: pre-crisis, during the crisis, and post-crisis and the base level is pre-crisis.

| | Private Debt | exp(b) | Public Debt | exp(b) | Public Equity | exp(b) |
|---|---|---|---|---|---|---|
| Rating Upgrade | -0.01688 | 0.98326 | 0.53197** | 1.70229** | 0.47889 | 1.61429 |
| | (-0.06485) | | (2.15998) | | (0.73036) | |
| Rating Downgrade | -0.17713 | 0.83767 | 0.52509*** | 1.69061*** | 0.72782** | 2.07056** |
| | (-1.21492) | | (3.79390) | | (2.35771) | |
| Research and Development | -0.09737*** | 0.90722*** | -0.00381 | 0.99620 | -0.20515*** | 0.81453*** |
| | (-7.06639) | | (-0.40622) | | (-8.06516) | |
| Dividend | -0.15639 | 0.85523 | 0.98788*** | 2.68554*** | 0.45997** | 1.58403** |
| | (-1.37672) | | (6.94170) | | (2.07304) | |
| Forecast Variance | -0.91728 | 0.39961 | 10.23496*** | 27,860.317*** | 12.20508*** | 199801.766*** |
| | (-0.48731) | | (5.69791) | | (3.10765) | |
| ZPROB | -0.33389*** | 0.71613*** | -0.09884** | 0.90589** | -0.78474*** | 0.45624*** |
| | (-6.63132) | | (-2.45872) | | (-6.16864) | |
| During Crisis | 1.85483*** | 6.39062*** | 0.97275*** | 2.64522*** | -0.21967 | 0.80278 |
| | (7.48536) | | (3.80471) | | (-0.31847) | |
| Post Crisis | 1.58985*** | 4.90301*** | 0.37031 | 1.44819 | -1.35556* | 0.25780* |
| | (6.34278) | | (1.37657) | | (-1.85958) | |
| Required RoR | -1.12971*** | 0.32313*** | | | | |
| | (-5.84467) | | | | | |
| Wald Chi 2(26) | 448.46 (0.000) | | | | | |

**Panel B**

| | Private Debt | exp(b) | Public Debt | exp(b) | Public Equity | exp(b) |
|---|---|---|---|---|---|---|
| RUD | -0.18311 | 0.83268 | 0.51363*** | 1.67134*** | 0.71267** | 2.03943** |
| | (-1.24497) | | -3.70225 | | -2.29811 | |
| Research and Development | -0.09859*** | 0.90612*** | -0.00315 | 0.99686 | -0.20638*** | 0.81353*** |
| | (-7.03978) | | (-0.33151) | | (-8.03544) | |
| Dividend | -0.16786 | 0.84547 | 0.98881*** | 2.68803*** | 0.44952** | 1.56757** |
| | (-1.45330) | | -6.89246 | | -2.02248 | |
| Forecast Variance | -1.02232 | 0.35976 | 10.30501*** | 29,881.80583*** | 12.20501*** | 199787.85704*** |
| | (-0.53864) | | -5.70159 | | -3.07091 | |
| ZPROB | -0.33832*** | 0.71297*** | -0.09443** | 0.90989** | -0.78927*** | 0.45418*** |
| | (-6.59206) | | (-2.33718) | | (-6.15296) | |
| During Crisis | 1.86542*** | 6.45862*** | 0.99614*** | 2.70780*** | -0.18921 | 0.82762 |
| | -7.48981 | | -3.87549 | | (-0.27213) | |
| Post Crisis | 1.60634*** | 4.98455*** | 0.37713 | 1.45809 | -1.33274* | 0.26375* |
| | -6.34555 | | -1.39078 | | (-1.81448) | |
| Required RoR | -1.14506*** | 0.31821*** | | | | |
| | (-5.86941) | | | | | |
| Wald Chi2 (prob) | 447.91 (0.000) | | | | | |

Table 30: Realised rating changes and Financing Choices

The results are summarised in table 31 and highlight two important aspects here. Firstly, realised rating changes are not a significant determinant of private debt as a source of capital. Coefficients on rating upgrade and downgrade in panel A and RUD in panel B are statistically insignificant for private debt. Therefore, it can be concluded that firms are

more likely to adjust their public means of financing after having a change in their credit rating. It is also in line with our argument in the rating anchor case that firms attempt to ensure that public investors are not overly sensitive to the changes in credit ratings. Further, this also allows firms to relay any hidden information that is not captured by the firms' credit ratings.

In contrast, the coefficients of rating upgrade and downgrade associated with public debt are significant at 5% and 10% alpha levels, respectively, and the signs on these coefficients are as expected. Beta estimates indicate that the probability of a firm using public debt increases by 70.23%, given a rating upgrade. Similarly, we also note that firms whose current credit rating downgrades are 69.06% more likely to use public debt.

We do not observe the coefficient on rating upgrade significant for the public equity that is in line with the established theory that firms with higher credit rating prefer public debt in most cases (Diamond, 1985). However, the coefficients on rating downgrade are statistically significant and indicate that firms are 1.07 times more likely to issue new shares after receiving a downgrade. It could indicate that such firms expect lenders to extract undue rent by demanding a higher rate of return. Another aspect is that these firms aim to strengthen their capital reserve or use that money to pay off their outstanding debt. It can help firms enhance their financial strengths and reverse the downgrade.

Panel b confirms our findings as coefficients on RUD are significant for public debt and public equity at 1% and 5% alpha, respectively. Firms for which RUD equals one are 67% more likely to raise public debt and 1.04 times more likely to issue new shares. Our results indicate bizarre implications of forecast variance on the likelihood of issuing bonds or new shares. The coefficient magnitude is too high but statistically significant; hence I have reported it here. I have run the model without including forecast variance, and the results are still the same, and robustness is not affected.

### 4.3.6. Firms' classification tests

This section tests the implications of firms' classification on firms financing choices. Dasilas and Papasyriopoulos (2015) note that firms debt ratios are positively related to firms' classification. In other words, firms who are on a higher classification level are more likely to use debt or issue bonds and vice versa. In addition to being a determinant of the debt ratio, we argue that firms' classification ought to play an important role in firms' choice of their capital providers. Our hypothesis is a lateral perspective of Dasilas and Papasyriopoulos (2015) arguments.

Our data and previous tests highlight that firms with higher credit ratings are more likely to use public capital providers (i.e., bondholders and private debt) due to the lower premium they need to pay. Similarly, we argue that highly rated firms may have very well-established relationships with private lenders such as banks; hence, we expect them to use more private debt. Therefore, a firm with higher credit ratings will prefer public capital providers (especially bonds holders) over private. In addition, their combined preference for private debt and public debt should indicate that they also prefer lenders over shareholders. To test the relationship, we are going to use four equations which are as follows:

$$V_{Public\ Vs\ Private} = \beta_j f(Firm\ Classification) + \beta_j f(\text{Hidden information Variables}) + \epsilon_{it} \quad \ldots\ldots. 1$$

$$V_{Equity\ Vs\ Debt} = \beta_j f(Firm\ Classification) + \beta_j f(\text{Hidden information Variables}) + \epsilon_{it} \quad \ldots\ldots. 2$$

Table 32 summarise the results for the first two equations and confirms our hypothesis. First, we observe that firm classification is a significant indicator of hidden information in the presence of other hidden information proxies. In both models, coefficients are significant at a 1% alpha level and suggest that firms' creditworthiness influences the choice of the capital provider.

**Firm Classification and Financing Choices (Nested Logit Model – Level 2 results)**

(With hidden information variables only)

The base choice in Model 1 is Private and in model 2 is debt. Public =1 if firms have issued bonds or new shares and private=1 if firms have used private debt or private equity. Debt=1 if firms have issued bonds or used Private debt and equity=1 if firms have issued new shares of used private equity. Firm classification is defined as 4= healthy companies, 3=balanced companies, 2=vulnerable companies, and 1= risky companies. Research and development = ln(R&D) spending, dividends =1 if the firm pays dividends, and forecast variance is estimated as the standard deviation of the first difference of EBIT. Time dummies comprise three periods: pre-crisis, during the crisis, and post-crisis and the base level is pre-crisis.

| | **Model 1** | | **Model 2** | |
|---|---|---|---|---|
| | Public | exp(b) | Equity | exp(b) |
| Firm Classification | 0.25047*** | 1.28463*** | -0.32374*** | 0.72344*** |
| | (7.22211) | | (-9.54378) | |
| Research and Development | -0.00691** | 0.99311** | 0.00574* | 1.00575* |
| | (-2.06574) | | (1.75476) | |
| Dividend | 0.20102*** | 1.22265*** | -0.10873** | 0.89698** |
| | (4.43052) | | (-2.47966) | |
| Forecast Variance | 5.19038*** | 179.53644*** | -2.21094*** | 0.10960*** |
| | (8.07405) | | (-3.67529) | |
| ZPROB | -0.05816*** | 0.94350*** | 0.02312 | 1.02339 |
| | (-3.02847) | | (1.29286) | |
| During Crisis | -0.00422 | 0.99578 | -1.69527*** | 0.18355*** |
| | (-0.03506) | | (-12.95618) | |
| Post Crisis | -0.23500* | 0.79057* | -1.51879*** | 0.21898*** |
| | (-1.91282) | | (-11.61542) | |
| Required RoR | -0.57282*** | 0.56393*** | -0.24680*** | 0.78129*** |
| | (-10.40941) | | (-4.33737) | |
| Public tau | 0.71611 | | | |
| Equity tau | | | 0.62835 | |
| Wald Chi2 (prob) | 502.43 (0.000) | | | |
| Test of IIA: Chi 2 | 78.49 | | 525.76 (0.000) | |
| Prob | 0.000 | | 614.60(0.000) | |

Table 31: Firm Classification and Financing Choices

The coefficient on firm classification in model one has a positive sign, and it indicates that firms with higher classification are 28.46% more likely to raise capital from public sources of capital. On the contrary, in model two, the coefficient has a negative sign that indicates a lack of preference of equity sources as firms' classification increases. The results are significant at the 1% level, and it indicates that with one level increase in firm classification, the likelihood of firms using equity (debt) is going to decrease (increase) by 27.66% (38.82%)[30]. Combined, both results suggest that firms with higher credit quality prefer more debt because of the sources from which they can raise their capital.

In addition to these two coefficients, we note that the coefficients on research and development and dividends align with our previous findings. Coefficients on R&D indicates that firms are 1% less likely to use public sources of capital and 0.5% less likely to use debt. Both coefficients' signs are as expected and are in line without previous findings. Similarly,

[30] Estimated using another model, in which equity is treated as a base alternative.:

coefficients on dividend in both variables are statistically significant, and their signs are as expected. It indicates that dividends paying firms are 22.27% more likely to use public sources. Whereas the odds of using equity (debt) for the dividends paying firms are going to decrease (increase) by 10.30 (11.49%).

It is noteworthy that signs on forecast variance and ZPROB are mixed and counterintuitive. The dissimilarity parameters in both models adhere to 0 and 1 bound. Although both coefficients are significant, their signs variation requires us to further investigate our results' robustness.

One of the main concerns concerning the robustness of our result is the way firm classifications are designed. Firms' classification is primarily an amalgamation of different credit rating groups. For instance, a healthy firm (indicated by 4) comprises firms with ratings AAA, AA+, AA, AA-, A+, A, and A-.

There is no universal benchmark that can determine the inclusion or exclusion of ratings from a given group. Previously, we observed significant heterogeneity in firms' choices of private debt, public debt, private equity, and public equity. Further, the graphs and table indicate that firms do not exhibit a linear trend in their choice of financial sources. Therefore, we will run the tests using firm classification as a set of indicator variables. The following two equations represents the model that will test the impact of firm classification on the choice of capital providers. The firm classification variable is coded as four distinct dummy variables. Each variable will be coded as 1 if belongs to the given class. For instance, healthy firm variable will be equal to 1 if the firm belongs to the rating groups AAA, AA+, AA, AA-, A+, A, and A-.

$$V_{Public\ Vs\ Private} = \beta_j f(i.Firm\ Classification) + \beta_j f(\text{Hidden information Variables}) + \epsilon_{it} \quad \ldots\ldots 3$$

$$V_{Equity\ Vs\ Debt} = \beta_j f(i.Firm\ Classification) + \beta_j f(\text{Hidden information Variables}) + \epsilon_{it} \quad \ldots\ldots 4$$

**Firm Classification and Financing Choices (Nested Logit Model- Level 2)**

(With hidden information variables only)

The base choice in Model 1 is Private and in model 2 is debt. Public =1 if firms have issued bonds or new shares and private=1 if firms have used private debt or private equity. Debt=1 if firms have issued bonds or used Private debt and equity=1 if firms have issued new shares of used private equity. Vulnerable, balanced, and healthy firms are indicator variables that are equal to one if a firm belongs to that group.

Research and development = ln(R&D) spending, dividends =1 if the firm pays dividends, and forecast variance is estimated as the standard deviation of the first difference of EBIT. Time dummies comprise three periods: pre-crisis, during the crisis, and post-crisis and the base level is pre-crisis.

| | **Model 1** | | **Model 2** | |
|---|---|---|---|---|
| | Public | Exp(b) | Equity | Equity |
| Risky firms (as the base) | | | | |
| Vulnerable | 0.10338 | 1.10891 | 0.30707 | 1.35943 |
| | (0.33617) | | (1.10632) | |
| Balanced | 0.26830 | 1.30774 | -0.00209 | 0.99791 |
| | (0.87487) | | (-0.00754) | |
| Healthy | 0.59862* | 1.81961* | -0.36947 | 0.69110 |
| | (1.92920) | | (-1.31478) | |
| Research & Development | -0.00789** | 0.99214** | 0.00619* | 1.00621* |
| | (-2.33668) | | (1.87456) | |
| Dividend | 0.21170*** | 1.23578*** | -0.11031** | 0.89556** |
| | (4.62504) | | (-2.49916) | |
| Forecast Variance | 5.09740*** | 163.59627*** | -2.13580*** | 0.11815*** |
| | (7.92170) | | (-3.54571) | |
| ZPROB | -0.06122*** | 0.94062*** | 0.02414 | 1.02443 |
| | (-3.17821) | | (1.34416) | |
| Pre-crisis (as the base) | | | | |
| During Crisis | 0.00428 | 1.00429 | -1.70153*** | 0.18240*** |
| | (0.03547) | | (-12.98739) | |
| Post Crisis | -0.22414* | 0.79921* | -1.52212*** | 0.21825*** |
| | (-1.82175) | | (-11.62243) | |
| Required RoR | -0.40007*** | 0.67027*** | -0.15184*** | 0.85913*** |
| | (-3.22517) | | (-3.38651) | |
| Public tau | 0.5000 | | | |
| Equity tau | | | 0.3866 | |
| Test of IIA: Chi2 | 74.10 (0.000) | | 338.20(0.000) | |
| Wald Chi2 | 585.67 (0.000) | | 530.58 (0.000) | |

Table 32: Firm Classification and Financing Choices

Table 33 summarise the results for these two equations and does indicate that these groups individually are a weak predictor of firms financing choices. Nonetheless, signs associated with these coefficients are still in line with our previous findings. Moreover, using public means is the preferred option for healthy firms. The likelihood of healthy firms to use public capital providers is 82.96% higher than risky firms. It is significant at the 10% level. It is also visible that firms' likelihood to use public sources of capital increases as we move from risky to vulnerable, to balanced and to healthy firms—the likelihood increases by 10.91%, 30.77%, and 82.96%, respectively.

In model two, the coefficients' signs confirm our finding in table 32; however, the coefficients on the indicators of firm classification are not statistically significant. Moreover, the coefficient on vulnerable firms is also positive. This suggests that these firms struggle to raise capital from debt providers and are more likely to use equity investors.

Although, firm classification shows that it is a significant indicator of firms' choice of capital provider. Nonetheless, the decline in statistical significance and emergence of a non-linear pattern in table 33 merits further investigation into the significance and direction of firm classifications as a determinant of financing choices. Therefore, we will run two more models that would include control variables. The following equations are going to test this relationship:

$$V_{Public\ Vs\ Private} = \beta_j f(Firm\ Classification) + \beta_j f(\text{Hidden information Variables}) + \beta_m f(Control\ Variables) + \in_{it} \quad \ldots. 5$$

$$V_{Equity\ Vs\ Debt} = \beta_j f(Firm\ Classification) + \beta_j f(\text{Hidden information Variables}) + \beta_m f(Control\ Variables) + \in_{it} \quad \ldots. 6$$

Results of these two models are summarised in table 34, and they confirm our concern concerning the validity of firm classification as a reliable predictor of the financing choice. Especially, the change of sign of coefficient in model one suggests that the likelihood of firms raising capital from public sources will decrease by 7.28%, and the probability is significant at the 10% alpha level. However, the coefficient on firms' classification retains its sign and suggest that firms are still more likely to source their capital from debt providers. Therefore, a combined interpretation of results suggests that the influence of firms' classification on financing choices is highly dependent on firm-specific conditions. For instance, model 1 in table 34 can be interpreted as that as firms credit quality

increase and their R&D spending increases; they are more likely to use private capital providers, Ceteris Paribas.

**Firm Classification and Financing Choices (Nested Logit Model- Level 2)**
(With hidden information and control variables)

The base choice in Model 1 is Private and in model 2 is debt. Public =1 if firms have issued bonds or new shares and private=1 if firms have used private debt or private equity. Debt=1 if firms have issued bonds or used Private debt and equity=1 if firms have issued new shares of used private equity. Firm classification is defined as 4= healthy companies, 3=balanced companies, 2=vulnerable companies, and 1= risky companies. Research and development = ln(R&D) spending, dividends =1 if the firm pays dividends, and forecast variance is estimated as the standard deviation of the first difference of EBIT. Time dummies comprise three periods: pre-crisis, during the crisis, and post-crisis and the base level is pre-crisis.

| | **Model 1** | | **Model 2** | |
|---|---|---|---|---|
| | Public | exp(b) | Equity | exp(b) |
| Firm Classification | -0.07567* | 0.92712* | -0.12676*** | 0.88094*** |
| | (-1.93235) | | (-3.37075) | |
| Research and Development | 0.00032 | 1.00032 | 0.00148 | 1.00148 |
| | (0.08303) | | (0.40306) | |
| Dividend | 0.05272 | 1.05413 | -0.03364 | 0.96692 |
| | (1.09876) | | (-0.73650) | |
| Forecast Variance | -1.24463* | 0.28805* | 1.53189** | 4.62693** |
| | (-1.95722) | | (2.42294) | |
| Size | 0.56775*** | 1.76430*** | -0.32877*** | 0.71981*** |
| | (22.94848) | | (-14.20094) | |
| ZPROB | 0.07196*** | 1.07461*** | -0.05612*** | 0.94543*** |
| | (3.60679) | | (-2.96004) | |
| Growth | 0.57788*** | 1.78225*** | -0.82316*** | 0.43904*** |
| | (8.65732) | | (-10.63326) | |
| Profitability | -0.22520** | 0.79835** | 0.01036 | 1.01041 |
| | (-2.04339) | | (0.09059) | |
| Target Cash | -0.15618*** | 0.85540*** | 0.09276*** | 1.09720*** |
| | (-7.74615) | | (4.81276) | |
| During Crisis | -0.49859*** | 0.60739*** | -1.40327*** | 0.24579*** |
| | (-3.93725) | | (-10.50367) | |
| Post Crisis | -0.87251*** | 0.41790*** | -1.16997*** | 0.31038*** |
| | (-6.69679) | | (-8.70915) | |
| Required RoR | -2.69094*** | 0.06782*** | -0.55844*** | 0.57210*** |
| | (-20.67986) | | (-4.39301) | |
| Public tau | 3.364 | | | |
| Equity tau | | | 1.4222 | |
| Wald CHi2 (Prob) | 1069.44 (0.000) | | 853.31 (0.000) | |
| Test of IIA: Chi2 (Prob) | 579.56 (0.000) | | 810.37 | |

Table 33: Firm Classification and Financing Choices

### 4.3.7. Macro Ratings ($MacR_{it}$) tests

Macro ratings provide the broadest classification of firms based on their credit risk. Implications of these ratings are profound in determining the required rate of return when

firms have speculative-grade status. However, these ratings are usually not directly used in econometric models due to the lack of variance they exhibit. For instance, investment-grade rating comprises AAA, AA, A, and BBB classes of rating and for a firm to move from AAA to BB is a long shot. However, this study aims to test the implications of macro ratings on the choices of capital providers in this section.

One way to visualise the implication of macro rating concerns is to focus on the ratings which are on the borderline such as firms with BBB+, BBB, BBB-, BB+, BB, BB-. The firms with BBB- ratings would try to prepare for the scenario in which they are downgraded to speculative grade. On the contrary, firms with a BB+ rating are likely to aim for an upgrade and exhibit caution in making unnecessary adjustments in their capital structure.

We will use the two constructs of macro ratings to test the implications of macro ratings and future changes in them. One construct should analyse the effects of investment-grade versus speculative-grade classification. It will be defined as a dummy variable equal to 1 if the firm has an investment-grade rating and zero if the firm has a speculative-grade rating.

Following Kisgen (2006), two dummy variables are used to analyse how firms may behave if they are on the borderline. The first dummy variable is denoted as IGSG, equal to 1 if a firm has BBB- and BB+ micro ratings. The second dummy variable is IGSG_1, equal to 1 if a firm has BBB, BBB-, BB+, and BB micro ratings. This construct enables us to analyse the effects of the firm being on the borderline of their respective macro rating. The following equations test the relationship for both specifications of borderline firms.

$$V_{Public\ vs\ Private} = \beta_j f(\text{IGSG}) + \beta_k f(\text{Investment Grade}) + \beta_l f(\text{Hidden information Variables}) + \beta_m f(\text{Control Variables}) + \epsilon_{it} \quad \ldots\ldots\ldots 1$$

$$V_{Debt\ Vs\ Equity} = \beta_j f(IGSG) + \beta_k f(\text{Investment Grade}) + \beta_l f(\text{Hidden information Variables}) + \beta_m f(\text{Control Variables}) + \epsilon_{it} \quad \text{…..... 2}$$

$$V_{Public\ vs\ Private} = \beta_j f(\text{IGSG\_1}) + \beta_k f(\text{Investment Grade}) + \beta_l f(\text{Hidden information Variables}) + \beta_m f(\text{Control Variables}) + \epsilon_{it} \quad \text{……3}$$

$$V_{Debt\ Vs\ Equity} = \beta_j f(IGSG\_1) + \beta_k f(\text{Investment Grade}) + \beta_l f(\text{Hidden information Variables}) + \beta_m f(\text{Control Variables}) + \epsilon_{it} \quad \text{…..... 4}$$

Table 35 summarises the results for these four equations. Results in panel A suggest that firms' financing behaviour is significantly influenced by their BBB- and BB+ credit ratings. The coefficient on IGSG indicates that if a firm has BBB- and BB+ rating, it is less likely to use public means of financing and may also prefer equity over debt. Due to financial distress concerns, the likelihood of firms using public means of financing or debt sources may decrease by 17.032% at 1% alpha and 11.256% at 5% alpha, respectively.

Financial distress concerns (represented by IGSG dummies) in models 1 and 2 are a significant determinant of public versus private and debt versus equity choice. In contrast, firms' overall macro ratings (i.e., investment-grade versus speculative-grade) seem to be more significant in determining the choice between debt and equity sources.

Although, the coefficient on investment-grade in model 1 is positive and shows that likelihood of firms to choose public capital providers may increase by 2.7%. However, this result is statistically as well as economically insignificant.

For instance, the combined effect of these variables on the likelihood for firms choosing public means of financing may be estimated as $= exp^{(-.18672*1+.02661*1)} - 1 = -14.79\%$. This means the likelihood may decrease by 14.79%; hence, the choice of public versus private is more of the function of financial distress concerns.

Whereas, in model 2, the combined effects of both dummies are estimable as: $exp^{(-.11942*1+.20570*1)} - 1 = 9.01\%$. This means that even after accounting for financial

distress concerns, firms are 9.01% likely to use debt sources (private debt and bonds) over equity sources.

**Macro Ratings and Financing Choices (Nested Logit Models Level 2)**

(With hidden information and control variables)

The base choice in both panels for model 1 is Private and in model 2 is equity. Public =1 if firms have issued bonds or new shares and private=1 if firms have used private debt or private equity. Debt=1 if firms have issued bonds or used Private debt and equity=1 if firms have issued new shares of used private equity. IGSG is a dummy variable that is equal to 1 if the firm has BBB- or BB+ rating in a period. IGSG_1 is a dummy variable that is equal to 1 if a firm has BBB, BBB-, BB+, and BB rating in a period. Investment grade is a dummy variable that is equal to 1 if a firm has an investment-grade rating or equal to 0 if the firm has a speculative-grade rating.

Research and development = ln(R&D) spending, dividends =1 if the firm pays dividends, and forecast variance is estimated as the standard deviation of the first difference of EBIT. Time dummies comprise three periods: pre-crisis, during the crisis, and post-crisis and the base level is pre-crisis. Size = ln (TA), Growth is estimated as growth in growth in total assets, profitability is estimated as $EBT\ pluc\ depriciation\ and\ amortisation_{it}/_{TA}$. Estimates the long-run average cash balance for the sample period of individual firms. The formula for its calculation is CSH&E/n. Where n = years in-sample period. Time dummies comprise three periods: pre-crisis, during the crisis, and post-crisis and the base level is pre-crisis.

| | **Panel A:** BBB- and BB+ | | | | **Panel B:** BBB, BBB-, BB+, and BB | | | |
|---|---|---|---|---|---|---|---|---|
| | Model 1 | | Model 2 | | Model 1 | | Model 2 | |
| | Public | exp(b) | Debt | exp(b) | Public | exp(b) | Debt | exp(b) |
| IGSG | -0.18672*** | 0.82968*** | -0.11942** | 0.88744** | | | | |
| | (-3.30117) | | (-2.19384) | | | | | |
| IGSG_1 | | | | | -0.08972** | 0.91419** | -0.06043 | .94136 |
| | | | | | (-2.13235) | | (-0.14891) | |
| Investment Grade | 0.02661 | 1.02697 | 0.20570*** | 1.22839*** | -0.02700 | 0.97336 | 0.17141*** | 1.18698*** |
| | (0.45557) | | (3.65334) | | (-0.49474) | | (3.28263) | |
| Research and Development | -0.00130 | 0.99870 | -0.00123 | 0.99877 | -0.00105 | 0.99895 | -0.00110 | 0.99890 |
| | (-0.34257) | | (-0.33611) | | (-0.27510) | | (-0.29936) | |
| Dividend | 0.01645 | 1.01659 | 0.01855 | 1.01872 | 0.03820 | 1.03894 | .03203 | 1.03254 |
| | (0.33188) | | (0.39405) | | (0.77999) | | (0.68785) | |
| Forecast Variance | -1.18205* | 0.30665* | -1.39076** | 0.24889** | -1.27135** | 0.28045** | -1.44687** | 0.23531 |
| | (-1.85041) | | (-2.19365) | | (-1.99216) | | (-2.28288) | |
| Size | 0.55180*** | 1.73637*** | 0.31852*** | 1.37509*** | 0.56120*** | 1.75277*** | .32461*** | 1.38349 |
| | (21.75138) | | (13.39031) | | (22.33135) | | (13.7922) | |
| ZPROB | 0.07510*** | 1.07799*** | 0.05659*** | 1.05822*** | 0.07290*** | 1.07562*** | 0.05520*** | 1.05675 |
| | (3.76447) | | (2.98909) | | (3.65287) | | (2.91518) | |
| Growth | 0.58444*** | 1.79398*** | 0.82805*** | 2.28884*** | 0.58114*** | 1.78807*** | 0.82590*** | 2.28393*** |
| | (8.75306) | | (10.66038) | | (8.71096) | | (10.63252) | |
| Profitability | -0.26278** | 0.76891** | -0.00559 | 0.99443 | -0.24864** | 0.77986** | 0.00518 | 1.00519 |
| | (-2.38616) | | (-0.04893) | | (-2.26640) | | (0.04502) | |
| Target Cash | -0.15725*** | 0.85449*** | -0.08892*** | 0.91492*** | -0.15972*** | 0.85239*** | -0.09059*** | 0.91339 |
| | (-7.80373) | | (-4.61859) | | (-7.92490) | | (-4.70487) | |
| During Crisis | -0.45774*** | 0.63271*** | 1.40281*** | 4.06662*** | -0.46737*** | 0.62665*** | 1.39652*** | 4.04110*** |
| | (-3.61561) | | (10.51226) | | (-3.69238) | | (10.46761) | |
| Post Crisis | -0.82675*** | 0.43747*** | 1.16809*** | 3.21585*** | -0.83586*** | 0.43350*** | 1.16216*** | 3.19682*** |
| | (-6.35462) | | (8.70938) | | (-6.42466) | | (8.66539) | |
| Required RoR | -2.67441*** | 0.06895*** | -0.51927*** | 0.59495*** | -2.70687*** | 0.06675*** | | |
| | (-19.92565) | | (-4.36946) | | (-20.15714) | | | |
| Public tau | 3.3434 | | | | 3.3839 | | | |
| | | | | | | | | |
| Private tau | 5.7298 | | | | 5.7995 | | | |
| | | | | | | | | |
| Debt tau | | | -5.88 | | | | -5.93903 | |
| Equity tau | | | 1.322 | | | | 1.33544 | |
| Wald Chi2 (prob) | 1078.50(0.000) | | 857.11(0.000) | | 1072.23(0.000) | | 854.45(0.000) | |
| Test of IIA: Chi2 (prob) | 520.08(0.000) | | 697.36(0.000) | | 539.56(0.000) | | 711.36(0.000) | |

Table 34: Macro Ratings and Financing Choices

Results in panel B show that when we include firms BBB and BB in the GSG_1 variable, financial distress concerns become less severe. For instance, in model 1 of panel

B, the significance is 5%, and the decrease in the likelihood of firms choosing public sources is 8.581% compared to a decrease of 17.032% associated with IGSG in model 1 of the panel.

Whereas, in model 2, the impact of IGSG_1 for debt versus equity choice is not statistically significant. The effects of investment-grade are statistically significant and the same as in panel A. This confirms our findings in panel A that as firms move away from the borderline of macro rating, they are more likely to use debt as means of financing. They prefer to source their capital from debt sources rather than equity sources. Combined interpretation of models 1 and 2 in the panel allows us to conclude that a firm is on the borderline of its macro rating and belongs to an investment-grade rating. Then such a firm is more likely to use private debt as a means of financing and less likely to use public debt. On the contrary, a firm belonging to a speculative grade may prefer equity sources of financing.

To further analyse the individual choices of firms and verify the impact of financial distress concern. We have run two models using the base level alternatives using the equations given below.

$$V_{Private\ Debt\ Vs\ Private\ Equity} = \beta_j f(\text{IGSG}) + \beta_j f(\text{Hidden information Variables}) + \epsilon_{it} \quad \ldots\ldots\ldots 9$$

$$V_{Public\ Debt\ Vs\ Private\ Equity} = \beta_j f(\text{IGSG}) + \beta_j f(\text{Hidden information Variables}) + \epsilon_{it} \quad \ldots\ldots\ldots 10$$

$$V_{Public\ Equity\ Vs\ Private\ Equity} = \beta_j f(\text{IGSG}) + \beta_j f(\text{Hidden information Variables}) + \epsilon_{it} \quad \ldots\ldots\ldots 11$$

$$V_{Private\ Debt\ Vs\ Private\ Equity} = \beta_j f(\text{IGSG\_1}) + \beta_j f(\text{Hidden information Variables}) + \epsilon_{it} \quad \ldots\ldots\ldots 12$$

$$V_{Public\ Debt\ Vs\ Private\ Equity} = \beta_j f(\text{IGSG\_1}) + \beta_j f(\text{Hidden information Variables}) + \epsilon_{it} \quad \ldots\ldots\ldots 13$$

$$V_{Public\ Equity\ Vs\ Private\ Equity} = \beta_j f(\text{IGSG\_1}) + \beta_j f(\text{Hidden information Variables}) + \epsilon_{it} \quad \ldots\ldots\ldots 14$$

Table 36 summarizes the results for these equations and panel A summarize results for equation 9 to 11 and panel B summarize results for 12 to 14. Panel A results

confirm that firms are 45.28% more likely to use private debt and their preference for debt is derived from their preference of private debt. In addition to this, we also observe that firms are 32.55% less likely to use public debt

**Macro Ratings and Financing Choices (Nested Logit Models Level 1)**

(with hidden information variables only)

The base choice is private equity. Private debt =1 if the firm has used private debt, public debt is equal to 1 if the firm has issued bonds, and public equity is equal to 1 if the firm has issued new shares. IGSG is a dummy variable that is equal to 1 if the firm has BBB- or BB+ rating in a period. IGSG_1 is a dummy variable that is equal to 1 if a firm has BBB, BBB-, BB+, and BB rating in a period. Investment grade is a dummy variable that is equal to 1 if a firm has an investment-grade rating or equal to 0 if the firm has a speculative-grade rating.

Research and development = ln(R&D) spending, dividends =1 if the firm pays dividends, and forecast variance is estimated as the standard deviation of the first difference of EBIT. Time dummies comprise three periods: pre-crisis, during the crisis, and post-crisis and the base level is pre-crisis.

| **Panel A** | Private Debt | exp(b) | Public Debt | exp(b) | Public Equity | exp(b) |
|---|---|---|---|---|---|---|
| IGSG | 0.37346*** | 1.45275*** | -0.39373*** | 0.67454*** | 0.08887 | 1.09294 |
| | (2.70825) | | (-2.93157) | | (0.30670) | |
| Research and Development | -0.10739*** | 0.89817*** | -0.00121 | 0.99879 | -0.21991*** | 0.80259*** |
| | (-6.98117) | | (-0.11919) | | (-7.89297) | |
| Dividend | -0.26039** | 0.77075** | 1.09721*** | 2.99579*** | 0.46212* | 1.58744* |
| | (-1.96844) | | (6.88162) | | (1.95169) | |
| ZPROB | -0.36427*** | 0.69470*** | -0.09224** | 0.91189** | -0.85064*** | 0.42714*** |
| | (-6.38327) | | (-2.13743) | | (-6.17390) | |
| During Crisis | 1.90204*** | 6.69954*** | 1.06903*** | 2.91255*** | -0.02269 | 0.97756 |
| | (7.24977) | | (3.90479) | | (-0.03079) | |
| Post Crisis | 1.62776*** | 5.09245*** | 0.41628 | 1.51630 | -1.28617 | 0.27633 |
| | (6.21532) | | (1.44887) | | (-1.64205) | |
| Req_RoR | -1.24958*** | 0.28663*** | | | | |
| | (-5.94586) | | | | | |
| Wald Chi2 (prob) | 455.76(0.000) | | | | | |
| Test of IIA: Chi2 (prob) | 159.16(0.000) | | | | | |
| **Panel B** | Private Debt | exp(b) | Public Debt | exp(b) | Public Equity | exp(b) |
| IGSG_1 | 0.38620*** | 1.47137*** | -0.22459** | 0.79884** | 0.35331 | 1.42377 |
| | (3.18181) | | (-2.09865) | | (1.46615) | |
| Research and Development | -0.11194*** | 0.89410*** | 0.00190 | 1.00191 | -0.22224*** | 0.80072*** |
| | (-6.91765) | | (0.17900) | | (-7.73978) | |
| Dividend | -0.33217** | 0.71737** | 1.16849*** | 3.21713*** | 0.45929* | 1.58296* |
| | (-2.30055) | | (6.85904) | | (1.88345) | |
| ZPROB | -0.37403*** | 0.68795*** | -0.08551* | 0.91804* | -0.85928*** | 0.42347*** |
| | (-6.23314) | | (-1.91568) | | (-6.09152) | |
| During Crisis | 1.89356*** | 6.64301*** | 1.09553*** | 2.99077*** | 0.00807 | 1.00811 |
| | (7.04340) | | (3.87077) | | (0.01067) | |
| Post Crisis | 1.61797*** | 5.04283*** | 0.41334 | 1.51186 | -1.31754 | 0.26779 |
| | (6.05345) | | (1.38957) | | (-1.63522) | |
| Req_RoR | -1.34805*** | 0.25975*** | | | | |
| | (-6.08230) | | | | | |
| Wald Chi2 (prob) | 460.50(0.000) | | | | | |
| Test of IIA: Chi2 (prob) | 159.88(0.000) | | | | | |

Table 35: Macro Ratings and Financing Choices

In panel B, the results also confirm that private debt is the most preferred source of capital providers for the firms. Coefficients on IGSG_1 indicate that likelihood of firms to

use private debt increase by 47.13%, given if they are near the borderline ratings. we have also run these tests using other specifications of such as including investment-grade ratings, and conclude the results show such firms prefer private debt.

## 4.4. Financial Distress and Robustness of Results

We have extensively discussed the potential methodological limitations of our results in previous sections. Our prime issues, hitherto, have been to minimise the concerns such as observing counterfactual signs or wrong cross elasticities. These limitations are not solely attributable to this study only. Instead, they can be ascribed to methodological limitations common in research on capital structure studies. Welch (2011), (2010), and (2007), Leary and Roberts (2010), and Mackie-Mason (1990) note that financial data on financing choices is coarse, which makes it harder to observe financing behaviour directly. Hence, with impaired ability to deduce concrete and meaningful choices generates unwanted endogeneity in data. Although this study argues in favour of treating financing choices (i.e., debt or equity use) as non-linear variables, it relies on continuous variables to infer any non-linearity. Therefore, our research suffers from limitations that are no different from other attempts on this topic.

To minimise the effects of methodological limitations on our research's reliability, we have adopted two prime strategies in previous sections.

First, we have included two sets of control variables, namely hidden information and firm-specific variables, to minimise the possibility of observing wrong or inflated coefficients estimates on credit ratings. Secondly, we have used different tree structures in which we have imposed conditions such as that errors are Independent and Identically Distributed (IID), and probability of alternatives is Independent of Irrelevant Alternatives (IIA). We have used alternative specific choice models and multinominal logistics

regression to verify that our coefficient signs and sizes are correct. These techniques have allowed us so far to argue that our results are robust, reliable, and generalisable.

However, one concern remains outstanding, and we believe it may impact all our findings in general. The concern we have is that firms financing behaviour, as indicated by credit ratings, may be influenced by the financial distress concerns rather than credit ratings per se. Although we have used Altman's Z-score (ZPROB) in every model, we have run so far, and our results remain valid and robust. Nevertheless, one cannot argue that ZPROB is an ultimate indicator of financial distress or eliminates financial distress concerns. Therefore, we dedicate this section to discussing this issue and presenting a few more results to identify any erroneous estimation.

Kisgen (2006) notes in his findings that it is plausible that firms' financing behaviour concerning anticipated rating changes or firms who have plus or minus signs may be ascribable to financial distress concerns. He further clarifies that firms on the borderline of the macro ratings are most sensitive to financial distress concerns. We have touched upon this in the last section, where we discussed that financing choices of firms, BBB, BBB-, BB+, and BB, are significantly influenced by their ratings. We have used two dummies to verify this concern: Investment Grade and Speculative Grade (IGSG) and Investment Grade and Speculative Grade_1 (IGSG_1). The first dummy indicates if a firm has BBB- and BB+ credit rating, and the second indicates if a firm has BBB, BBB-, BB+, and BB credit rating. In addition to this, we used a dummy variable to indicate whether the firm belongs to investment grade or speculative grade. We observed in the last section that if a firm is on the borderline of their respective macro rating, then their financing choices are significantly different from those that are not. Therefore, it merits further discussion whether this difference persists concerning other variants of credit ratings.

In this section, we will evaluate the significance of the effects of rating signs, rating anchors, realised rating changes, and firm classifications on firms' financing behaviour, along with financial distress concerns. Following are the equations which are going to test the financial distress concerns for each rating variation.

$$V_{Public\ vs\ Private} = \beta_j f(\text{IGSG}) + \beta_k f(\text{Credit Ratings}) + \beta_l f(\text{Hidden information Variables}) + \beta_m f(\text{Control Variables}) + \epsilon_{it} \quad \ldots\ldots\ldots 1$$

$$V_{Public\ vs\ Private} = \beta_j f(\text{IGSG\_1}) + \beta_k f(Credit\ Ratings) + \beta_l f(\text{Hidden information Variables}) + \beta_m f(\text{Control Variables}) + \epsilon_{it} \quad \ldots\ldots\ldots 2$$

Investment Grade and Speculative Grade (IGSG) is a dummy variable equal to 1 if the firm has BBB- or BB+ rating in a period. IGSG_1 equals 1, if a firm has BBB, BBB-, BB+, and BB credit ratings. Credit rating refers to the different variations of credit ratings that have already been used in previous sections. These variations are RUD, RU, RD, Rating Anchor 1 and 2, Plus or Minus signs and Investment grade.

IGSG and IGSG_1 both indicate the current rating level of the firm, a firm that has a rating above BB+ is an investment-grade firm, and the lower-rated firm is speculative-grade. However, imagine a firm rated BBB-, one downgrade can convert this firm to a speculative-grade issuer and vice versa. These firms lie on the borderline; hence, they ought to be sensitive to their rating status and the possibility of moving from one scale to another (Kisgen, 2006).

The equation outlined above will perform two tests: the first equation will test the impact of credit rating variants on a firm's choice of capital provider, given that such firms have BBB- and BB+ ratings. The second equation extended the IGSG range and tested the impact of credit rating variants on a firm's choice of capital provider. Tables 37 and 38 summarises results for equations 1 and 2, respectively. Both equations test the implications of financial distress and credit rating variants for public versus private choice.

Coefficients on the IGSG in table 37 indicate that the financial distress concerns significantly influence firms' choice of public versus private capital providers. Firms on the borderline of their respective macro ratings are less likely to use public capital providers in all models. The coefficients are significant at 1% in all models, and signs associated with them are also negative. It is in line with our findings in the previous section.

Model one test that does financing behaviour of firms who have plus or minus rating signs attached to their credit ratings is influenced by financial distress concerns or not. The POM argument is that firms with these signs anticipate a rating change and act such as that minimises the information asymmetry costs and inhibits unwanted changes in their credit ratings (Kisgen, 2006). We observe that the effects of POM are negligible on firms' financing behaviour in the presence of financial distress concerns. It confirms our argument in section 3 that anticipated rating changes are not a very important consideration for firms when deciding about their capital providers.

Model two tests whether the effects of realised rating changes are above and beyond financial distress concerns. Ratings Upgrade and Downgrade (RUD) is used to assess the implications of realised rating changes. We note that firms financing behaviour ex-post rating change is statistically significant and linked to their realised rating. The coefficient is significant at the 1% alpha level. Results indicate that firms are 30.86% more likely to use public capital providers than private capital providers if a firm's rating has increased from the previous year.

Moreover, if we combine the impact of IGSG and RUD, the impact of RUD is still statistically significant. Holding everything constant, if a firm's rating has increased from the previous year and it belongs to the IGSG category, then their combined impact on the likelihood can be estimated as $exp^{(-0.20321+0.26896)} - 1 = 6.796\%$.

## Implications of Financial Distress Concerns on the relationship between Credit Ratings and Capital Providers Choice

(Firms rated between BBB- and BB+)

The base choice in all models is private. Public =1 if firms have issued bonds or new shares and private=1 if firms have used private debt or private equity IGSG is a dummy variable that is equal to 1 if the firm has BBB- or BB+ rating in a period. Firm classification is defined as 4= healthy companies (firms with rating => A), 3= balanced companies (firms with the rating between BB and BBB), 2= vulnerable companies (firms with the rating between CCC and B) and 1= risky companies (firms with the rating between D and CCC). Investment-grade =1 if the firm has a rating equal to and above BB+ and speculative-grade if the rating is below BB+. Plus, and minus dummies indicate if firms' rating has a plus or minus signs. RUD = 1 if the firm rating has changed in the current period from the previous period. Rating Anchors 1 & 2 indicate the lagged ratings for the last two years. Dividends =1 if the firm pays dividends. Size = ln(TA), Growth is estimated as growth in growth in total assets, profitability is estimated as $\boldsymbol{EBT\ pluc\ depriciation\ and\ amortisation_{it}/_{TA}}$. Estimates the long-run average cash balance for the sample period of individual firms. The formula for its calculation is **CSH&E/n**. Where n = years in-sample period. Time dummies comprise three periods: pre-crisis, during the crisis, and post-crisis and the base level is pre-crisis.

| | **Anticipated rating** | | **Realised rating** | | **Rating Anchors** | | | | **Firm Classification** | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Model 1** | | **Model 2** | | **Model 3** | | **Model 4** | | **Model 5** | |
| | Public | exp(b) | Public | exp(b) | Public | exp(b) | Public | exp(b) | Public | exp(b) |
| IGSG | -0.21059*** | 0.81011 | -0.20321*** | 0.81611*** | -0.23884*** | 0.78754*** | -0.22657*** | 0.79726*** | -0.22723*** | 0.79674*** |
| | (-3.51) | | (-3.58194) | | (-3.73846) | | (-3.65446) | | (-3.87233) | |
| POM | 0.05166 | 1.05302 | | | | | | | | |
| | (-1.2000) | | | | | | | | | |
| Investment Grade | 0.02784 | | 0.05716 | 1.05883 | 0.12842 | 1.13703 | 0.10450 | 1.11016 | 0.10750 | 1.11349 |
| | (0.48000) | | (0.97077) | | (1.55900) | | (1.36304) | | (1.62067) | |
| Rating Anchor 1 | | | | | -0.02028* | 0.97993* | | | | |
| | | | | | (-1.75321) | | | | | |
| Rating Anchor 2 | | | | | | | -0.01668 | 0.98346 | | |
| | | | | | | | (-1.56957) | | | |
| RUD | | | 0.26896*** | 1.30860*** | | | | | | |
| | | | (4.47238) | | | | | | | |
| Firm Classification | | | | | | | | | -0.11456*** | 0.89176*** |
| | | | | | | | | | (-2.58261) | |
| Research and Development | -0.0011 | 0.99890 | -0.00131 | 0.99870 | -0.00070 | 0.99930 | -0.00084 | 0.99916 | -0.00052 | 0.99948 |
| | (-0.2900) | | (-0.34289) | | (-0.18273) | | (-0.21990) | | (-0.13705) | |
| Dividend | 0.01853 | 1.01870 | 0.01186 | 1.01193 | 0.03279 | 1.03333 | 0.02950 | 1.02994 | 0.03915 | 1.03992 |
| | (0.37000) | | (0.23888) | | (0.64978) | | (0.58670) | | (0.77706) | |
| Forecast Variance | -1.1831 | 0.30633 | -1.21710* | 0.29609* | -1.12696* | 0.32402* | -1.12755* | 0.32383* | -1.16190* | 0.31289* |
| | (-1.8500) | | (-1.90452) | | (-1.76287) | | (-1.76328) | | (-1.81845) | |
| Size | 0.5533*** | 1.73898 | 0.54521*** | 1.72497*** | 0.55653*** | 1.74462*** | 0.55569*** | 1.74315*** | 0.55709*** | 1.74559*** |
| | (21.7800) | | (21.43896) | | (21.80125) | | (21.78689) | | (21.89137) | |
| ZPROB | 0.07612*** | 1.07909 | 0.07718*** | 1.08023*** | 0.07237*** | 1.07505*** | 0.07254*** | 1.07524*** | 0.07317*** | 1.07592*** |
| | (3.8100) | | (3.86694) | | (3.61571) | | (3.62185) | | (3.66821) | |
| Growth | 0.5841*** | 1.79338 | 0.60193*** | 1.82563*** | 0.57724*** | 1.78112*** | 0.58022*** | 1.78644*** | 0.58142*** | 1.78858*** |
| | (8.7500) | | (8.93190) | | (8.64522) | | (8.69784) | | (8.70548) | |
| Profitability | -0.2641** | 0.76790 | -0.22415** | 0.79920** | -0.24015** | 0.78651** | -0.24885** | 0.77970** | -0.23218** | 0.79280** |
| | (-2.4000) | | (-2.03375) | | (-2.17304) | | (-2.25593) | | (-2.10334) | |
| Target Cash | -0.1582*** | 0.85368 | -0.15710*** | 0.85462*** | -0.15529*** | 0.85617*** | -0.15570*** | 0.85581*** | -0.15403*** | 0.85725*** |
| | (-7.8500) | | (-7.78596) | | (-7.69313) | | (-7.71517) | | (-7.63212) | |
| During Crisis | -0.4559*** | 0.63388 | -0.47556*** | 0.62154*** | -0.20129 | 0.81767 | -0.24957 | 0.77914 | -0.47990*** | 0.61885*** |
| | (-3.600) | | (-3.75312) | | (-1.03883) | | (-1.35956) | | (-3.78227) | |
| Post Crisis | -0.8261*** | 0.43775 | -0.85549*** | 0.42508*** | -0.57164*** | 0.56460*** | -0.61728*** | 0.53941*** | -0.85530*** | 0.42516*** |
| | (-6.3500) | | (-6.56173) | | (-2.92471) | | (-3.30918) | | (-6.54933) | |
| Required RoR | -2.6914*** | 0.06779 | -2.64447*** | 0.07104*** | -2.73867*** | 0.06466*** | -2.72523*** | 0.06553*** | -2.60339*** | 0.07402*** |
| | (-19.8900) | | (-19.75398) | | (-19.49725) | | (-19.58874) | | (-19.19105) | |
| Public tau | 3.3647 | | 3.3061 | | 3.4238 | | 3.407 | | 3.2546 | |
| Private tau | 5.7660 | | 5.6656 | | 5.8674 | | 5.8386 | | 5.5775 | |
| Wald Chi2 (prob) | 1079.82(0.000) | | 1092.15(0.000) | | 1081.05(0.000) | | 1079.52(0.000) | | 1084.97(0.000) | |
| Test of IIA: Chi2 (prob) | 518.69 (0.000) | | 505.57(0.000) | | 497.74(0.000) | | 502.31(0.000) | | 465.30(0.000) | |

Table 36: Financial Distress Concerns, Credit Ratings and Financing Choices

This means that even after accounting for financial distress concerns, firms whose ratings have increased from the previous period are 6.796% more likely to raise capital from public providers.

This study uses rating anchors to analyse the implications of historical ratings on firms' financing behaviour. Now we aim to test these implications in the presence of financial distress concerns. Results indicate that given a firm is rated between BBB- and BB+ and had a high rating in the previous period, they are 2% less likely to use public capital providers. We observe that the coefficient on rating anchor 1 is still significant at 10%; nonetheless, the sign of the variable is not as we expect. It indicates that if a firm rating has declined in the current period from the previous year and the firm is on the borderline of macro rating, such a firm would prefer to use internal cash or private debt to inhibit further deterioration.

Model 5 tests the statistical significance of firm classification in the presence of financial distress concerns. We observe that the statistical significance of firm classification remains valid for firms even after accounting for financial distress concerns. However, signs change show that firms with financial distress concerns are less likely to use public capital providers. In section 4.3.6, we noted that the impact of firm classification on financing behaviour is not linear. Furthermore, we also observed in section 4.2 of this chapter that active financial firms generally belong to balanced and vulnerable categories. Therefore, the change in signs indicates that as firms move from risky firms to healthy firm status, they may try to use fewer public means of financing. The combined impact of firm classification and IGSG can be estimated as $exp^{(-0.22723-0.11456)} - 1 = -18.36\%$. This indicates that given that a firm belongs to the IGSG category, it is likely that as firms move from vulnerable towards healthy status, they become conservative in using external financing.

## Financial Distress Concerns, Credit Ratings and Financing Choices

(Firms rated between BBB, BBB-, BB+ and BB)

Base choice in all models is private. Public =1 if firms have issued bonds or new shares and private=1 if firms have used private debt or private equity. IGSG is a dummy variable that is equal to 1 if firm has BBB- or BB+ rating in a period. Firm classification is defined as 4= healthy companies (firms with rating => A), 3= balanced companies (firms with rating between BB and BBB), 2= vulnerable companies (firms with rating between CCC and B) and 1= risky companies (firms with rating between D and CCC) . Investment grade =1 if firm has rating equal to and above BB+ and speculative grade if rating is below BB+. Plus, and minus dummies indicate if firms' rating has plus or minus signs. RUD = 1 if firm rating has changed in the current period from previous period. Rating Anchor 1 & 2 indicate the lagged ratings for last two years. Dividends =1 if firm pays dividends. Size = ln (TA), Growth is estimated as growth in growth in total assets, profitability is estimated as $\boldsymbol{EBT\ pluc\ depriciation\ and\ amortisation_{it}/_{TA}}$. Estimates the long run average cash balance for the sample period of individual firms. Formula for its calculation is: **CSH&E/n**. Where, n = years in sample period. Time dummies comprise three periods: pre-crisis, during crisis, and post crisis and the base level is pre-crisis.

| | **Model 1** | | **Model 2** | | **Model 3** | | **Model 4** | | **Model 5** | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Public | exp(b) | Public | exp(b) | Public | exp(b) | Public | exp(b) | Public | exp(b) |
| IGSG_1 | -0.10609** | 0.89934** | -0.09509** | 0.90930** | -0.10132** | 0.90364** | -0.09984** | 0.90498** | -0.10996** | 0.89587** |
| | (-2.52365) | | (-2.25632) | | (-2.26470) | | (-2.25905) | | (-2.54353) | |
| POM | -0.03640 | 0.96426 | | | | | | | | |
| | (-0.86613) | | | | | | | | | |
| RUD | | | 0.25864*** | 1.29517*** | | | | | | |
| | | | (4.31135) | | | | | | | |
| Investment Grade | | | -0.00300 | 0.99701 | 0.00929 | 1.00934 | 0.00405 | 1.00406 | 0.03123 | 1.03172 |
| | | | (-0.05453) | | (0.12864) | | (0.05916) | | (0.50988) | |
| Rating Anchor 1 | | | | | -0.00835 | 0.99169 | | | | |
| | | | | | (-0.76793) | | | | | |
| Rating Anchor 2 | | | | | | | -0.00766 | 0.99237 | | |
| | | | | | | | (-0.75275) | | | |
| Firm Classification | | | | | | | | | -0.09292** | 0.91127** |
| | | | | | | | | | (-2.11921) | |
| Research and Development | -0.00144 | 0.99856 | -0.00101 | 0.99899 | -0.00078 | 0.99922 | -0.00082 | 0.99918 | -0.00040 | 0.99960 |
| | (-0.37646) | | (-0.26575) | | (-0.20377) | | (-0.21476) | | (-0.10536) | |
| Dividend | 0.02846 | 1.02887 | 0.03571 | 1.03635 | 0.04734 | 1.04847 | 0.04624 | 1.04733 | 0.06019 | 1.06204 |
| | (0.63548) | | (0.72829) | | (0.93909) | | (0.92245) | | (1.20164) | |
| Forecast Variance | -1.24918** | 0.28674** | -1.31378** | 0.26880** | -1.25894** | 0.28395** | -1.25473** | 0.28515** | -1.27103** | 0.28054** |
| | (-1.96313) | | (-2.05772) | | (-1.97255) | | (-1.96541) | | (-1.99134) | |
| Size | 0.55648*** | 1.74452*** | 0.55575*** | 1.74324*** | 0.56417*** | 1.75799*** | 0.56386*** | 1.75745*** | 0.56693*** | 1.76285*** |
| | (23.05492) | | (22.06837) | | (22.18172) | | (22.21276) | | (22.42865) | |
| ZPROB | 0.07281*** | 1.07553*** | 0.07471*** | 1.07757*** | 0.07152*** | 1.07414*** | 0.07152*** | 1.07414*** | 0.07098*** | 1.07356*** |
| | (3.65763) | | (3.74238) | | (3.56904) | | (3.56710) | | (3.55471) | |
| Growth | 0.58290*** | 1.79123*** | 0.59758*** | 1.81772*** | 0.57784*** | 1.78219*** | 0.57893*** | 1.78412*** | 0.57824*** | 1.78290*** |
| | (8.74511) | | (8.87832) | | (8.65087) | | (8.67663) | | (8.66560) | |
| Profitability | -0.25434** | 0.77543** | -0.21005* | 0.81054* | -0.23783** | 0.78834** | -0.24105** | 0.78580** | -0.22170** | 0.80116** |
| | (-2.33768) | | (-1.90191) | | (-2.15245) | | (-2.18892) | | (-2.00885) | |
| Target Cash | -0.15915*** | 0.85287*** | -0.15973*** | 0.85237*** | -0.15922*** | 0.85281*** | -0.15928*** | 0.85276*** | -0.15761*** | 0.85418*** |
| | (-7.89314) | | (-7.91544) | | (-7.89573) | | (-7.89896) | | (-7.81361) | |
| During Crisis | -0.46088*** | 0.63073*** | -0.48578*** | 0.61522*** | -0.36287* | 0.69568* | -0.37263** | 0.68892** | -0.48615*** | 0.61499*** |
| | (-3.65484) | | (-3.83434) | | (-1.95125) | | (-2.08688) | | (-3.83160) | |
| Post Crisis | -0.82748*** | 0.43715*** | -0.86474*** | 0.42116*** | -0.73184*** | 0.48103*** | -0.74044*** | 0.47691*** | -0.85965*** | 0.42331*** |
| | (-6.39360) | | (-6.63264) | | (-3.89438) | | (-4.07568) | | (-6.58230) | |
| Required RoR | -2.67554*** | 0.06887*** | -2.68179*** | 0.06844*** | -2.73656*** | 0.06479*** | -2.73288*** | 0.06503*** | -2.65330*** | 0.07042*** |
| | (-20.43473) | | (-20.01405) | | (-19.50228) | | (-19.63633) | | (-19.56401) | |
| Public tau | 3.3448 | | 3.3527 | | 3.4211 | | 3.4163 | | 3.3169 | |
| Private tau | 5.7322 | | 5.7453 | | 5.8629 | | 5.8551 | | 5.6847 | |
| Wald Chi2 (prob) | 1072.97(0.000) | | 1084.82(0.000) | | 1072.67(0.000) | | 1072.27(0.000) | | 1076.50(0.000) | |
| Test of IIA: Chi2 (prob) | 558.75(0.000) | | 526.86(0.000) | | 497.64(0.000) | | 506.03(0.000) | | 492.79(0.000) | |

Table 37: BBB, BBB-, BB+, and BB and Financing Choices

Table 38 comprises the results for IGSG_1 to assess the implications of how firms may behave if they have credit ratings such as BBB, BBB-, BB+, and BB. Coefficients of IGSG_1 in all models are statistically significant, and their signs are as expected. Negative signs indicate that firms having ratings closer to macro rating borderline are less likely to use public capital providers. Overall results in table 38 indicate that firms' choices of capital provider are influenced by their credit ratings even after accounting for financial distress concerns.

Model one tests the effects of PO signs on the firm's financing choices in the presence of financial distress concerns for firms. We note that the POM coefficient loses its statistical significance. The coefficient on POM indicates that the implications of POM signs are not statistically significant in the presence of financial distress concerns. Nonetheless, signs are as expected.

In models three and four, we also observe that historical ratings proxied by rating anchors 1 and 2 lose their statistical significance. Therefore, it becomes evident that firms current financing decisions are more closely aligned with the financial distress concerns than their historical credit ratings.

However, in models two and five, the results show that realised ratings and firms' classification is still significant determinants of the choice of capital providers. Model three results show that firms whose ratings have increased or decreased from the previous year are more likely to raise capital from public capital providers, all other things held constant. The results are significant at a 1% p-value and are valid in the presence of financial distress concerns.

Model five tests the implication of firms' classification in the presence of financial distress concerns. The coefficient on the firm classification is significant at a 5% p-value,

and it is in line with our expectations. We observe that as firms tend to become healthier, they do not prefer raising finances from external sources. The coefficient also indicates that firms are 8.88% less likely to use public capital providers. However, we expect this sign to be mainly due to public equity (i.e., issuing new shares), not public bonds.

In light of this discussion, we can conclude that our results are robust. We conclude that credit ratings, especially realised rating changes, rating anchor and firm classification, are the reliable determinant choice of capital providers. We also note that firms nearer the borderline of their respective macro rating are highly concerned about whom they choose as their capital provider. We argue that this concern manifests the financial distress concerns for firms and indicates that firms' credit ratings are an essential indicator of financial distress of firms as well.

# 5. Chapter-Five: Conclusion

## 5.1. Introduction

Capital structure is still an enigma in corporate finance. As we are moving away from the age of fiat currency to digital currency, this problem will persist and is bound to exacerbate. Firms' financing choices and behaviour will become more complex. Firms will be able to raise capital directly from the public in addition to traditional financing channels. Therefore, establishing a reliable indicator can minimise information asymmetry and allow observers to gather firms' preferences.

Understanding a firm's desired mix of capital providers can help markets match the most appropriate parties in an enduring economic alliance. Managers can also use an optimal mix of capital providers to maximise the wealth of their shareholders and the value of the firms. Following Mackie-Mason (1990), this study argues that the firm's value is the function of the type of capital and type of the source of capital. The functional form is given as below:

$$Value\ of\ Firm = Type\ of\ funds + Type\ of\ Source + Product\ of\ both + Errors\ terms$$

Therefore, finding the optimal type of capital source determinant is vital for the value maximisation hypothesis.

To find a reliable indicator of firms' capital providers choice, this thesis questions whether hidden information and credit ratings as an indicator of hidden information influence firms' choice of capital providers. This study focuses on three key issues to answer the central question of this thesis.

1. Is hidden information more relevant in determining capital providers' choice or financing instruments?

2. Is there a relationship between credit ratings and the firms' choice of capital providers?
3. Is firms' choice of capital providers influenced by anticipated or realised rating changes?

Uniquely tailored choice models are developed in this study to answer these questions. Our study notes compelling positive evidence for each of these questions and suggests that credit ratings are reliable variables to be used as hidden information proxy. Credit ratings are also observed as an important determinant of the choice of capital providers, and their realised changes can be instrumental in predicting corporate financing decisions. This chapter summarises the research carried out in this thesis. It starts with a brief review of the main philosophy behind this research. Then it will discuss the key findings for each question asked above. After this, it discusses the limitations of this study. Finally, this study will discuss the implications and provide recommendations.

## 5.2. Basis of the research

Our study attempts to test the implications of credit ratings and hidden information on firms' preferred capital providers. Although existing studies such as of Kisgen (2006), Kisgen (2009), Kisgen and Strahan (2010), Naeem (2012), Drobetz and Heller (2014), and Dasilas and Papasyriopoulos (2015) focus on this aspect from pecking order and trade-off theory perspective. However, these studies mainly rely on identifying implications of credit ratings as an additional determinant of percentage changes in debt levels. Hence, this approach limits the role of credit ratings and suggests that credit ratings are influential in so far as to determine the current changes in the aggregate debt level of a firm.

These assertions are irrespective of the fact that credit ratings and variations in them may translate into discrete decisions such as the choice of capital providers or the type of

lenders the management may prefer. The role of credit ratings as the determinant of managerial choices is not rare in capital structure literature. Naeem (2012) has discussed the role of credit ratings in the choice of maturity period; however, they did not discuss the choice of capital providers. Moreover, many studies note that credit ratings can influence firms' choice of debt providers such as banks, non-bank private lenders, bondholders, and private loan placements. (Marshall et al. (2016), Ahmed (2011), Denis and Mihov (2003), Johnson (1997), Rajan (1992), and Diamond (1991)). However, they do not mention the equity providers such as new shareholders who buy new shares and existing shareholders who allow managers to use retained earnings. Rauh and Sufi (2010, p. 17) also argue that it is flawed to assume that *"the equilibrium debt structure conditional on credit quality consists of [only] one type of debt for a given firm"*. Faulkender and Petersen (2005) also confirm that firms having a rated debt are intrinsically different from other firms in their borrowing behaviour.

In this context, the philosophical basis of our study is a simple assertion that capital structure decisions under information asymmetry are a set of discrete choices. In which firms carefully select their investors. This study argues that corporate actions such as increasing debt proportions or targeting an optimal debt level are not arbitrary decisions. Each instance of increasing or decreasing debt level is a well-thought transaction between managers and their existing and prospective investors. The debt obligations and shares are a contract between two decision-makers by their very nature. Therefore, both parties are bound to ration each other. Although, interest rate or required rate of return furnish a reliable mechanism that firms and investors can use to target their preferred clientele. Nevertheless, such a mechanism is limited to a one-period setting and may struggle to handle multi-period transactions under information asymmetry (Stiglitz and Weiss, 1981).

Therefore, this study argues that we need treating credit ratings and corporate financing decisions differently. This study does so by considering financing actions as human choices and by recognising behavioural implications of credit ratings. This study uses choice models to handle the human factor in corporate financing decisions and treats credit ratings as discrete information carefully solicited and released by managers.

This study argues that credit ratings and their role as an indicator of hidden information are more influential in the choice of capital providers. This study uses revealed preference theory and choice modelling to establish a causal relationship between credit ratings and the type of investors firms choose. We use balance sheet data to code firms' choices and then use random utility models to test whether credit ratings affect managers choices. A unique aspect of this study is that it does not impose IID or IIA assumptions and uses nested logit choice models to incorporate firms' complex and correlated choice behaviour.

## 5.3. Key Findings

The results section (4.3 onwards) of this thesis presents findings on three significant aspects of the capital structure issue of firms: hidden information and capital providers, credit ratings and capital providers, and credit ratings, financial distress, and capital providers. This section will summarise these findings and outline how they relate to the existing body of knowledge and what additional evidence this study provides.

### 5.3.1. Hidden Information and Capital Structure

Mackie-Mason (1990) argues that persistent irregularities find in corporate financing choices are manifestations of the non-linear financing behaviour of firms. He also notes that the so-called role of information asymmetry is more profound in crafting the composition

of capital providers rather than the composition of capital instruments issued by firms. He notes that "Since different funds providers have different access to information about the firm and different ability to monitor firm behaviour, the importance of asymmetric information gives a reason for firms to care about who provides the funds." (Mackie-Mason (1990), pp. 63-64). Saa-Requejo (1996) also verifies that hidden information influences firms' choice of capital providers. Gomes and Phillips (2012) observe that asymmetric information plays a crucial role in deciding which market (private or public) firms may access to raise capital. Lin et al. (2013) extend this assertion a step further and argue that the composition of existing capital providers can also influence the choice of different debt providers. Therefore, this study argues that hidden information should be more influential in determining the type of capital providers rather than security providers.

This study starts by establishing whether hidden information plays a vital role in determining the choice of capital providers. Section 4.3.1 and 4.3.2 provide evidence that hidden information is a statistically significant determinant of the choice of capital providers. Following Mackie-Mason (1990), we have used research and development, Dividends, Forecast Variance, and ZPROB as indicators of hidden information. We tested these variables using three nested logit models. Fist two models analysed that these indicators play a significant role in determining the choice of debt vs equity or public versus private. We find mixed evidence for these two classifications of capital providers. However, when we extended the choice analysis to three alternatives, we noticed that hidden information is a significant determinate of private lenders and public investors (Table 18). Our results indicate that firms, given the increase in information asymmetry proxied by research and development firms, are 2.1% less likely to borrow from banks and 0.8% less likely to borrow from public investors. It indicates that R&D intensive firms do follow strategic rationing of their investors. These firms prefer internal capital in all circumstances;

however, they prefer public investors over private investors, if they need to raise external capital. As the decrease in probability for public sources is 0.8%, that is lower than the decrease in likelihood for private sources, which is 2.%.

Similarly, we observed that dividends and ZPROB are also significant determinants of the choice of capital provider. We conclude that both variables show that firms are more likely to raise capital from bond investors as hidden information increases. These investors require the least information disclosure from the firm and are mainly interested in generating fixed income. Managers of firms paying dividends and those firms vulnerable to financial distress are likely to use public debt to avoid scrutiny of their existing and new shareholders. Coefficients on these two variables indicate firms' inclination towards debt, and within debt, public lenders are firms' preferred options.

Coefficients on forecast variance indicate that firms with high earning volatility and unstable cash flows are less likely to use debt and public sources of capital. The coefficients are statistically significant in their influence on debt versus equity, public versus private, and public versus private equity choice. The odds of raising capital from debt providers for firms with higher forecast variance are 80% lower than equity sources. It is noteworthy here that equity sources comprise public equity and private equity. Hence, the choice may be more related to private equity. Therefore, firms with higher forecast variance are more likely to use private equity than public equity.

These results indicate that hidden information is a more significant determinant of firms' choice of capital provider than the type of security instruments. These results are estimated using Size, Growth, Profitability, Target Cash, and time dummies. To validate their reliability, we have also used multi-nominal logit models and noticed that coefficients on research and development, Dividends, Forecast Variance, and ZPROB are reliable in predicting the choice of capital providers. The coefficient on research and development

indicates that firms are more inclined towards private equity; however, if they need to raise capital externally, they will prefer public debt over private lenders and public equity investors. We also note that coefficients on Dividends and ZPROB indicate that firms are more likely towards public debt.

This study observes that capital structures discussion should focus more on the people who buy the securities issued by firms. It highlights that hidden information is an essential consideration for firms when deciding which type of investors would buy their securities. If firms expect that investors are well informed, and the associated cost of hidden information concern is not high, they may prefer public investors and issue bonds and new shares. However, if they note that information asymmetry costs are too high, they may prefer bank loans or internal funding.

### 5.3.2. Credit Ratings and Capital providers

The second issue focuses on whether credit ratings are important in determining the choice of capital providers. This study argues that credit ratings are reliable indicators of hidden information; therefore, their implications on the choice of capital providers ought to be significant. Proving this relationship requires investigating two aspects. Firstly, determining whether credit ratings are reliable indicators of hidden information. Secondly, determine the effects of credit ratings on corporate financing choices and delineate their implications on the choice of capital provider from debt versus equity.

This study starts the analysis by first establishing that credit ratings are reliable indicators of firms' hidden information. Existing studies such as of Kisgen (2006), Kisgen (2009), Kisgen (2012), and Aktan et al. (2019) note that role of credit ratings is significant in determining the debt issuance behaviour of firms. They argue that firms try to adjust their capital structure in anticipation of credit rating changes such as it minimises the negative

externalities of the change. However, their tests do not include the other indicators of hidden information and mainly use size, profitability, and current leverage as control variables.

Table 21 presents the results of a full-information model in which all variants of credit ratings, hidden information indicators, and control variables are included. Results indicate that implications of credit ratings are significant even after accounting for other hidden information variables.

We observe that firms' broad classifications based on their credit ratings and rating downgrade significantly determine firms' corporate financing behaviour. We note that broad ratings have positive signs that confirm the notion that firms with higher ratings are more likely to raise capital from public sources to benefit from the low cost of borrowing available to them (Diamond (1991) and Denis and Mihov (2003)). Broad ratings indicate that firms with higher ratings are 11% more likely to use public capital providers. Although the coefficient is only significant at 12%; still, it is significantly better than the p-value of 28% for debt versus equity choice in model 2 (see Table 21).

Bedendo and Siming (2020) also note that firms that have higher credit ratings and use more private debt are penalised by rating agencies, prima facie. Hence, higher credit ratings of a firm may be the compelling factor that induces firms to raise capital from public investors.

On a contradictory note, our results show that as firms move from risky to healthy firms, they are 15% less likely to use public capital providers. It contradicts our findings for broad ratings. However, we have run tests using firm classification as an indicator variable (Presented in 4.3.6). These results indicate that the probability of using public sources increases as the firms move from a risky to healthy credit quality state. These results are statistically valid for healthy firms, in line with our previous assertion.

In both models, we observe that research and development and dividends are statistically insignificant, and their economic significance has declined from models used in previous sections. Forecast variance is significant at the 5% level, and the coefficient suggests that the probability of firms relying on public capital providers will decrease by 75%, given the increase in forecast variance.

These results allow us to conclude that credit ratings are a reliable indicator of hidden information of firms, and their use as a proxy is well justified.

To investigate the second aspect of this study, we have conducted a range of partial tests in which we used one credit rating variant (i.e., plus or minus signs, rating anchor, or realised ratings) and hidden information and control variables. These results are presented in sections 4.3.3 to 4.3.7 and detail which variants of credit ratings are reliable and which are not. Our results indicate that credit ratings are robust estimators of the choice of capital provider. This role, we argue, is above and beyond the Credit Rating and Capital Structure (CR-CS) hypothesis proposed by Kisgen (2006).

Our study indicates that the relationship between credit ratings and choice of capital providers is concave. In other words, we do not conclude that as firms' rating increase, they increasingly rely on a particular type of capital provider. Instead, we notice a diminishing marginal utility of a particular source of capital for firms. For instance, firms rated speculative-grade consider the bank a reliable financing partner. Although, reliance on bank finance declines as we move from C rated firms to the BBB rating category.

Nonetheless, we observe that firms with the highest rating prefer public debt. Similarly, bond issuance and new share issuance is higher in firms rated between BBB+ to BB-. It indicates that high and low rated firms find it costly to use public sources for raising capital and prefer relying on private sources.

### 5.3.3. Realised rating versus anticipatory rating changes

The third issue in this study is that firms' choice of capital providers is influenced by anticipated or realised rating changes? This study argues that the role of anticipated rating changes[31] on firms financing behaviour is not significant. Although we note some links between rating signs and preference of capital providers; however, this evidence is statistically weak. We find it questionable why firms would change their existing relationship with investors based on an anticipated change. Doing so is bound to exacerbate the information asymmetry problem. Firms changing their capital structure by issuing more debt or issuing less debt may send unintended signals to outsiders. It risks the flight of existing investors and can also lead new investors to consider the firms' securities of inferior quality and demand higher premiums.

This study notes that realised rating changes are a more reliable indicator of firms' financing preference. Firms are observed to respond to actual rating upgrades and downgrade in the current period by changing the composition of their capital providers. Interestingly, we observe that likelihood of tapping public markets for firms whose rating is upgraded increases by 29.05% (See Table 29). In comparison, the same likelihood increases by 32.35% for the firms whose rating is downgraded. The first coefficient is significant at 5%, and the latter is significant at 1%.

[31] According to the CR-CS hypothesis, firms with signs such as plus or minus attached to their rating anticipate a change in their capital ratings. Hence, they issue less debt (Kisgen, 2006).

It indicates that rated firms use going to public investors (issuing bonds instruments) as means to indicate and/or verify their creditworthiness in both cases (e.g., upgrade, as well as downgrade). One may question the uniformity of responses by firms as our results suggest that firms in both circumstances (i.e., upgrade and downgrade) are likely to tap public markets. Ostensibly, this seems strange; however, we counter this by arguing that in both circumstances, the firm is trying to achieve multiple distinct objectives using the same means for the reasons as follows:

i. In case of an upgrade, firms are trying to benefit from the lower costs of borrowing from public sources, especially by issuing the new bond and benefit from the increased creditworthiness.
ii. In case of a downgrade, firms are trying to test the market perception about their rating downgrade and signal investors that management is confident about its future cash flows.
iii. Similarly, firms may also consider issuing new shares after a downgrade to raise additional capital or exhibit managers' trust in the firms' future.

Although gathering evidence for such hypothetical assertions is not accessible yet, we argue that these reasons are as plausible as the reasons given by credit ratings and capital structure hypothesis proponents.

Our results also indicate that last years' credit ratings influence firms' current choice of capital providers. We note that firms on the borderline of macro ratings are more concerned with the nature of capital providers rather than the instruments of raising capital. Results indicate that firms on the borderline of their macro rating are more likely to use private sources of capital rather than public.

This study provides evidence that firms care about their capital sources, and firms' credit ratings indicate how firms ensure the desired combination of their capital providers. This study concludes that we need further study credit ratings and capital providers problems. More research is required to understand the difference between firms' credit ratings that frequently tap public markets and those that predominantly use private debt.

### 5.3.4. Limitations of the Study

Hitherto, the discussion outlines that this study uses advanced choice modelling to estimate robust predictors of firms' corporate financing choices. A large data set is collected to ensure robust and reliable estimated coefficients. Multiple specifications of models are used to test the significance of credit ratings in the presence of other variables. Section 4.3.1 and 4.4 detail the steps we have taken to ensure the robustness of our results. However, our study does not claim to present the ultimate truth.

Two broad issues limit the strengths of our results. The first issue is the data and methodology limitation, and the second issue is the generalisation and prediction limitations.

#### 5.3.4.1. Data and Methodology Limitations

This study uses Bloomberg ® and Osiris ® to collect financials, securities issuance, and credit rating data. Given that the data sources are not uniform, there are noticeable differences in estimating different variables. Therefore, limitations arising due to this can be considered mechanical limitations. Mechanical limitations are those issues that purely arise from the availability of data, its form, and its size. This study's three significant problems are matching, survival bias, and missing observations. Firstly, the matching problem; it is the case that often if the data is available on one source (i.e., Bloomberg) for

a firm, then it may not be available for the other and vice versa. This issue is managed by creating our dataset using an ordered id system, and firms are identified using that id. Secondly, our data collection suffers from survival bias; firms often enter and leave the sample throughout the sample period. Hence, fewer firms remain part of the population for the entirety of the period.

Furthermore, we primarily focus on public firms; therefore, a firm only remains in the sample if it has remained a publicly quoted firm irrespective it exists or not exists. This issue is common to corporate finance studies (Welch, 2007); hence, we do not expect it to affect our results differently from the existing studies. Thirdly, the issue of missing observations in the data; is due to lack of disclosure by firms or the instances where the database did not collect the data field for the given period.

The second type of limitation is methodological, which is ascribable to how this study interprets the data and uses it to construct independent and dependent variables. Firstly, we study incremental financing decisions rather than percentage changes in debt ratios. For our analysis, we use changes in absolute levels of different financing sources at year-end as indicators of whether a firm has chosen a particular financing decision or not. This approach allows us to minimise the mean tendency of the data and enables us to focus on the strategic contents of the financing decisions. Nonetheless, there are two issues with this approach. Firstly, MacKie-Mason (1990) notes that such an approach requires us to assume that firms only make financing decisions once a year. There are also instances where it is notable that firms often make more than one choice, and secondly, there are also instances where firms made no financing choice during the period.

It is important to mention that the duplicity of financing decisions is more endemic in bank loans and internal funds than in the issuance of public securities such as bonds and stocks. Therefore, we observe severe opacity and an unpredictable selection of financing

choices. In addition to this, establishing the link between incremental financing and investment decisions is also not possible due to the opacity of data (MacKie-Mason, 1990). However, Welch (2007) notes that these issues are common to the capital structure research; hence, results may be in line with other studies. Furthermore, Section 3.7.1 and 3.7.2 elaborate that how we have tried to minimise these issues.

#### 1.3.4.2. Generalisation and Prediction Limitations

The second types of limitation are abstract and grounded in the ontological differences between our approach and real-life scenarios. This study uses data from expensive databases and then adapts advanced level modelling techniques to find the relationships. However, to make such information available to public investors and enable them to predict firms' choice of capital providers is a distant reality. Furthermore, nested-logit models do not fully relax the IID and IIA assumptions, and it requires more complex choice modelling to analyse utility correlations, if there are any.

One common issue with capital structure studies is the ability of models to predict the future course of actions adopted by firms. However, Lemmon and Zender (2010) note that choice modelling enhances the prediction power of capital structure models. However, such enhancement is more relatable to historical decisions than future decisions.

There is one issue that limits the prediction power of our models; it is the lack of data. We have used 35000 observations that belong to publicly listed firms; however, to make better predictions, one needs to collect more data about private firms. Moreover, our sample set mainly comprises USA firms; however, using the UK and European firms' data can give us a better prediction model. Therefore, the prediction power of our model is limited to publicly listed USA firms and to make these models more generalisable; one needs to collect more data.

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### 5.3.5. Implications and Recommendations

This study explores unique and non-linear implications of credit ratings and their reliability as hidden information indicators. This thesis provides detailed evidence of how historical, current, and realised ratings affect a firm’s capital provider choice. Therefore,

this study concludes that firms should view their credit ratings and rating changes as a credit quality signal to existing and prospective investors. Furthermore, our study provides a concrete basis for the regulators to treat credit ratings as a public good. It will help in minimising the information asymmetry between firms and well-established investors. In addition to this, this can also enable small investors to understand the creditworthiness of firms and be willing to invest directly in firms. Our study contributes towards theory, managerial decision making, and policymaking processes.

#### 5.3.5.1. Theoretical Contribution

This study adds to theories of hidden information, signalling, the choice of capital providers, and the role of credit ratings. We combine central bankers' and monetary economists' orientation towards firms' financing choices and merge them with existing capital structure theories under information asymmetry. The first academic orientation focuses on the supply side of financial markets and looks at how an efficient supply of bank loans can help firms borrow and invest. The second academic orientation focuses on managerial discretion and views financing decisions as to the sole discretion of firms. However, by combining them, we argue that firms and investors mutually ration, and credit ratings are a rationing mechanism.

This study further notes that signalling theories that generally focus on information asymmetry minimising managerial decisions[32] can combine credit ratings and the choice of credit ratings. The combination can help managers indicate their opinions about their firms' credit quality. It can also enable managers to seek capital providers less susceptible to

[32] Such as dividend policy and target leverage or pecking order financing structure.

temporary shocks to firms' credit quality. Especially, we observe that firms vulnerable to financial distress prefer private over public. Therefore, if these firms choose to raise capital from public investors, it indicates that managers are optimistic about their credit quality.

This study also made an important distinction between anticipated and realised rating changes. The first one is usually indicated by plus or minus signs associated with the credit ratings. The latter is indicated by the actual upgrade or downgrade associated with a firm's credit rating. This study notes that realised rating changes are more reliable indicators of firms' choice of capital providers. Therefore, it would be interesting to see whether this pattern holds for larger data sets and different countries.

This study also advances the use of extreme value analysis in capital structures. We relax IID and IIA assumptions and note that choice modelling can help better understand the firms' financing choices. We have used nested-logit models to allow for dependence between alternatives and evidenced that firms current and historical financing choices affect each other. Furthermore, we also note that a firm's selection of one financing alternative can affect the choice of other alternatives. Lemmon and Zender (2010) note that using such modelling techniques improves the predictive power of capital structure models.

#### 5.3.5.2. Implications for managers and policymakers

Our study extends the findings of Naeem (2012) and notes that firms need to have a rating for their firm. In addition to getting their debt instruments rated, firms with a corporate rating can help investors understand the firm better.

This study notes that having a credit rating becomes imperative as firms move away from traditional financing channels such as stock markets and bond markets. Micro-investors who neither have the skills nor infrastructure to perform technical analysis can use credit ratings to understand firms’ credit quality.

This study also notes that firms should use changes in capital providers after the change in the credit ratings to signal hidden information. Managers can minimise any unwanted consequence of credit rating changes by doing so.

Our study also verifies the importance of credit ratings for management and investors. Results indicate that high-rated firms prefer public debt, and firms near macro rating borders prefer private. It means that credit ratings can play a crucial role if larger and high rated firms choose to borrow from banks or instead abstain from borrowing. Similarly, middle rated firms that are often smaller may be inhibited by their credit ratings to issue bonds. Therefore, central banks and regulators should ensure that credit ratings agencies are objectives. Especially rating inflation and rating conservatism (ALP (2013) and Baghai et al. (2014)) can seriously deter borrowing and lending activity. Furthermore, rating agencies can develop more robust rating models by ensuring objectivity. These rating models (ideally if they are made public) can help smaller investors to directly assess that whether the issued ratings are an accurate representation of firms' creditworthiness.

#### 5.3.5.3. Recommendations

This study arguably provides the first concrete evidence for the existence of the Credit Ratings and Capital Provider (CP) hypothesis. This evidence is in addition to the existing Credit Ratings and Capital Structure (CS) hypothesis proposed by Kisgen (2006). This study overcomes numerous limitations of existing studies, as noted by Naeem (2012), by using incremental financing data, long-run data, relaxation of IID assumption, and classification models rather than linear models. However, there are many other avenues that this study could not explore due to limitations as mentioned above.

As data availability increases and modelling techniques improve, researchers can focus on unexplored options. Although strategic financing decisions can never be made in

the absence of human supervision; yet, having an objective and detailed model can help managers to make the best decisions. Firstly, I argue that our study demonstrates that one can reliably predict the choice of capital providers through classification models. Classification models can enable future researchers to use machine language and artificial intelligence to do more detailed modelling to auto-predict managers' best course of action. Secondly, there is room for exploring other capital providers that firms use for financing—especially using government grants and subsidies and analysing the implications of credit ratings on such decisions.

In addition to this, this study proposes realised rating changes as the best estimator of firms' financing choices. Future researchers can use this variable to test that is it true for small firms and private firms. This can inform policymakers and central bankers and help them better use their economic stimulus policies. Future researchers can also use our credit rating construct to test the relationship in different countries and continents. This comparison will allow us to assess whether the role of credit ratings is universal and holds across different countries.

This study also demonstrates the successful adoption of advanced choice models for corporate financing research. Future researchers should consider using nested-logit models and alternative specific models to analyse capital structure decisions as human choices. This will help us understand the strategic content of financing choices of firms and analyse managerial intents in making irregular financing choices.

We also recommend that future researchers should consider differentiating the firms based on their credit ratings. Firms' financing choices and firms that are not rated should be analysed and compared to rated firms. If there is a qualitative difference between such firms, it will further argue that all firms should try to have credit ratings. In addition to this, future research should also differentiate between the issuing models of credit ratings. Especially,

ratings issued without solicitation and after solicitation and the difference in their implications can help us understand the inherent conflict in rating models. This may help regulators regulate credit rating agencies and ensure the ratings are neither inflated nor deflated due to rating models.

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# Appendices

## 1. Appendix A: Rating Scale and Coding for our Research.

| Agency | Rating | Micro Scale | Macro Rating | Sign Category | Broad Rating | Broad Scale |
|---|---|---|---|---|---|---|
| Moody's | Aaa | 1 | Investment Grade | Neutral | Aaa | 1 |
| Moody's | Aa1 | 2 | Investment Grade | Plus | Aa | 2 |
| Moody's | Aa2 | 3 | Investment Grade | Neutral | Aa | 2 |
| Moody's | Aa3 | 4 | Investment Grade | Minus | Aa | 2 |
| Moody's | A1 | 5 | Investment Grade | Plus | A | 3 |
| Moody's | A2 | 6 | Investment Grade | Neutral | A | 3 |
| Moody's | A3 | 7 | Investment Grade | Minus | A | 3 |
| Moody's | Baa1 | 8 | Investment Grade | Plus | Baa | 4 |
| Moody's | Baa2 | 9 | Investment Grade | Neutral | Baa | 4 |
| Moody's | Baa3 | 10 | Investment Grade | Minus | Baa | 4 |
| Moody's | Ba1 | 11 | Investment Grade | Plus | Ba | 5 |
| Moody's | Ba2 | 12 | Spec Grade | Neutral | Ba | 5 |
| Moody's | Ba3 | 13 | Spec Grade | Minus | Ba | 5 |
| Moody's | B1 | 14 | Spec Grade | Plus | B | 6 |
| Moody's | B2 | 15 | Spec Grade | Neutral | B | 6 |
| Moody's | B3 | 16 | Spec Grade | Minus | B | 6 |
| Moody's | Caa1 | 17 | Spec Grade | Plus | Caa | 7 |
| Moody's | Caa2 | 18 | Spec Grade | Neutral | Caa | 7 |
| Moody's | Caa3 | 19 | Spec Grade | Minus | Caa | 7 |
| Moody's | Ca | 20 | Spec Grade | Neutral | Ca | 8 |
| Moody's | C | 21 | Spec Grade | Neutral | C | 9 |
| Moody's | (P)A1 | 5 | Investment Grade | Plus | A | 3 |
| Moody's | (P)A3 | 7 | Investment Grade | Minus | A | 3 |
| Moody's | (P)Baa1 | 8 | Investment Grade | Plus | Baa | 4 |
| Moody's | (P)Baa2 | 9 | Investment Grade | Neutral | Baa | 4 |
| Moody's | (P)Baa3 | 10 | Investment Grade | Minus | Baa | 4 |
| S&P | AAA | 1 | Investment Grade | Neutral | AAA | 1 |
| S&P | AA+ | 2 | Investment Grade | Plus | AA | 2 |
| S&P | AA | 3 | Investment Grade | Neutral | AA | 2 |
| S&P | AA- | 4 | Investment Grade | Minus | AA | 2 |
| S&P | A+ | 5 | Investment Grade | Plus | A | 3 |
| S&P | A | 6 | Investment Grade | Neutral | A | 3 |
| S&P | A- | 7 | Investment Grade | Minus | A | 3 |
| S&P | BBB+ | 8 | Investment Grade | Plus | BBB | 4 |
| S&P | BBB | 9 | Investment Grade | Neutral | BBB | 4 |
| S&P | BBB- | 10 | Investment Grade | Minus | BBB | 4 |
| S&P | BB+ | 11 | Investment Grade | Plus | BB | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| S&P | BB | 12 | Spec Grade | Neutral | BB | 5 |
| S&P | BB- | 13 | Spec Grade | Minus | BB | 5 |
| S&P | B+ | 14 | Spec Grade | Plus | B | 6 |
| S&P | B | 15 | Spec Grade | Neutral | B | 6 |
| S&P | B- | 16 | Spec Grade | Minus | B | 6 |
| S&P | CCC+ | 17 | Spec Grade | Plus | CCC | 7 |
| S&P | CCC | 18 | Spec Grade | Neutral | CCC | 7 |
| S&P | CCC- | 19 | Spec Grade | Minus | CCC | 7 |
| S&P | CC | 20 | Spec Grade | Neutral | CC | 8 |
| S&P | C | 21 | Spec Grade | Neutral | C | 9 |
| S&P | D | 22 | Spec Grade | Neutral | D | 10 |
| S&P | ST.DEV | 22 | Spec Grade | Neutral | ST.DEV | 10 |
| S&P | A-u | 7 | Investment Grade | Minus | A | 3 |
| S&P | BBB+u | 8 | Investment Grade | Plus | BBB | 4 |
| S&P | BBBu | 9 | Investment Grade | Neutral | BBB | 4 |
| S&P | BBB-u | 10 | Investment Grade | Minus | BBB | 4 |
| S&P | BB+u | 11 | Investment Grade | Plus | BB | 5 |
| S&P | BBu | 12 | Spec Grade | Neutral | BB | 5 |
| S&P | BB-u | 13 | Spec Grade | Minus | BB | 5 |
| S&P | Bu | 15 | Spec Grade | Neutral | B | 6 |
| S&P | ST.DEV | 22 | Spec Grade | | D | 10 |
| Fitch | AAA | 1 | Investment Grade | Neutral | AAA | 1 |
| Fitch | AA+ | 2 | Investment Grade | Plus | AA | 2 |
| Fitch | AA | 3 | Investment Grade | Neutral | AA | 2 |
| Fitch | AA- | 4 | Investment Grade | Minus | AA | 2 |
| Fitch | A+ | 5 | Investment Grade | Plus | A | 3 |
| Fitch | A | 6 | Investment Grade | Neutral | A | 3 |
| Fitch | A- | 7 | Investment Grade | Minus | A | 3 |
| Fitch | BBB+ | 8 | Investment Grade | Plus | BBB | 4 |
| Fitch | BBB | 9 | Investment Grade | Neutral | BBB | 4 |
| Fitch | BBB- | 10 | Investment Grade | Minus | BBB | 4 |
| Fitch | BB+ | 11 | Investment Grade | Plus | BB | 5 |
| Fitch | BB | 12 | Spec Grade | Neutral | BB | 5 |
| Fitch | BB- | 13 | Spec Grade | Minus | BB | 5 |
| Fitch | B+ | 14 | Spec Grade | Plus | B | 6 |
| Fitch | B | 15 | Spec Grade | Neutral | B | 6 |
| Fitch | B- | 16 | Spec Grade | Minus | B | 6 |
| Fitch | CCC+ | 17 | Spec Grade | Plus | CCC | 7 |
| Fitch | CCC | 18 | Spec Grade | Neutral | CCC | 7 |
| Fitch | CCC- | 19 | Spec Grade | Minus | CCC | 7 |
| Fitch | CC | 20 | Spec Grade | Neutral | CC | 8 |
| Fitch | C | 21 | Spec Grade | Neutral | C | 9 |
| Fitch | D | 22 | Spec Grade | Neutral | D | 10 |

# 1. Appendix A1: Year-wise descriptive analysis of films

| Year | stats | D | NCL | TLIBD | BL | DC | LL | OLTIBD | Private Debt | ONCL |
|---|---|---|---|---|---|---|---|---|---|---|
| 1999 | mean | 7371553.00 | 5161161.00 | 2842554.00 | 2820420.00 | 4060.51 | 18073.05 | 0.00 | 2838493.00 | 1748959.00 |
| | St.Dev | 29200000.00 | 25200000.00 | 11100000.00 | 11100000.00 | 62510.70 | 201231.90 | 0.00 | 11100000.00 | 9072645.00 |
| 2000 | mean | 9155974.00 | 6350219.00 | 3676568.00 | 3650200.00 | 0.00 | 19928.54 | 6439.38 | 3676568.00 | 2230296.00 |
| | St.Dev | 31800000.00 | 26700000.00 | 13500000.00 | 13500000.00 | 0.00 | 195302.10 | 88135.41 | 13500000.00 | 10200000.00 |
| 2001 | mean | 6812289.00 | 4521458.00 | 2926835.00 | 2896964.00 | 0.00 | 26449.03 | 3421.35 | 2926835.00 | 1569793.00 |
| | St.Dev | 18000000.00 | 13800000.00 | 9520656.00 | 9501148.00 | 0.00 | 208687.00 | 66474.56 | 9520656.00 | 4902333.00 |
| 2002 | mean | 9291276.00 | 6740082.00 | 3700463.00 | 3678072.00 | 0.00 | 20508.13 | 1883.47 | 3700463.00 | 2630549.00 |
| | St.Dev | 33500000.00 | 29200000.00 | 12400000.00 | 12400000.00 | 0.00 | 196270.60 | 49938.70 | 12400000.00 | 11700000.00 |
| 2003 | mean | 8570572.00 | 6354742.00 | 3443907.00 | 3427025.00 | 0.00 | 16882.51 | 0.00 | 3443907.00 | 2451761.00 |
| | St.Dev | 36000000.00 | 31900000.00 | 13700000.00 | 13700000.00 | 0.00 | 175787.40 | 0.00 | 13700000.00 | 12000000.00 |
| 2004 | mean | 8888578.00 | 6694866.00 | 3277998.00 | 3256975.00 | 1190.32 | 19832.89 | 0.00 | 3276808.00 | 2601194.00 |
| | St.Dev | 46600000.00 | 43000000.00 | 15200000.00 | 15100000.00 | 28765.35 | 198614.70 | 0.00 | 15200000.00 | 16900000.00 |
| 2005 | mean | 8502795.00 | 6142507.00 | 3268619.00 | 3247066.00 | 0.00 | 21552.65 | 0.00 | 3268619.00 | 2296243.00 |
| | St.Dev | 36000000.00 | 32000000.00 | 13300000.00 | 13200000.00 | 0.00 | 223109.10 | 0.00 | 13300000.00 | 10300000.00 |
| 2006 | mean | 10100000.00 | 7111201.00 | 3963242.00 | 3942898.00 | 0.00 | 20343.49 | 0.00 | 3963242.00 | 2564744.00 |
| | St.Dev | 39200000.00 | 34500000.00 | 16500000.00 | 16500000.00 | 0.00 | 213666.90 | 0.00 | 16500000.00 | 10100000.00 |
| 2007 | mean | 10900000.00 | 7664107.00 | 4348536.00 | 4326110.00 | 1971.15 | 20455.02 | 0.00 | 4346565.00 | 2740770.00 |
| | St.Dev | 40800000.00 | 36700000.00 | 18800000.00 | 18800000.00 | 52039.95 | 204772.70 | 0.00 | 18800000.00 | 9797509.00 |
| 2008 | mean | 13300000.00 | 9854710.00 | 5521507.00 | 5499320.00 | 0.00 | 20510.51 | 1676.36 | 5521507.00 | 3562884.00 |
| | St.Dev | 50800000.00 | 46400000.00 | 25200000.00 | 25200000.00 | 0.00 | 192943.90 | 42738.84 | 25200000.00 | 11800000.00 |
| 2009 | mean | 13600000.00 | 10000000.00 | 5532890.00 | 5506516.00 | 0.00 | 26373.69 | 0.00 | 5532890.00 | 4114050.00 |
| | St.Dev | 42900000.00 | 37900000.00 | 21600000.00 | 21600000.00 | 0.00 | 209935.20 | 0.00 | 21600000.00 | 12200000.00 |
| 2010 | mean | 10700000.00 | 7636222.00 | 4429618.00 | 4403578.00 | 0.00 | 26040.03 | 0.00 | 4429618.00 | 3018487.00 |
| | St.Dev | 30700000.00 | 26800000.00 | 15500000.00 | 15400000.00 | 0.00 | 230139.50 | 0.00 | 15500000.00 | 8833746.00 |
| 2011 | mean | 12500000.00 | 9083570.00 | 5139828.00 | 5107924.00 | 0.00 | 31904.12 | 0.00 | 5139828.00 | 3718721.00 |
| | St.Dev | 32500000.00 | 28100000.00 | 14500000.00 | 14400000.00 | 0.00 | 227148.40 | 0.00 | 14500000.00 | 11200000.00 |
| 2012 | mean | 12400000.00 | 8913172.00 | 5171356.00 | 5142753.00 | 0.00 | 24835.28 | 3767.67 | 5171356.00 | 3657197.00 |
| | St.Dev | 29800000.00 | 23800000.00 | 13700000.00 | 13700000.00 | 0.00 | 186074.00 | 72276.41 | 13700000.00 | 10100000.00 |
| 2013 | mean | 14500000.00 | 10500000.00 | 6488241.00 | 6447911.00 | 0.00 | 38324.58 | 2005.55 | 6488241.00 | 3937384.00 |
| | St.Dev | 36700000.00 | 29900000.00 | 18500000.00 | 18400000.00 | 0.00 | 220990.80 | 53664.98 | 18500000.00 | 11200000.00 |
| 2014 | mean | 15800000.00 | 11100000.00 | 6371434.00 | 6316485.00 | 0.00 | 52916.26 | 2032.56 | 6371434.00 | 4699011.00 |
| | St.Dev | 34700000.00 | 27100000.00 | 12900000.00 | 12900000.00 | 0.00 | 365200.40 | 53313.46 | 12900000.00 | 14400000.00 |
| 2015 | mean | 16600000.00 | 12100000.00 | 7207052.00 | 7153902.00 | 0.00 | 50726.61 | 2423.40 | 7207052.00 | 4800987.00 |
| | St.Dev | 34300000.00 | 27400000.00 | 13200000.00 | 13200000.00 | 0.00 | 362483.30 | 66057.20 | 13200000.00 | 13700000.00 |
| 2016 | mean | 18400000.00 | 13300000.00 | 7981560.00 | 7924864.00 | 0.00 | 53738.98 | 2957.41 | 7981560.00 | 5255078.00 |
| | St.Dev | 33400000.00 | 24800000.00 | 13400000.00 | 13300000.00 | 0.00 | 390532.10 | 79575.81 | 13400000.00 | 12300000.00 |
| 2017 | mean | 18800000.00 | 13400000.00 | 8506167.00 | 8380859.00 | 0.00 | 121877.40 | 3431.29 | 8506167.00 | 4858833.00 |
| | St.Dev | 37700000.00 | 28000000.00 | 15700000.00 | 15600000.00 | 0.00 | 937069.80 | 93151.72 | 15700000.00 | 12700000.00 |
| 2018 | mean | 18400000.00 | 13300000.00 | 8603241.00 | 8453107.00 | 0.00 | 144967.60 | 5166.67 | 8603241.00 | 4660917.00 |
| | St.Dev | 38200000.00 | 29000000.00 | 17000000.00 | 16800000.00 | 0.00 | 1173937.00 | 126978.30 | 17000000.00 | 12800000.00 |
| Total | mean | 12500000.00 | 9003679.00 | 5252489.00 | 5210567.00 | 233.88 | 39848.23 | 1838.94 | 5252255.00 | 3445194.00 |
| | St.Dev | 36500000.00 | 30900000.00 | 15900000.00 | 15800000.00 | 15947.93 | 411315.50 | 57246.26 | 15900000.00 | 11700000.00 |

# 2. Appendix B: Variable Specification and Explanation

| | |
|---|---|
| **Alternative Specific Variables** | |
| **Required rate of return** | Represents theoretical indication of the required rate of return by investors in normal circumstance. As the convention suggest that equity holder demands the highest rate of internal and costs of internal funds is the lowest. Therefore, the variable is scaled on the scale of 1 to 4; 4 being the highest required rate of return and 1 the lower.<br>1 = Private equity proxied for Internal financing.<br>2 = private debt if firm has speculative grade rating. However, if firm has investment grade rating then it is public debt.<br>3 = public debt if firm have speculative grade rating. However, if firm has investment grade rating then it's private debt.<br>4 = public equity. |
| **Control and monitoring** | Represent the extent to which capital provider can directly monitor and observe firms' financing decisions. As per the design of the instruments, private investors have the highest ability to observe firms and the internal finance has zero monitoring. The variable is scaled from 0 to 2; where, 0 represent non control and monitoring threat and 2 means the highest control and monitoring.<br>0 = Private equity proxied for Internal financing.<br>1 = public debt & Public Equity<br>2 = private debt |
| **Tax considerations** | Represent the tax considerations for a source of capital. The variable is scaled from 0 to 2; where, 0 means no or limited concerns and 2 means the highest concern. 0 would be allocated to private equity proxied for internal financing as their use has no link to tax deduction. Whereas 1 is for public and private lenders and 2 for equity investors as their income is subject to double tax. |
| **Firm Specific Variables** | |
| **1. Credit Ratings Variables** | |
| **Micro Rating** ($MRT_{it}$) | Represents current credit ratings of firms such as from AAA to AA+, AA+ to AA and so on. The ratings are ranked on the scale from 1 to 22; where, 1 refers to the credit rating of D or below C and 22 represents AAA. |
| **Broad Rating** ($BRT_{it}$) | Represents current broad rating of the firm such as AAA, AA, BBB, BB and so on. These ratings are ranked on the scale from 1 to 10; where, 1 refers to the credit rating of D or equivalent and 10 represents AAA. |
| **Rating Upgrade** ($RU_{it}$) | It is the dummy variable that indicates whether current micro rating is an upgrade from previous year or not. If current rating is higher than previous year it is 1 otherwise 0. |
| **Rating Downgrade** ($RD_{it}$) | It is the dummy variable that indicates whether current micro rating is a downgrade from previous year or not. If current rating is lower than previous year than it is 1 otherwise 0. |
| **Rating Anchor** ($RA_{it}$) | It is the lagged credit rating variable. We have taken two-year lag to demonstrate if historical credit rating can influence financing choices of firms in the current year. Rating Anchor 1 represents one-year lag and rating anchor 2 represents two-year lag. |

| | |
|---|---|
| **Plus, or Minus ($PoM_{it}$)** | It is a dummy variable which is equal to 1 firm has plus or minus sign at the beginning of the period and 0 otherwise. |
| **Plus ($P_{it}$)** | It is a dummy variable which is equal to 1 if the credit rating has plus sign at the beginning of the period and 0 otherwise. |
| **Minus ($P_{it}$)** | It is a dummy variable which is equal to 1 if the credit rating has minus sign at the beginning of the period and 0 otherwise. |
| **Investment Grade ($INV_t$)** | It is a dummy variable that is equal to 1 if firm has a rating of BB and above at the beginning of period and 0 otherwise. |
| **Speculative Grade ($Spec_t$)** | It is a dummy variable that is equal to 1 if firm has a rating of BB and above at the beginning of period and 0 otherwise. |
| **Firm Classification ($FC_{it}$)** | Represents classification of firms into four categories based on their credit ratings. These four classifications are: healthy companies, balanced companies, vulnerable companies, and risky companies. These classifications are recorded on a scale of 1 to 4; where, 4 refers to the heathy companies and 1 to risk companies. |
| 2. **Information Asymmetry** | |
| **Dividend Payment** | It is dummy variable coded as 1 if a firm pays dividend and 0 otherwise. |
| **Forecast Variance** | Estimates the volatility of earnings forecast and is estimated as standard deviation of first difference of EBIT |
| 3. **Control Variables** | |
| **Size of the firm** | It is estimated as natural logarithm of book value of Total Assets (TA) such as $ln(TA_{it})$ for firm *i at time t.* |
| **ZPROB** | It is estimated as Altman Z score modified by MacKie-Mason (1990) that estimates the distance from bankruptcy. $$ZPROB = 3.3\frac{EBIT}{Total\ assets} + 1.0\frac{Sales}{Total\ assets} + 1.4\frac{RE}{Total\ assets} + 1.2\frac{WC}{Total\ assets}$$ |
| **Growth** | Change in Total assets |
| **Profitability** | It is estimated as $\frac{EBT\ pluc\ depriciation\ and\ amortisation_{it}}{Total\ Assets}$ |
| **Time** | Dummy variables to control for the prevalent economic environment. I have divided the sample period into three cycles: pre-financial crisis from 1999 to 2006, during financial crisis from 2007 to 2012, and after financial crisis from 2012 to 2018. Three dummy variables are created which are coded 1 for the year if belonging to the cycle and 0 otherwise. |
| **Target Cash Balance** | Estimates the long run average cash balance for the sample period of individual firms. Formula for its calculation is: $(CSH/E_{it})/n$. Where, n = years in sample period. |

# 3. Appendix D: Base alternative analysis using MNL

Multinomial logistic regression — Number of obs = 7,475
LR chi2(30) = 1654.56
Prob > chi2 = 0.0000
Log likelihood = -8305.3129 — Pseudo R2 = 0.0906

| Ch_Obs | Coef. | Std. Err. | z | P>\|z\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| Private_Equity | (base outcome) | | | | | |
| Private_Debt | | | | | | |
| ln_R_D | .0063468 | .0102441 | 0.62 | 0.536 | -.0137313 | .026425 |
| Div | -.5249636 | .1276349 | -4.11 | 0.000 | -.7751234 | -.2748038 |
| Forecast_Variance | -.3322542 | .1465483 | -2.27 | 0.023 | -.6194837 | -.0450248 |
| size | .3193488 | .0647444 | 4.93 | 0.000 | .1924521 | .4462455 |
| ZPROB | .1244965 | .0580535 | 2.14 | 0.032 | .0107138 | .2382792 |
| Growth | 7.52256 | .4152567 | 18.12 | 0.000 | 6.708671 | 8.336448 |
| Profitability | .8988262 | .5113807 | 1.76 | 0.079 | -.1034616 | 1.901114 |
| Tg_CSH | -.3360369 | .0563998 | -5.96 | 0.000 | -.4465786 | -.2254953 |
| time | | | | | | |
| During Crisis | .0156859 | .1381636 | 0.11 | 0.910 | -.2551097 | .2864816 |
| Post-Crisis | .020891 | .1258803 | 0.17 | 0.868 | -.2258298 | .2676119 |
| _cons | 1.033621 | .6391612 | 1.62 | 0.106 | -.2191117 | 2.286354 |
| Public_Debt | | | | | | |
| ln_R_D | .0282254 | .0101635 | 2.78 | 0.005 | .0083053 | .0481455 |
| Div | -.6208391 | .1292318 | -4.80 | 0.000 | -.8741288 | -.3675493 |
| Forecast_Variance | -.5063852 | .1558958 | -3.25 | 0.001 | -.8119353 | -.200835 |
| size | .7839777 | .0656069 | 11.95 | 0.000 | .6553905 | .912565 |
| ZPROB | .2532441 | .0582834 | 4.35 | 0.000 | .1390106 | .3674775 |
| Growth | 7.234158 | .4155788 | 17.41 | 0.000 | 6.419639 | 8.048677 |
| Profitability | 1.059028 | .5231895 | 2.02 | 0.043 | .0335955 | 2.084461 |
| Tg_CSH | -.2952912 | .0571609 | -5.17 | 0.000 | -.4073245 | -.1832578 |
| time | | | | | | |
| During Crisis | -.1511162 | .1385411 | -1.09 | 0.275 | -.4226518 | .1204194 |
| Post-Crisis | -.2868553 | .1263233 | -2.27 | 0.023 | -.5344444 | -.0392662 |
| _cons | -6.546035 | .6460384 | -10.13 | 0.000 | -7.812247 | -5.279823 |
| Public_Equity | | | | | | |
| ln_R_D | -.00573 | .0112217 | -0.51 | 0.610 | -.0277242 | .0162641 |
| Div | -.613634 | .1359827 | -4.51 | 0.000 | -.8801551 | -.3471129 |
| Forecast_Variance | -.1300346 | .1573051 | -0.83 | 0.408 | -.4383469 | .1782778 |
| size | .6101118 | .0694349 | 8.79 | 0.000 | .4740219 | .7462016 |
| ZPROB | .0506246 | .0624061 | 0.81 | 0.417 | -.071689 | .1729383 |
| Growth | 7.593811 | .4173843 | 18.19 | 0.000 | 6.775753 | 8.411869 |
| Profitability | -1.255111 | .4878577 | -2.57 | 0.010 | -2.211295 | -.2989279 |
| Tg_CSH | -.5049194 | .0598698 | -8.43 | 0.000 | -.6222619 | -.3875768 |
| time | | | | | | |
| During Crisis | -.5060261 | .1499009 | -3.38 | 0.001 | -.7998264 | -.2122258 |
| Post-Crisis | -.638882 | .1366544 | -4.68 | 0.000 | -.9067197 | -.3710443 |
| _cons | -1.588547 | .6881019 | -2.31 | 0.021 | -2.937202 | -.239892 |

## 4. Appendix E: Bonds Issues and Coupon rate as per Credit Rating

| | Bonds Issues | Coupon Rate |
|---|---|---|
| BBB | 536 | 4.53 |
| BBB+ | 493 | 4.47 |
| A | 335 | 4.03 |
| BBB- | 331 | 5.33 |
| A- | 299 | 4.18 |
| BB- | 289 | 6.54 |
| BB+ | 280 | 5.57 |
| BB | 254 | 5.82 |
| B+ | 213 | 6.28 |
| A+ | 192 | 4.25 |
| B | 175 | 6.81 |
| AA- | 121 | 3.06 |
| B- | 93 | 6.62 |
| AA | 69 | 3.86 |
| AAA | 48 | 3.37 |
| CCC+ | 34 | 7.48 |
| AA+ | 11 | 3.56 |
| CC | 11 | 8.27 |
| CCC | 10 | 6.33 |
| D | 6 | 6.96 |
| CCC- | 4 | 6.63 |