On the study of debt structure determinants*

†Lucas S. Macoris
Getulio Vargas Foundation (FGV - EAESP)

Working Paper
January 23, 2024

Abstract

While the study of capital structure is widespread in the corporate finance literature, debt structure - how and why firms choose a specific setting for their debt - remains a puzzle. In this paper, I provide empirical evidence that changes in passive ownership have the potential to affect the choice of firms' debt structure over time. I do so by exploiting exogenous variation in mutual funds' passive ownership due to *Russell 1000/2000* index assignments between 2010 and 2019 in a regression-discontinuity-design setting. More specifically, I ask whether increases in passive ownership are related to changes in firms' debt concentration among different debt contract types. Estimates show that a one standard deviation increase in passive ownership is related to a 29% decrease in debt concentration. In a subsequent set of results, I show that these results are entirely driven by smaller firms, are mostly leaned towards increases in *Commercial Papers*, *Term Loans* and *Revolving Credit*, and are unrelated to other firms' *ex-post* fundamentals. The results remain robust after different specifications and after adding a wide set of controls. In the final section of the study, I discuss the implications of these results and how they relate to some of the hypotheses previously highlighted in the most recent literature on debt structure and its determinants. This work is the first to provide empirical evidence on the role of passive ownership in explaining debt structure decisions, and contributes to the growing literature on how and why do firms adjust their debt structure decisions over time.

Keywords: Debt Structure; Passive Investors; Corporate Finance.

J.E.L. codes: C11, C52, G11, G17, F31

* I am grateful to all participants at Insper Seminars for their extremely insightful comments. All remaining errors are of my responsibility.
†lucas.macoris@fgv.br

1 Introduction

The study of capital structure has come a long way since the seminal work of Modigliani and Miller (1959), where perfect capital markets imply that capital structure decisions are irrelevant to firms' value. On the other hand, by relaxing the strong assumptions embedded in Modigliani and Miller (1959)'s work, several authors seek to identify the effect of capital structure on firms' value (Rajan and Zingales, 1995; Frank and Goyal, 2009). Despite a large body of research on this issue, capital structure remains one of the most contested issues in financial economics. For example, Lemmon et al. (2008) shows empirical evidence points that firms' fixed, unobserved characteristics are responsible for explaining a large portion of the cross-sectional variation in firms' capital structure. As such, high (low) leverage firms tend to remain high (low) leveraged for decades.

Leaning on that, what could explain capital structure persistence over time? Among other reasons, an explanation for the empirical pattern presented in Lemmon et al. (2008) and embedded in the assumptions of the main capital structure theories is that debt contracts are considered to be *uniform*. Notwithstanding, debt heterogeneity – in terms of several dimensions, such as maturity and convertibility – is a common feature of real-world capital markets.

In contrast, the study of firms' *debt structure* – *i.e,* how and why firms choose the design of their debt contracts – has gained attention over the last decade (Colla et al., 2020). Rauh and Sufi (2010) shows that as most of what has been done in capital structure studies treated debt as uniform, such studies miss a substantial and relevant component and are informative of firms' financial decisions. In this sense, studying the role of debt structure entails having a detailed glance at firms' balance sheets, seeking not only to recognize the different characteristics of firms' debt structure, such as maturity, types, sources, and priority, but also to understand *why* such heterogeneity is present.

While there is empirical evidence regarding debt specialization, there is no clear understanding of why some firms specialize in their debt structure to a higher degree than others. In this paper, I investigate a specific channel that seems to explain firms' debt structure decisions: ownership by passive investors. Stock ownership by passive institutional investors – *i.e,* those that seek to match the performance of an index, such as the S&P 500, or a particular investment style – has grown rapidly over the last years in the U.S, having quadrupled their share in the U.S stock market over the last 15 years and representing now more than a third of all mutual fund assets.

As shown in Appel et al. (2018), the increased presence of passive ownership facilitates

investor activism, as the large, concentrated shares of passive investors, along with their inability to sell poorly-performing stocks due to their mandate to track index constituents lessens the cost of coordinating efforts to engage in investor activism. For example, higher passive ownership is associated with greater success by activists in obtaining board representation, removing takeover defenses, and facilitating the sale of a targeted company. Overall, passive investors seem to mitigate the *free-rider* problem (Grossman and Hart, 1980), increasing activists' willingness to engage in costlier forms of activism, and thereby unlocking shareholder engagement actions that would not be incentive-compatible in the absence of highly concentrated ownership – either due to an increase in the campaign's credibility or through diluting coordination costs, as passive investors can proxy their large voting share in favor of the activist campaign.

Using a detailed dataset that allows me to analyze firms' debt structure through 10-K fillings, I exploit exogenous variation in passive institutional holdings due to *Russell 1000/2000* index assignments to investigate whether exogenous increases in passive ownership by U.S firms are related to firms' debt structure movements away from bank debt and/or other types of secured/collateralized debt. More specifically, I ask whether higher levels of passive ownership can affect firms' debt structure outcomes *ex-post* exogenous increases in the portion of equity held by large, passive shareholders, such as *ETF* funds. As such, by exploring such relationship, I am able to discuss potential channels related to debt structure dynamics related to the different hypothesis previously mentioned in the literature. For example, by bearing the coordination costs related to shareholder activism – or the threat of – can provide enough incentives for active monitoring, allowing firms to reap the benefits of multiple creditors and increased access to other types of debt, such as bonds.

By applying an identification strategy in the likes of Appel et al. (2018), I focus on the sub-sample of 250 firms in the bottom (top) of the *Russell 1000* (*Russell 2000)*) the threshold that defines the assignment these indices right after the recalibration period. As *Russell* indexes are value-weighted, a firm in the 950^{th} position of the *Russell 1000* index would have a much lower weight in the index portfolio than a firm in the $50th$ position of the *Russell 2000* index. As a consequence, index funds – also known as *exchange-traded funds* or ETFs – that track *Russell 1000/2000* recalibrate their portfolio based on the new theoretical portfolio weights of the indexes. This implies that a firm that was previously assigned to the bottom of the *Russell 1000* and has been assigned to the *Russell 2000* index will have an influx of passive ownership.

First, I show that the results obtained by regressing passive ownership on assignment

to the *Russell 2000* index, after controlling for all determinants of index assignment, implies an increase of approximately 29%, which is in line with the estimates presented in Appel et al. (2018). Importantly, this discontinuous change in passive ownership near the threshold between the two indices is plausibly exogenous to firm's characteristics, as the main component that drives index assignment is stock market capitalization, which is not fully in the control of the manager. Even if that is the case, other important confounders, such as analyst coverage, tend to increase in the opposite direction - *i.e,* whenever a firm is included in the *Russell 1000*–, as shown in Appel et al. (2018).

In a second stage, I use the sample estimates from the regression of passive ownership in a regression-discontinuity-design and analyze what happens to these firms' debt concentration among several types of debt structure *ex-post* changes in passive ownership. The results show that a one standard deviation increase in the level of passive ownership decreases debt concentration by 29%, and it is entirely driven by firms in the lowest tercile of asset size distribution. These results remain robust after including a wide set of fixed effects, different specifications for the running variable, and show that firms with increased passive ownership tend to move from a concentrated to a multi-tiered debt structure. Overall, the increase in the number of debt types considered is modest, with an average increase of 0.56 in the number of new debt types added to the firms' debt structure *ex-post* index recalibration, and provides evidence that is in line with the argument that firms borrow predominantly from a very limited number of debt types.

If firms are adjusting towards a more multi-tiered debt structure, which types of debt are increasing due to shifts in passive ownership? To answer this question, I use the instrumentalized variation from my first-stage regression and analyze the *ex-post* effect on the (log) level of each debt type. The results show that the *Commercial Paper*, *Term Loans*, and *Revolving Credit* are the debt types that are receiving a larger financial share. Furthermore, the results are concentrated on firm that at least a minimum level of debt diversification – *i,e,* at least two different debt types. Finally, additional results show that other firms' fundamentals do not have statistically significant changes *ex-post* increases in passive ownership, which rules out hypothesis regarding more broader channels that could indirectly affect debt structure.

This work relates to mainly two strands of the literature. First, this study extends the recent growing literature on debt structure (Rauh and Sufi, 2010; Colla et al., 2013, 2020) by providing empirical evidence on the potential possible channels by which debt heterogeneity manifests. Additionally, this study relates to corporate governance literature by studying the role of passive investors and their consequences on firms' corporate gover-

nance and future outcomes. Previous studies (Appel et al., 2016, 2018) show that institutional investors affect corporate governance by bearing the costs of monitoring managerial discretion, and the mechanism that enables such a link is related to an interplay between passive investors and activist shareholders.

The remainder of this paper is structured as follows. Section 2 provides a detailed discussion on the study of debt structure, its determinants, and the related literature. Section 3 provides a simple framework to illustrate the role of agency costs in financing decisions, and how debt structure decisions can manifest in such a way to lessen the agency costs. Sections 4 and 5 provides a detailed outlook on the data and information sources used throughout the analysis and the identification strategy used in this study. Section 6 presents the results of the econometrics estimation, and Section 7 translates the empirical results in terms of the hypothesis for debt structure determinants previously discussed in the literature. Finally, Section 8 concludes with a summary of the main contributions and directions for future research.

2 Capital Structure and Debt Structure

While different theories provide predictions on how capital structure may be informative of firms' financial decisions and relevant to maximizing shareholders' value, empirical evidence regarding the distinct capital structure theories provides, at best, mixed results. In stark contrast to several papers on the determinants of capital structure, such as Rajan and Zingales (1995), Lemmon et al. (2008) have shown prominent empirical results that capital structure is fairly persistent over time: high/low levered firms tend to keep their leverage in similar levels for over two decades. These results suggest that variation in capital structure is primarily determined by (unobserved) factors that are held constant over time, as the inclusion of firm fixed effects implies that time-invariant, unobservable firm characteristics capture most of the variation in the cross-section.

To that matter, what could explain capital structure persistence over time? Among other reasons, an explanation for the empirical pattern presented in Lemmon et al. (2008) is embedded in the assumptions of the main capital structure theories -– *i.e*, the *trade-off* theory (Kraus and Litzenberger, 1973), the *pecking-order* theory (Shyam-Sunder and C. Myers, 1999), and the *market-timing* theory (Baker and Wurgler, 2002) -– that debt contracts are uniform. In contrast, however, debt heterogeneity -– in terms of several dimensions, such as maturity and convertibility – is a common feature of real-world capital markets.

As documented in Colla et al. (2013), debt specialization – when firms borrow predom-

inantly from one type of debt – is widespread among U.S publicly-listed firms, and the extent to which firms specialize or diversify their debt across multiple types varies widely across different subsamples. For example, Rauh and Sufi (2010) shows that relative to high-credit-quality firms, low-credit-quality firms are more likely to have a multi-tiered capital structure consisting of both secured bank debt with tight covenants and subordinated non-bank debt with loose covenants.

As such, an explanation for why capital structure is surprisingly stable over time relates to the simplistic manner in which most of the previous studies have treated debt/equity decisions. When analyzing leverage ratios, an important shortcoming is that a focus on leverage ratios naturally leads to very strong assumptions about the underlying contractual characteristics of the securities. Notwithstanding, a detailed description of a debt claim is generally built, among other characteristics, on the following aspects (Rauh and Sufi, 2010):

(i) **Maturity**: how long does the promised payment for the borrower is due for?

(ii) **Type**: does the debt contract consists of a payment at the end of the contract or multiple coupons throughout the contract?

(iii) **Priority**: in an eventual default, which debtor should be the first to receive his claims?

(iv) **Covenants**: are covenant terms present so that debtholders are able to takeover control rights in an eventual situation of covenant break?

(v) **Convertibility**: is debt *convertible* to equity as a way to overcome possible *risk-shifting* problem due to the lack of managerial incentives?

As expected, abstracting away from the specifics of debt contracts may have important unfoldings for our understanding of firms' financial decisions that ultimately affect firms' overall capital structure. In this sense, despite the findings presented in Lemmon et al. (2008) that capital structure is stable over time, even though the total amount of debt (in % of Total Assets) is fairly stable over time, its *composition* may change significantly.

Seeking to shed light on this issue, Rauh and Sufi (2010) examine the types, sources, and the priorities of debt contracts using a sample of 305 randomly selected nonfinancial, rated public U.S. firms for the period 1996 to 2006. Contrasting to the "uniform" treatment of debt, almost three-quarters of firm-year observations employ more than two different

debt instruments. More strikingly, a quarter of the sample experiences no significant year-over-year change in debt level but shows a significant change in debt composition. By providing a detailed analysis of debt heterogeneity among different firms' characteristics, their findings advance on important patterns for the study of debt structure: weaker firms are more likely to use secured debt (bank debt), and as firms move from higher to lower ratings, the likelihood of issuing secured or subordinated debt increases.

Adding to the findings presented in Rauh and Sufi (2010), Colla et al. (2013) take advantage of the debt structure database available through *Capital IQ* and complement their analysis by considering rated and unrated firms. By distinguishing debt structure in terms of seven categories of debt contracts – such as bonds and term loans, for example–, they examine the debt structure of public U.S. firms that are representative of the universe of *Compustat* firms.

In line with previous findings on debt structure, results show that most firms borrow predominantly with one type of debt, thus showing a tendency towards *debt specialization*. However, the degree of specialization varies widely across subsamples: while large, rated firms simultaneously employ multiple types of debt, all other firms, comprising the majority of listed firms in the United States, make use of *only one type* of debt.

Altogether, these results constitute a broader picture on the grounds of understanding how firms manage to choose debt contracts: traditional capital structure studies that ignore debt heterogeneity miss a substantial portion of the variation in firms' capital structure. This opens the possibility to explore why there exists heterogeneity in debt issuance, and how one can reconcile the evidence that firms simultaneously use different types of debt.

While suggestive of the potential mechanisms that explain the variability of debt specialization across several firm dimensions, the recent literature has not presented empirical evidence of the grounds of establishing a *causal* relationship between any of these motives and firms' debt structure decisions. To that matter, this paper aims to bridge passive ownership and debt structure choices and discuss the hypothesis regarding the determinants of debt structure.

3 Debt structure decisions and its motivations

At a higher level, there is a strikingly historical persistence of debt issuance over equity: over 1946-1987, debt issues accounted for 87% of all external financing, while equity had only represented 7% (Bolton and Scharfstein, 1996). The vast prevalence of debt over

equity has motivated studies seeking to understand the contractual framework of debt financing decisions over time.

Theoretically, in a Modigliani and Miller (1959) world, the lack of agency costs abstracts away any difficulty faced by shareholders and debtholders of the firm to reach out to the managers and pursue their interests and maximize the value of the firm. However, relaxing this assumption gives rise to a series of conflicts of interest between managers and investors - also known as the *Principal-Agent* problem. Accordingly, the seminar work of Berle and Means (1932) highlights the agency problems that arise from the separation of ownership and control, such as insufficient effort, wasteful investment, managers extracting private benefits through excessive salaries and perks, among others.

Ultimately, these concerns between managers and claimants entail a series of issues related to transaction costs and information asymmetry, such as moral hazard, free cash flow, risk-shifting, credit-rationing, among others, that ultimately affects shareholders' value maximization. The possibility of such problems being pervasive to firms' long-term value entails that stakeholders such as banks and investors take these agency costs into account when making decisions. As a consequence, financing – either through debt or equity – may be hindered due to a higher cost of capital, making firms to foregone otherwise profitable investment opportunities.

In this sense, as debtholders anticipate the need for incentivizing managers to exert effort and act on behalf of their best interests, the absence of monitoring efforts that guarantee that managers pursue actions in line with these goals may hinder lenders from financing profitable investments – either through credit rationing or by setting higher prices. As such, some firms would only obtain funding if monitoring by a third party takes place to guarantee that managers are acting as a way to safeguard debt payments.

On the other hand, looking at individual debtholder decisions and its relationship with agency costs may miss important practical questions when it comes to equity and debt financing. Leaning on that observation, Bolton and Scharfstein (1996) studies the optimal debt contracting framework of a firm. Their model proposes that an optimal debt structure, from a contracting perspective, should be able to discourage firms from defaulting on their debt, while being able to minimize the losses conditional on the event of a liquidation. To that matter, their main point is that debt structure can influence the outcomes of a negotiation after a default, which can vary in the number of creditors involved, the allocation of security interests, and voting rules. In this sense, an optimal debt structure emerges from balancing-off default occurrence and the value of the firm following a default.

More recently, the emerging literature on debt structure determinants has focused on

two important stylized facts: the substantial heterogeneity of debt structure characteristics *across* firms, and the within-firm debt structure persistence. Overall Colla et al. (2013) proposes three potential explanations for the cross-sectional heterogeneity in debt structure: i) bankruptcy costs; ii) lack of access (or prohibitively costly) to some market segments; and iii) economies in information collection costs and enhanced incentives to monitor.

First, the idea of trading benefits and costs of debt goes back to Modigliani and Miller (1963). Assuming that agency costs arising from conflicting interests between equity holders and debtors (Jensen and Meckling, 1976) or between different debt claimants (Welch, 1997; Hackbarth and Mauer, 2011) may induce costly coordination costs in the case of liquidation. As such, firms may be optimally choosing their debt structure to trade-off the benefits of debt with the (expected) bankruptcy costs: since a more concentrated debt structure can induce lower renegotiation costs across few lenders, low-quality firms are expected to have a more concentrated debt structure to maximize its liquidation value, whereas high-quality firms seek debt from multiple sources to minimize the probability of default. Theoretically, lowering (expected) bankruptcy costs goes back to (Bolton and Scharfstein, 1996), where theoretical predictions show that firms with lower prospects maximize the liquidation value by borrowing from a single creditor, while high prospect firms do so my contracting from multiple debtors.

Empirical studies, such as Ivashina et al. (2016) show that higher debt concentration increases the speed of reestructuring under *Chapter 11* while lowering the likelihood of liquidation, which is in line with the argument that debt concentration act in lowering negotiation costs between debtholders. Furthermore, empirical evidence presented in Colla et al. (2013) shows that measures of bankruptcy costs, such as asset tangibility (Titman and Wessels, 1988) and cash-flow volatility (Rajan and Zingales, 1995) are in line with the interpretation of firms choosing debt structure to minimize bankruptcy costs: while firms with more tangible assets tend to employ a less concentrated debt structure, firms with more volatile cash-flows tend to concentrate towards only one type of debt.

Second, moving away from frictionless capital markets, market frictions may also induce some firms to credit rationing, either in the intensive margin – *i.e,* limiting the extent to which firms can resort to debt financing through prices – or in the extensive margin – by simply refusing to finance some types of firms (Almeida et al., 2012; Rauh and Sufi, 2010; Faulkender and Petersen, 2005). To this point, as market frictions induce some conditions previously mentioned – such as bankruptcy costs and information asymmetry – to make debt structure decisions relevant from the firm perspective, the lender perspective in terms of whether (and how much) to ration the amount of lending to a given firm can

help explaining the persistence of within-firm debt specialization in the U.S.

For example, the lender's decision of rationing certain firms' access to capital may hinder these firms to seek for alternative financing sources, narrowing the set of financing choices available and increasing debt persistence on a given type of debt over time. Furthermore, lack of access and/or prohibitively higher costs for some debt alternatives, such as bond issuance, may hinder smaller firms to move away from traditional bank debt – for a detailed discussion on market and bank-based economies, see Bats and Houben (2020).

Finally, asymmetric information between managers and the different firm's stakeholders implies that collecting information and monitoring managerial activity is costly. As such, debt structure and ownership can be chosen as a way to provide enough incentives to monitor. For example, not only blockholders, due to their increased equity stake in the firm, can have enough incentives to monitor Edmans (2014) but creditholders can also exert monitoring so as to guarantee that managerial action is in line with their interests. For example, much of the literature on relationship lending points to banks as effective monitors.

As such, a potential explanation for this heterogeneity in debt structure may be related to information collection costs and enhanced incentives to monitor: as monitoring is costly, for monitoring efforts to be incentive-compatible, the agent has to have a sufficiently large claim in the firm to circumvent the *free-rider* problem (Grossman and Hart, 1980). Therefore, opaque firms with higher information collection and monitoring costs are more likely to present a concentrated debt structure, whereas transparent firms with less monitoring should present a more widespread debt structure (Colla et al., 2013).

Theoretical models of active monitoring, such as the one presented in Tirole (2006), highlights conditions where monitoring plays a role in providing conditions for firms to fund profitable investment opportunities – *i.e,* entrepreneurs with weak balance sheets only obtain funding by hiring a monitor. As a consequence, monitoring has a role in financing by allowing *ex-ante* constrained entrepreneurs to fund their projects in the presence of a monitor. As a matter of fact, some general empirical patterns are consistent with the implications of such model. For example, Porta et al. (1998) find that in legal systems with poor investor protection - and therefore a higher opportunity for insider private benefits - also exhibit concentrated ownership structures. Thus, as large shareholders are more likely to bear the costs of monitoring, such process is facilitated by concentrated ownership.

Crucially, however, monitoring management's actions is costly: time, effort, lawsuits, proxy representation, and other corporate-governance actions are needed to ensure that

managers are aligned with shareholders' interests. Ultimately, the question of who bears the cost of monitoring gives rise to the commonly known *free-rider* problem, described in (Grossman and Hart, 1980): on the one hand, monitoring keeps managers in check, but on the other hand, the investor that monitors bears the full cost of the monitoring, but only receives a fraction of the benefit, while creating a positive externality on other investors. In this sense, the combination of dispersed benefits and concentrated costs may induce an underprovision of monitoring.

Theoretical models of active monitoring – see, for example, Tirole (2006) – often point to bank monitoring as a solution to reduce agency costs, as banks emerge as natural agents to have enough incentives to bear the costs of monitoring. While most of the empirical application focuses on banks as active monitors due to relational lending, the monitoring solution does not necessarily need to arise through banks: a large shareholder, which may have incentives to bear the costs of monitoring, may ensure that managers act in behalf of shareholders' interests, thereby alleviating concerns related to shareholder expropriation. As such, *blockholders* – investors with a large equity stake in the firm – can act as a type of investor with the necessary incentives to bear the cost of monitoring (for a detailed survey about the topic, see, for example, Edmans (2014)).

3.1 Passive Ownership and Debt Structure

The previous subsection highlighted the study of debt structure and the hypotheses outlined in the literature about its motivations. Although there has been increasing attention towards debt heterogeneity (and the firms' choice of debt characteristics) as opposed to a more high-level debt *versus* equity decision, there is still no empirical assessment of the motivations behind the stylized facts regarding within-firm debt specialization and the heterogeneity of debt structure across firms.

Of special relevance to this study, there has been no empirical evidence on how (or whether) the different stakeholders of the firm may influence debt structure decisions. In practice, however, one could think of several ways in which large shareholders, such as investment funds and trust corporations may exert influence over managers' debt decisions. For example, recent empirical evidence (Appel et al., 2018) shows that increased passive ownership – *i.e,* ownership by an investment vehicle that has no intentions of interfering in management decisions – lessens the costs of monitoring and coordination, which in turn facilitates investor activism. One can view this interplay as a shift in activist shareholders' actions after a decrease in monitoring costs, as passive investors, due to their lack

of incentives to engage in management, can proxy their voting decisions to groups of activist investors. This, in turn, makes it optimal for them to oppose (or simply threaten to) managerial policies that do not act on behalf of the shareholders' interests.

In the next sections, I discuss the data and the identification strategy adopted in this study aiming to bridge the gap between debt structure and passive ownership.

4 Data

I construct an extensive dataset at the *firm-year* level using information available from *Bloomberg®*, *Standard and Poor's (S&P)*, and *Wharton Research Data Services (WRDS)* that comprises stock assignments for *FTSE's Russell 1000/2000* indexes, debt structure information, ownership characteristics, and firms' financials. In the next subsections, I provide a thorough description of the main steps to construct the data collected in order to construct the dataset for the implementation of the empirical framework described in Section 5.

4.1 Stock Index Assignments

First, I collect stock index assignments for the *Russell 1000* and *Russell 2000* indexes from *Bloomberg®*. *Russell* is a family of global stock market indexes from *FTSE Russell* that allows investors to track the performance of distinct market segments worldwide. In this sense, passive funds attempt to match the performance of a market index by holding securities of the market index in proportion to their weights in the index.

More specifically, the *Russell 1000* index comprises the 1,000 U.S. stocks that mostly reflect the largest 1,000 companies in terms of market capitalization, whereas the *Russell 2000* index comprises the *next* largest 2,000 stocks that are not included in *Russell 1000*. As discussed in Appel et al. (2018), since 2007, *Russell* indexes are reconstituted each year at the end of June using a combination of three factors, known as the *"banding criteria"*[1]. This policy, implemented in 2007, intended to avoid index turnover on each reconstitution year, conditions assignment to the indexes based on i) the stock's market capitalization as of the last trading day in May of that year; ii) the stock's index assignment in the previous reconstitution year; and iii) the stock's market capitalization falls within a certain range of the cutoff between $1,000^{th}$ and $1,001^{st}$ largest stock market caps.

The fact that *Russell* indexes are value-weighted implies that index assignment has a significant effect on index weights and the extent to which a stock is owned by passive

[1]For a detailed discussion about the banding criteria, see Appel et al. (2018).

investors. For example, due to the value-weighting scheme, the 950^{th} largest stock is more likely to be included in the *Russell 1000* and be given a very small weight in the index, while the $1,050^{th}$ largest stock is more likely to be included in the *Russell 2000* and being given a much larger weight.

Key to the identification strategy adopted in this study, described in detail in Section 4, I collect the full list of firms and their respective index assignments, along with their identifying information such as ticker and CUSIP codes, for each reconstitution year from 2007 to 2019. This procedure yields a list of all components of *Russell 1000/2000* indexes in each year of our sample.

4.2 Debt Structure and Firms' Financials

As in Colla et al. (2013), I collect data regarding firms' key financials and debt structure information from *Capital IQ*, an affiliate of *S&P*. For each unique firm in the sample that has belonged to *Russell 1000/2000* in any reconstitution year from 2007-2019, I use their corresponding Ticker/CUSIP codes to collect information on financial characteristics, such as Assets, Cash-Flows, Liabilities, and other key performance measures, along with yearly information on its debt structure, being able to distinguish between several classifications of debt, such as commercial paper, credit lines, term loans, senior and subordinated bonds/notes, and capital leases.

4.3 Ownership Characteristics

Finally, for each unique firm that has belonged to *Russell 1000/2000* in any reconstitution year from 2007-2019, I use their corresponding Ticker/CUSIP codes to collect information on firms' ownership characteristics using S12 Mutual Fund Holdings data, available from *WRDS*. More specifically, since May 2004, mutual funds and exchange-traded funds (ETFs) that hold stocks traded on U.S exchanges are required to inform quarterly holdings to the *Securities Exchange Commission (SEC)* through N-CSR and N-Q forms.

Along with end-of-quarter information on stock prices, obtained from the *Center for Research in Security Prices (CRSP)* and also available at *WRDS*, I construct measures of Mutual Fund Ownership by classifying each fund as being either actively or passively managed. To that matter, I calculate a firm's total market capitalization by multiplying each end-of-quarter price by the firms' shares outstanding. After that, to assign fund holdings into actively or passively managed, I follow Appel et al. (2016) and classify a fund as "pas-

sively" managed if i) its fund name includes a string that identifies it as an index fund[2]; or ii) if *CRSP* Mutual Fund Database itself classifies it as an index fund.

Importantly, while *Bloomberg*®'s local provider provides the actual index composition and yearly rebalancing for each portfolio, it *does not* enable access to the exact portfolio weights on each stock. To circumvent this problem, for each firm in the sample, I also collect daily stock-price information from May to June in *CRSP* and follow the *FTSE Russell*'s guidelines for assigning index weights for each stock in *Russell 1000/2000* indexes.

While index assignment is made based on total market capitalization, after index assignments are determined, each stock's weight on the portfolio is calculated using its end-of-June-float-adjusted market cap – *i.e,* considers only shares that are available to the public. To be able to determine portfolio weightings, I collect data on Institutional Ownership (Thomson 13F) and calculate $Float_{i,t}$ as the stocks' float-adjusted-market cap by subtracting the portion of shares held by institutional investors and use it to compute portfolio weights for each stock that belongs to the *Russell 1000/2000*.

4.4 Final Sample and Variable Description

After collecting and merging all the available sources of data, the final sample comprises information regarding 1,130 unique U.S publicly listed firms that have been included in the *Russell 1000/2000* indexes in at least one year over the sample period. In sum, for each firm in this sample, I observe its debt structure, ownership characteristics, and its assignment to any of the *Russell 1000(2000)* indexes across an (unbalanced) panel from 2007 to 2019.

To be able to analyze the extent to which stocks' shares are held by passive investors, I define $Passive_{i,t}$ as the percentage of a firm's total market capitalization that is held by passive mutual funds:

$$Passive_{i,t} = \frac{Price_{i,t} \times P.Own_{i,t}}{MKTCap_{i,t}}, \tag{1}$$

where $P.Own_{i,t}$ refers to the number of shares outstanding held by passive investors, and $MKTCap_{i,t}$ is the firm's total market capitalization in period t.

Additionally, to get a better understanding of the usage of different types of debt by

[2]The exact strings that were considered were for an fund to be considered as passively were: *"Index", "Idx", "Indx"," Ind", "Ind ","Russell", "S & P", "S and P", "S&P", "SandP", " SP ", "DOW", "Dow", " DJ ","MSCI", "Bloomberg", "KBW", "NASDAQ","NYSE", "STOXX", "FTSE", "iShares","Wilshire", "Morningstar", "100", "400", "500", "600", "900", "1000", "1500", "2000","5000"*, and *"3000"*.

firms, I follow Colla et al. (2013) and define a (normalized) Herfindahl-Hirschman Index (HHI) of debt usage. Specifically, let the total debt of a firm, denoted by $TD_{i,t}$, be divided into seven categories: Commercial Papers ($CP_{i,t}$), Drawn Credit Lines ($DC_{i,t}$), Term Loans ($TL_{i,t}$), Senior Bonds and Notes ($SBN_{i,t}$), Senior Unsecured Bonds ($SUB_{i,t}$), Capital Leases ($CL_{i,t}$), and Others ($Other_{i,t}$). By dividing by the firm's total debt, $TD_{i,t}$, I calculate the squared sum of the debt type ratios as:

$$SS_{i,t} = \left(\frac{CP_{i,t}}{TD_{i,T}}\right)^2 + \left(\frac{DC_{i,t}}{TD_{i,T}}\right)^2 + \left(\frac{TL_{i,t}}{TD_{i,T}}\right)^2 + \left(\frac{SBN_{i,t}}{TD_{i,T}}\right)^2 + \left(\frac{SUB_{i,t}}{TD_{i,T}}\right)^2 + \left(\frac{CL_{i,t}}{TD_{i,T}}\right)^2 + \left(\frac{Other_{i,t}}{TD_{i,T}}\right)^2 \tag{2}$$

With that in mind, I define $HHI_{i,t}$ as the normalized Herfindahl-Hirschman Index of debt type usage as:

$$HHI_{i,t} = \frac{SS_{i,t} - \frac{1}{7}}{1 - \frac{1}{7}} \tag{3}$$

Intuitively, $HHI_{i,t}$ measures the degree of a firm's debt specialization towards one type of debt: when $HHI_{i,t} \to 1$, then firm i shows a tendency towards *specialization*. Conversely, when $HHI_{i,t} \to 0$, then firm i presents a multi-tiered debt structure. In the limit, when $HHI = 1$, then the firm employs only one type of debt, whereas then $HHI = 0$, it means that the firm employs all the seven types of debt in the same proportion.

5 Empirical Strategy

Studying the effect of passive ownership on firms' debt structure is empirically challenging, as passive ownership is likely to be correlated with other (unobserved) factors that might also affect firms' debt decisions. For example, poor past performance might cause both a stock's removal from a popular index, thereby reducing passive ownership, but also increasing the issuance costs especially for non-secured contracts, such as subordinated and unsecured debt.

As a consequence, naïve estimates of the effect of passive ownership on the presence of firms' specific debt contracts may lead to biased estimates of the causal effect of passive ownership on debt structure outcomes. Therefore, one must consider ways to incorporate

changes in passive ownership that are orthogonal to any firm's unobservable characteristics that might affect debt decisions, such as investment opportunities.

To shed light on the potential relationship between passive ownership and debt structure, I exploit the assignment in *Russell 1000/2000* indexes as a source of exogenous variation in passive ownership. Using *Russel 1000/2000* as an identification strategy has been widely applied to instrument passive ownership in several Corporate Governance studies (Appel et al., 2016, 2018; Schmidt and Fahlenbrach, 2017), as increases in passive ownership for firms *close* to the cutoff that distinguishes assignment to one of the indexes is related to discretionary mutual fund allocation rules, and therefore plausibly exogenous to unobserved confounding factors, such as investment opportunities.

Following the previous studies using index assignments, I use the inclusion in the *Russell 2000* as an instrument for passive ownership, while controlling for all the other factors that determine assignments. As such, since the index assignment is arbitrarily determined for firms near the threshold of *Russell 1000/2000 - i.e,* the bottom firms of *Russell 1000* and the top firms of *Russell 2000*- after controlling for the factors that determine firms' assignment, one can treat the change in mutual fund allocations as an exogenous source of variation in passive ownership.

Therefore, the baseline specification is comprised of a two-stage instrumental variable (IV) procedure, where the first stage instruments passive ownership considering all index assignment components:

$$\widehat{Passive\%}_{i,t} = \eta + \lambda R2000_{i,t} + \sum_{n=1}^{N} \chi_n \ln {MktCap_{i,t}}^n + \sigma \ln\left(Float_{i,t}\right) + \phi_1 Band_{i,t} + \phi_2 R2000_{i,t-1} + \phi_3 (Band_{i,t} \times R2000_{i,t-1}) + \delta_t + u_{i,t} \quad (4)$$

where $R2000_{i,t}$ is a dummy variable that assigns the value 1 (one) if stock i is in the *Russell 2000* for reconstitution year t, $MktCap_{i,t}$ is the end-of-May CRSP market capitalization of stock i in year t; $Float_{i,t}$ is the float-adjusted market capitalization calculated by *Russell* when setting the portfolio weights during the end-of-June reconstitution; $Band_{i,t}$ refers to the banding criteria used to determine changes in index assignments. I also control for time fixed effects δ_t in order to account for within-year variation.

After that, the instrument is used in the second-stage regression:

$$\mathbf{Y_{i,t+n}} = \alpha + \beta \widehat{Passive\%}_{i,t} + \sum_{n=1}^{N} \theta_n + \ln\left(MktCap_{i,t}\right)^n + \gamma \ln\left(Float_{i,t}\right)$$
$$+\mu_1 band_{i,t} + \mu_2 R2000_{i,t-1} + \mu_3 (band_{i,t} \times R2000_{i,t-1}) + \delta_t + \varepsilon_{i,t} \quad (5)$$

where $\mathbf{Y_{i,t+n}}$ is a vector that contains the outcomes of interest for firm i in year $t+n$; $\widehat{Passive\%}_{i,t}$ is the (instrumentalized) percentage of a firm's shares held by passively managed mutual funds at the end of the end of September in year t (*i.e.*, in the first quarter after reconstitution in year t). All other variables are the same as in specification (1). Regarding the vector of outcomes, $\mathbf{Y_{i,t+n}}$ is a vector containing all the six debt classifications for firm i over time.

Intuitively, the identifying assumption is that inclusion in the *Russell 2000* has an effect on $\mathbf{Y_{i,t+n}}$ only through increases in passive ownership, and not by other indirect effects that are correlated with the inclusion in the *Russel 1000* or *Russel 2000* indexes. For example, a key concern regarding this identification strategy is that analyst coverage changes concurrently as firms are assigned to *Russell 2000* with a higher weight. Hence, it is necessary to verify whether any other possible confounding factor embedded in ε also changes discontinuously within the *Russell 1000/2000* threshold.

As expected, due to the design of the empirical setting, this approach provides only a local identification of the effect, in the sense that a causal interpretation of the changes in debt structure due to increases in passive ownership can only be, at best, made for firms near the threshold between the two indexes. In our baseline specification, I follow the previous empirical literature and use a bandwidth of $\psi = 500$ firms for each index. In this sense, we restrict our attention to the 500^{th} smallest firms in the *Russell 1000* index and the 500^{th} biggest firms in the *Russell 2000* index in terms of portfolio weighting.

In the next section, I present clear evidence that not only index assignment is indeed related to increases in passive ownership, but also that such increases have a significant impact on firms' debt structure measures and debt specialization.

6 Results

As argued earlier, identification using exogenous variation due to *Russell 1000/2000* reconstitution relies on using local variation near to the threshold between the two indexes. In this sense, for each year, I only consider a bandwidth of $\phi = 500$ firms above/below

the threshold. To get an graphical interpretation on how index assignments may induce exogenous variation in passive ownership, Figure 1 plots the portfolio weights for both indexes considering the smallest (largest) firms on *Russell 1000 (2000)* index in the 2013 reconstitution year.

Similar to what is presented in Appel et al. (2018), as a result of *FTSE Russell*'s rules, it is worth noticing that portfolio weights on *Russell 1000/2000* stock jump discontinuously around the assignment threshold when a firm is reclassified from the *Russell 1000* to the *Russell 2000* index[3]. Along with the information regarding the dollar value of passive mutual funds that track both indexes, this evidence is suggestive that, around the threshold, passive ownership should increase for firms that were marginally assigned to the *Russell 2000* index.

To shed light on the validity of using *Russell 2000* assignment as an instrument for passive ownership, Table 1 shows the results from employing the specification highlighted in Equation (4) by regressing passive ownership on the assignment to *Russell 2000* for the subsample of firms with available information on debt structure.

As Table 1 shows, regardless of the specification, assignment to the *Russell 2000* has a positive and statistically significant effect on the share of passive ownership: given that the average percentage of passive ownership in a firm for the sample is 12.56%, estimates imply an increase of approximately 29% in the passive ownership, even after controlling for the factors that determine assignment to the *Russell 2000* index. As a result, stocks that were assigned to the *Russell 1000/2000* and that are near to the threshold should be comparable in the sense that unobserved characteristics are unlikely to drive changes on firms' future outcomes except for the change in passive ownership due to index assignment.

With this information in mind, Table 2 presents the results from the second-stage IV regression, where the dependent variable is the one-year-ahead debt concentration level, $HHI_{i,t+1}$. To clarify the interpretation of the results, I normalize Passive Ownership before obtaining the results from the first-stage regression.

The results from Table 2 provide evidence that increases in passive ownership due to the assignment to the *Russell 2000* index induces firms towards a *multi-tiered* debt structure: a one standard deviation increase in the (instrumentalized) level of passive ownership decreases HHI by approximately -0.2. Given that the average level of debt concentration in our sample is 0.69, this implies a decrease of approximately 29%, which is both economically and statistically significant. Put another way, firms that faced increases in passive ownership coming through the *Russell 1000/2000* channel seem to spread its debt

[3]The same pattern is found for any given reconstitution year of the sample.

structure to include more types of debt relative to their debt structure prior to the *Russell 1000/2000 recalibration*.

What is also interesting to note about these results is how they relate to the findings presented in the prior literature, where it was shown that debt specialization (as measured by $HHI_{i,t+1}$) seems to have a positive relationship with *market-to-book*. All else equal, index recalibrations from the *Russell 1000* to the *Russell 2000* index would imply that the numerator component of the *market-to-book* is decreasing (or increasing less than others firms) since indexes are value-weighted, which is in line with the argument that firms with higher *market-to-book* ratios have more specialized debt.

Alternatively, one might be interested in understanding how such change reflects in the actual number of debt types that a firm can have. To shed light on how these effects can be translated in terms of the number of unique debt types (out of seven categories), Table 3 estimates Equation (5) using the number of different debt types that firm i has in period $t+1$. As we results show, a one standard deviation in the (instrumentalized) level of passive ownership implies, on average, approximately 0.57 more debt type. From these results, it seems that although there is a significant increase in the percentage of new debt structure types, firms are not completely changing their debt structure toward a more complex, multi-tiered debt structure. Rather, the change seems to be much more concentrated in a limited number of debt types, which is in line with the results presented in Colla et al. (2013) that most firms borrow predominantly from one type of debt, and thus have a tendency towards debt specialization.

6.1 Which types of debt are increasing?

The results from the previous tables highlight not only that the *Russell 1000/2000* index recalibration has the potential to exogenously increase passive ownership, but also that this variation induces firms to reduce their dependence on specific types of debt *ex-post* the influx of passive ownership. Now, I ask the question on whether such increase has to do with a specific type of debt, or it is widespread across all debt types present in my sample.

Table 5 presents the results of estimating Equation (5), where the dependent variable is the one plus the natural logarithm[4] of the book value of $Debt_{i,s,t+1}$, where s is the specific type of debt in consideration, according to the definitions presented in Colla et al.

[4]To consider both intensive and extensive margins, I have considered the natural logarithm of one plus the value of the debt.

(2013) and used throughout the analysis. Interestingly, not all types of debt are equally affected: while increases in passive ownership related to the index assignment do not seem to be related to increases in *Leases*, *Revolving Credit*, *Senior* and *Subordinate* bonds, passive ownership is positively related to increases in *Commercial Paper* and *Term Loans*.

More specifically, results show that firms are increasing *Commercial Paper* and *Term Loans* exposure after increases in passive ownership, which statistically significant effects that are also of economic relevance: a one-standard-deviation in the level of passive ownership translated in a 49% (112%) increase in the levels of *Commercial Paper* (*Term Loan*) after the recalibration period. While *Commercial Paper* is rarely adopted by firms (as presented in Colla et al. (2013), *Term Loans* has gained share among the different debt types over time.

Interestingly, while *Commercial Paper* has shown to be predominantly adopted by high investment-grade firms, *Term Loans* is monotonically decreasing on credit ratings (Colla et al., 2013). Together with the fact that most firms borrow predominantly from a specific type of debt, these results show that passive ownership has a significant effect on debt specialization for a wide spectrum of firms. In order to better understand this dynamic, Tables 6 and 7 re-estimate the equations presented in Table 5 for subsamples of firms with only one type and multiple types of debt *ex-ante* index recalibration, respectively. As results show, while there does not seen to have any relationship for firms that are borrowing from one type of debt, the results are entirely driven by the sub-sample of firms that adopted two or more types of debt *ex-ante* index recalibration. Not only the results for *Commercial Paper* and *Term Loans* are stronger in magnitude and statistically significance, these firms also show rely more on *Revolving Credit ex-post* increases in passive ownership.

6.2 Analyzing *ex-post* firm fundamentals

While the results from several debt types suggest that these changes are through debt structure composition, there is also the possibility such dynamics to be part of a broader channel that affects a wide range of firm fundamentals: if, for example, firms that are newly listed in the top positions of the *Russell 1000/2000* have more analyst coverage than others, which could be a potential explanation for firms being able to use multiple types of debt and do not require to provide enough incentives for a single monitor. On the other hand, if bad performance affected firms market capitalization, which in turn increased their probability of switching over to the *Russell 2000* index, then we would expect exogenous changes in passive ownership also to be related to firms' *ex-post* performance.

While I am not able to rule out the argument that analyst coverage is increasing along the threshold of my sample, Appel et al. (2018) shows that, if anything, this relationship is reverse: firms near the threshold that are not tracked anymore by the *Russell 1000* and are assigned to the *Russell 2000* show less analyst coverage relative to their counterparts. However, to the point that the documented changes are just part of a broader channel that is affecting several firms' fundamentals, I use the firms' identification codes to collect sample firms' fundamentals from *COMPUSTAT*. More specifically, I match my sample with *COMPUSTAT* figures based on firms' Ticker, SEDOL and CUSIP identifiers, collecting firm-year information regarding key target firm fundamentals, such as Cash-Flows, Assets, Profits, Short and Long-Term Debt, Dividends, and Leverage.

After applying all the filters regarding key financial indicators – *e.g,* negative values for Assets, Debt ratios, Leverage, as well as negative/greater than one for PPE/Assets, Cash Holdings/Assets, etc – I winsorized all firms' financial variables on an yearly basis at the 1^{th} and 99^{th} percentiles. Table 7 shows the results of estimating Equation (5) on a wide set of firms' *ex-post* fundamentals at $t+1$. Across all fundamentals, there is no evidence that increases in passive ownership stemming from *Russell 2000* assignment are related to changes in firms' fundamentals. These results do not align with the hypothesis that the changes observed in firms' debt structure are part of a broader channel that has impact on several fundamentals. In special, these results reinforce the argument in this study that passive ownership has a direct impact on firms' debt structure.

6.3 Which firms reduce debt specialization?

As a final piece of evidence on the effects of passive ownership on debt structure, I ask whether decreases in debt specialization vary across different sizes of firms. For example, bigger firms may benefit from a wider set of debt structure options that smaller firms are not allowed to (or do so only at prohibitively high costs). Furthermore, smaller firms may need to concentrate their debt structure on types so as to ensure enough incentives for debtors to monitor its performance.

To analyze these points, Table 8 provides estimates similar to Table 2 for different sizes of firms based on the terciles of the year distribution of Total Assets. Interestingly, all of the reduction in debt concentration comes from firms in the lower tercile of the distribution of assets – *i.e,* smaller firms [5].

[5]The changes in the sample size reflect the fact that it was not possible to match all observations with *COMPUSTAT*, which provides the information on Total Assets to create the terciles classifications.

This result provides a more clear picture of how debt structure dynamics take place after increases in passive ownership: not only the fact that only smaller firms are reducing debt specialization, these firms are increasing their exposure to *Commercial Papers*, *Term Loans*, and *Revolving Credit*. Relatedly, evidence presented in (Colla et al., 2013) shows that, in terms of credit quality, debt specialization varies in a nonmonotonic fashion (excluding firms with ratings lower than CCC+), with firms with highest/lowest grades (A and BBB) showing higher debt specialization, and firms in the middle of the rating spectrum (A and BBB) leaning towards a multi-tiered debt structure. Taken together, smaller firms, which tend to have lower credit ratings, are exactly the ones to reduce its debt structure concentration after exogenous increases in passive ownership, which can indicate that a higher degree of passive ownership can unlock different debt structure types that wouldn't otherwise be feasible.

7 Potential mechanisms and relationship with the previous literature

Prior literature on debt specialization has discussed potential explanations for the stylized facts that i) within-firm debt structure is persistent over time; and ii) debt structure is substantially heterogeneous across firms. Although the results presented in Section 6 are merely exploratory of the potential mechanisms that could be driving debt structure changes through the passive ownership channel, in this final section, I discuss how these results relate to the hypotheses highlighted in the debt structure literature.

First and foremost, there is a growing literature that states that passive investors are, in reality, active shareholders of the firm. With the rise of proxy voting advisory firms, such as *ISS (Institutional Shareholder Services)* and *Glass-Lewis*, although passive institutional investors have the duty to accurately track the index components, they can rely on proxy advisory firms to proxy their voting shares to active shareholders of the firm. As the size of the passive ownership stake gets more significant (as a percentage of the firm's total shares), monitoring and coordination costs decrease for active shareholders, which can proxy passive investor's votes in their favor to shape corporate policies where otherwise the benefits of such intervention would not offset the agency costs. (Fisch et al., 2018).

Active shareholders, on the other hand, have not only the "voice" but also the "exit" option – see Edmans (2014), where a credible threat of exit on the basis of private information can alleviate conflicts of interest between managers and shareholders – also referred to as

the *Wall Street walk* (Admati and Pfleiderer, 2009). All in all, the exploratory results presented ealier are in line with the monitoring hypothesis, highlighted in the prior literature on debt specialization, that firms choose their debt structure so as to alleviate monitoring and information collection costs. As conjectured in (Colla et al., 2013), more opaque firms, with high monitoring and information collection costs and facing information asymmetry should have a more concentrated debt structure. As our results are entirely driven by smaller firms, which tend to be more opaque, the results presented herein can be supportive of passive ownership reducing information collection costs and, as a consequence, making debt diversification more likely.

Additionally, our results are aligned with the argument that firms have constrained access to some debt segments, and that debt structure reflects the optimal decision conditional on the debt structure types available. As sophisticated investors, institutional ownership can help overcome this issue by means of a lower coordination cost and an increase in the returns to monitoring – see, for example, Shleifer and Vishny (1986); Yang (2021)).

Finally, regarding the hypothesis that debt structure is chosen as to balance bankruptcy costs and and liquidation value, previous literature has conjectured that firms with higher expected bankuptcy costs should be more specialized in their borrowing so as to reduce the renegotiation costs associated with multiple lenders. As in Colla et al. (2013), which follows Rajan and Zingales (1995) and Titman and Wessels (1988) and considers Tangibility and Cash-Flow volatility as two measures of expected bankruptcy costs, I use these two measures and perform two ANOVA tests to verify whether there are significant differences across the quintiles of the $HHI_{i,t}$, and I find a positive and statistically significant relationship in both cases – *i.e,* for my regression sample, debt specialization is also increasing in Tangibility and Cash-Flow volatility, which also provides evidence for the hypothesis.

Overall, although the analysis of the second-stage results should be considered exploratory, they do provide evidence in favor of the three hypothesis previously highlighted in the literature.

8 Conclusions and directions for future research

The fact that debt structure has presented substantial variability both in the cross-section and the time series provides a standpoint that shed criticism regarding the implications of any capital structure studies that treat debt as uniform. Interestingly, the study of debt structure - as opposed to the previous capital structure discussion - sheds light on

the possible agency and informational problems faced by firms in their funding decisions Rauh and Sufi (2010), and gained attention in literature in the recent years. Although some hypothesis have been outlined in the literature so as to understand why within-firm debt structure is persistent, but largely heterogeneous across firms, there is still few empirical evidence to shed light on the potential determinants of debt structure decisions.

This study provides evidence that passive ownership can effectively affect financing decisions – and, in special, debt decisions. In this sense, this study contributes to the growing literature on debt structure as it provides evidence that passive institutional investors can affect firms' debt structure decisions. Overall, the results show not only that debt specialization decreases 29% given a one standard deviation increase the passive ownership due to shifts in the the *Russell 1000/2000* assignment, but that this shift is heterogeneous across debt types, is entirely driven by smaller firms, and is not related to any other changes in firms' *ex-post* fundamentals. Although exploratory, the results show evidence in favor of the hypothesis previously highlighted in the literature on the determinants of debt structure.

All in all, capital structure (and ultimately debt structure) still remains a puzzle among corporate finance academics. By seeking to understand the changing nature of debt structure presented by U.S firms during the recent years, the insights presented in this paper can enhance our understanding of the mechanisms behind the firms' financing choices – in special, the choice between the different types of debt that a firm can have in place.

References

ADMATI, A. R. AND P. PFLEIDERER (2009): "The "Wall Street Walk" and Shareholder Activism: Exit as a Form of Voice," *Review of Financial Studies*, 22, 2645–2685. 23

ALMEIDA, H., M. CAMPELLO, B. LARANJEIRA, AND S. WEISBENNER (2012): "Corporate Debt Maturity and the Real Effects of the 2007 Credit Crisis," *Critical Finance Review*, 1, 3–58. 9

APPEL, I., T. A. GORMLEY, AND D. B. KEIM (2018): "Standing on the Shoulders of Giants: The Effect of Passive Investors on Activism," *SSRN Electronic Journal*. 2, 3, 4, 5, 11, 12, 16, 18, 21, 29, 30, 31, 32, 33, 34, 35, 36

APPEL, I. R., T. A. GORMLEY, AND D. B. KEIM (2016): "Passive investors, not passive owners," *Journal of Financial Economics*, 121, 111–141. 5, 13, 16

BAKER, M. AND J. WURGLER (2002): "Market Timing and Capital Structure," *The Journal of Finance*, 57, 1–32. 5

BATS, J. V. AND A. C. HOUBEN (2020): "Bank-based versus market-based financing: Implications for systemic risk," *Journal of Banking &amp Finance*, 114, 105776. 10

BERLE, A. AND G. MEANS (1932): *The modern corporation and private property*, New Brunswick, N.J., U.S.A: Transaction Publishers. 8

BOLTON, P. AND D. S. SCHARFSTEIN (1996): "Optimal Debt Structure and the Number of Creditors," *Journal of Political Economy*, 104, 1–25. 7, 8, 9

COLLA, P., F. IPPOLITO, AND K. LI (2013): "Debt Specialization," *The Journal of Finance*, 68, 2117–2141. 4, 5, 7, 9, 10, 13, 15, 19, 20, 22, 23, 30, 31, 32, 33, 34, 35, 36

——— (2020): "Debt Structure," *Annual Review of Financial Economics*, 12, 193–215. 2, 4

EDMANS, A. (2014): "Blockholders and Corporate Governance," *Annual Review of Financial Economics*, 6, 23–50. 10, 11, 22

FAULKENDER, M. AND M. A. PETERSEN (2005): "Does the Source of Capital Affect Capital Structure?" *Review of Financial Studies*, 19, 45–79. 9

FISCH, J. E., A. HAMDANI, AND S. D. SOLOMON (2018): "Passive Investors," *SSRN Electronic Journal*. 22

FRANK, M. Z. AND V. K. GOYAL (2009): "Capital Structure Decisions: Which Factors Are Reliably Important?" *Financial Management*, 38, 1–37. 2

GROSSMAN, S. J. AND O. D. HART (1980): "Takeover Bids, The Free-Rider Problem, and the Theory of the Corporation," *The Bell Journal of Economics*, 11, 42. 3, 10, 11

HACKBARTH, D. AND D. C. MAUER (2011): "Optimal Priority Structure, Capital Structure, and Investment," *Review of Financial Studies*, 25, 747–796. 9

IVASHINA, V., B. IVERSON, AND D. C. SMITH (2016): "The ownership and trading of debt claims in Chapter 11 restructurings," *Journal of Financial Economics*, 119, 316–335. 9

JENSEN, M. C. AND W. H. MECKLING (1976): "Theory of the firm: Managerial behavior, agency costs and ownership structure," *Journal of Financial Economics*, 3, 305–360. 9

KRAUS, A. AND R. H. LITZENBERGER (1973): "A State Preference Model of Optimal Financial Leverage." *The Journal of Finance*, 28, 911–922. 5

LEMMON, M. L., M. R. ROBERTS, AND J. F. ZENDER (2008): "Back to the Beginning: Persistence and the Cross-Section of Corporate Capital Structure," *The Journal of Finance*, 63, 1575–1608. 2, 5, 6

MODIGLIANI, F. AND M. H. MILLER (1959): "The Cost of Capital, Corporation Finance, and the Theory of Investment: Reply," *The American Economic Review*, 49, 655–669. 2, 8

——— (1963): "Corporate Income Taxes and the Cost of Capital: A Correction," *The American Economic Review*, 53, 433–443. 9

PORTA, R. L., F. L. DE SILANES, A. SHLEIFER, AND R. W. VISHNY (1998): "Law and Finance," *Journal of Political Economy*, 106, 1113–1155. 10

RAJAN, R. G. AND L. ZINGALES (1995): "What Do We Know about Capital Structure? Some Evidence from International Data," *The Journal of Finance*, 50, 1421–1460. 2, 5, 9, 23

RAUH, J. D. AND A. SUFI (2010): "Capital Structure and Debt Structure," *Review of Financial Studies*, 23, 4242–4280. 2, 4, 6, 7, 9, 24

SCHMIDT, C. AND R. FAHLENBRACH (2017): "Do exogenous changes in passive institutional ownership affect corporate governance and firm value?" *Journal of Financial Economics*, 124, 285–306. 16

SHLEIFER, A. AND R. W. VISHNY (1986): "Large Shareholders and Corporate Control," *Journal of Political Economy*, 94, 461–488. 23

SHYAM-SUNDER, L. AND S. C. MYERS (1999): "Testing static tradeoff against pecking order models of capital structure," *Journal of Financial Economics*, 51, 219–244. 5

TIROLE, J. (2006): *The Theory of Corporate Finance*, Princeton, N.J: Princeton University Press. 10, 11

TITMAN, S. AND R. WESSELS (1988): "The Determinants of Capital Structure Choice," *The Journal of Finance*, 43, 1–19. 9, 23

WELCH, I. (1997): "Why Is Bank Debt Senior? A Theory of Asymmetry and Claim Priority Based on Influence Costs," *Review of Financial Studies*, 10, 1203–1236. 9

YANG, Y. (2021): "Are Passive Institutional Investors Engaged Monitors or Risk-Averse Owners? Both!" *IMF Working Papers*, 2021, 1. 23

9 Figures and Tables

This figure presents the relationship between the portfolio weight and rank position using the subset of firms from our sample included in the top/bottom 500 of the *Russell 1000/2000* indices as of 2013. The black dots indicate the bottom 500 firms included in the *Russell 1000*, whereas the gray dots indicate the top 500 firms included in the *Russell 2000* index. Firms are ordered on the x-axis in terms of their Float-Adjusted Market Capitalization following the rule for index assignment followed by the *Russell* family of indices. The dashed line at the 500^{th} position indicates the threshold for assignment to the *Russell 1000* (left) and *Russell 2000* (right).

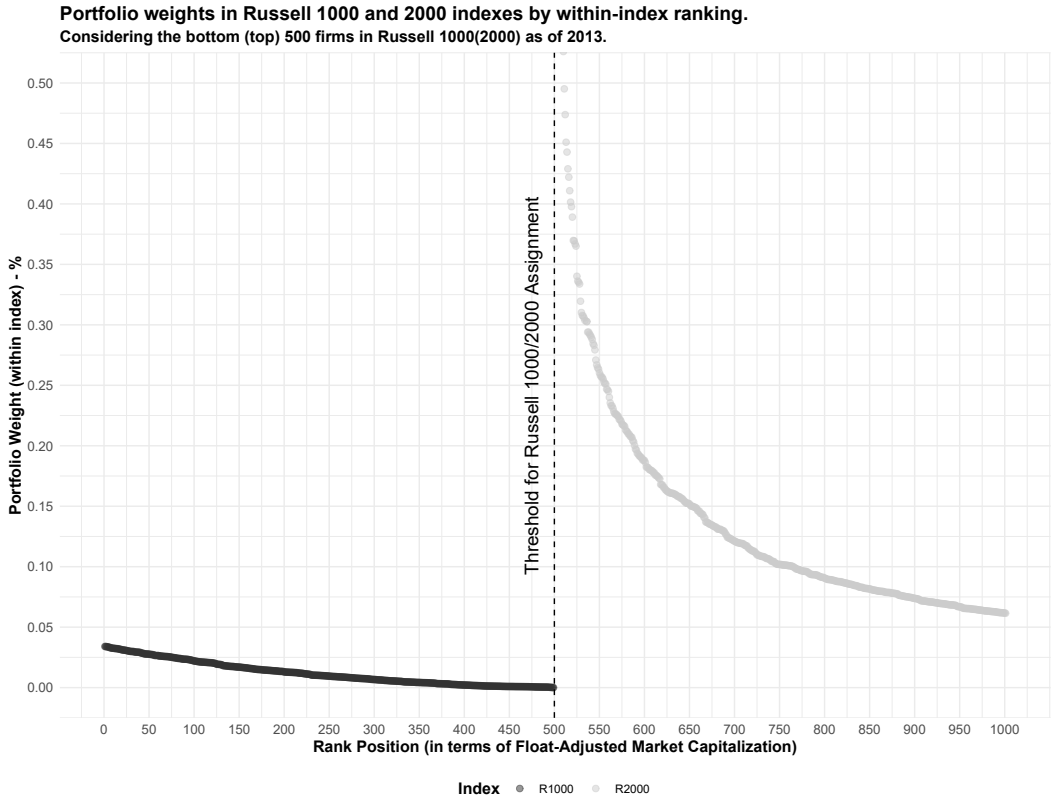

Figure 1: Portfolio Weight Distribution as of 2013 reconstitution year.

Table 1: First-stage Results - Passive Ownership and Russell 1000/2000 Assignment

This table presents the estimates of the first-stage results, presented in Equation (4), and described in Section 5, following Appel et al. (2018), in such a way to capture all factors that determine index assignment in a given recalibration episode. The dependent variable, $Passive_{i,t}$, is the percentage of shares of firm i held by passive investors in period t. $R2000$ is an indicator variable that assigns 1 (one) if firm i has been assigned to the *Russell 2000* index in period t, and zero otherwise, and $Float_{i,t}$ denotes the Float-Adjusted market capitalization. $Band_{i,t}$ is an indicator variable that assigns one if firm i lies within the *banding* criteria for index assignment, and zero otherwise. Finally, this specification also includes 1^{st}, 2^{nd}, and 3^{rd} order polynomials for $MktCap_{i,t}$. Standard errors are in parenthesis. *, **, *** denote statistical significance at 10, 5, and 1 percent, respectively.

	Dependent variable:		
	Passive %		
	(1)	(2)	(3)
R2000	4.122***	4.181***	4.293***
	(0.670)	(0.667)	(0.719)
Banding	1.083***	1.049***	1.102***
	(0.402)	(0.401)	(0.414)
Previous R2000	−0.064	−0.126	−0.110
	(0.366)	(0.369)	(0.371)
Banding × Previous R2000	−0.822	−0.895	−1.015
	(0.641)	(0.633)	(0.675)
Year fixed effects	✓	✓	✓
Firm fixed effects	✓	✓	✓
Float	✓	✓	✓
Pol. Order	1^{st}	2^{nd}	3^{rd}
S.E Clustering	Firm	Firm	Firm
Observations	2,938	2,938	2,938
R^2	0.817	0.817	0.817
Adjusted R^2	0.755	0.756	0.756
Residual Std. Error	3.303 (df = 2196)	3.301 (df = 2195)	3.301 (df = 2194)
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 2: Second-stage Results - Passive Ownership and Russell 1000/2000 Assignment

This table presents the estimates of the second-stage results, presented in Equation (5), and described in Section 5, following Appel et al. (2018). The dependent variable, $HHI_{i,t+1}$, is the debt concentration index, as shown in equation (3), following Colla et al. (2013). $\widehat{Passive}\%$ is the (instrumentalized) percentage of shares held by passive investors relative to the total. The specification includes year and firm fixed effects and Float-Adjusted Market Capitalization as controls, as well as 1^{st}, 2^{nd}, and 3^{rd} order polynomials for $MktCap_{i,t}$. Standard errors (clustered at the firm-level) are in parenthesis. *, **, *** denote statistical significance at 10, 5, and 1 percent, respectively.

	Dependent variable:		
	HHI		
	(1)	(2)	(3)
$\widehat{\text{Passive}}$ %	-0.141^{*}	-0.144^{*}	-0.201^{**}
	(0.084)	(0.083)	(0.093)
Year fixed effects	✓	✓	✓
Firm fixed effects	✓	✓	✓
Float	✓	✓	✓
Pol. Order	1^{st}	2^{nd}	3^{rd}
S.E Clustering	Firm	Firm	Firm
Observations	2,494	2,494	2,494
R^2	0.619	0.617	0.576
Adjusted R^2	0.468	0.465	0.408
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 3: Second-stage Results - Passive Ownership and number of debt types

This table presents the estimates of the second-stage results, presented in Equation (5), and described in Section 5, following Appel et al. (2018). The dependent variable, $DebtTypes_{i,t+1}$, is the number of debt types presented in firm's i debt structure in period t. Debt structure types and categorization are defined following Colla et al. (2013). $\widehat{Passive}\%$ is the (instrumentalized) percentage of shares held by passive investors relative to the total. The specification includes year and firm fixed effects and Float-Adjusted Market Capitalization as controls, as well as 1^{st}, 2^{nd}, and 3^{rd} order polynomials for $MktCap_{i,t}$. Standard errors (clustered at the firm-level) are in parenthesis. *, **, *** denote statistical significance at 10, 5, and 1 percent, respectively.

	Dependent variable:		
	$DebtTypes_{i,t+1}$		
	(1)	(2)	(3)
$\widehat{\text{Passive}}$ %	0.423	0.443*	0.568**
	(0.266)	(0.263)	(0.279)
Year fixed effects	✓	✓	✓
Float	✓	✓	✓
Pol. Order	1^{st}	2^{nd}	3^{rd}
S.E Clustering	Firm	Firm	Firm
Observations	2,916	2,916	2,916
R^2	0.788	0.787	0.776
Adjusted R^2	0.716	0.715	0.700
Residual Std. Error	0.728 (df = 2176)	0.730 (df = 2175)	0.748 (df = 2174)
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 4: Second-stage Results - Passive Ownership and Debt Structure Types

This table presents the estimates of the second-stage results, presented in Equation (5), and described in Section 5, following Appel et al. (2018). The dependent variables, presented in columns 1-6, are the specific debt structure types present in firm's i debt structure in period t. Debt structure types and categorization are defined following Colla et al. (2013). $\widehat{Passive}\%$ is the (instrumentalized) percentage of shares held by passive investors relative to the total. The specification includes year and firm fixed effects and Float-Adjusted Market Capitalization as controls, as well as 1^{st}, 2^{nd}, and 3^{rd} order polynomials for $MktCap_{i,t}$. Standard errors (clustered at the firm-level) are in parenthesis. *, **, *** denote statistical significance at 10, 5, and 1 percent, respectively.

	Dependent variable:					
	log(*Commercial Paper*)	log(*Leases*)	log(*Revolving Credit*)	log(*Senior Bonds*)	log(*Sub. Bonds*)	log(*Term. Loans*)
	(1)	(2)	(3)	(4)	(5)	(6)
$\widehat{\text{Passive}}$ %	0.434**	−0.096	0.892	0.742	−0.085	1.125*
	(0.204)	(0.390)	(0.544)	(0.553)	(0.154)	(0.585)
Year fixed effects	✓	✓	✓	✓	✓	✓
Float	✓	✓	✓	✓	✓	✓
Pol. Order	3^{rd}	3^{rd}	3^{rd}	3^{rd}		
S.E Clustering	Firm	Firm	Firm	Firm	Firm	Firm
Observations	2,938	2,938	2,938	2,938	2,916	2,938
R^2	0.600	0.757	0.661	0.728	0.647	0.662
Adjusted R^2	0.465	0.675	0.546	0.636	0.527	0.547
Residual Std. Error	0.625 (df = 2194)	1.194 (df = 2194)	1.666 (df = 2194)	1.694 (df = 2194)	0.476 (df = 2174)	1.791 (df = 2194)
Note:						*p<0.1; **p<0.05; ***p<0.01

Table 5: Second-stage Results - Passive Ownership and Debt Structure Types, only firms with one type of debt

This table presents the estimates of the second-stage results, presented in Equation (5), and described in Section 5, following Appel et al. (2018), for the sub-sample of firms with only one type of debt, according to the debt structure categorization proposed by Colla et al. (2013). The dependent variables, presented in columns 1-6, are the specific debt structure types present in firm's i debt structure in period t. $\widehat{Passive}\%$ is the (instrumentalized) percentage of shares held by passive investors relative to the total. The specification includes year and firm fixed effects and Float-Adjusted Market Capitalization as controls, as well as 1^{st}, 2^{nd}, and 3^{rd} order polynomials for $MktCap_{i,t}$. Standard errors (clustered at the firm-level) are in parenthesis. *, **, *** denote statistical significance at 10, 5, and 1 percent, respectively.

	Dependent variable:					
	log(*Commercial Paper*)	log(*Leases*)	log(*Revolving Credit*)	log(*Senior Bonds*)	log(*Sub. Bonds*)	log(*Term Loans*)
	(1)	(2)	(3)	(4)	(5)	(6)
$\widehat{\text{Passive}}$ %	0.086	0.467	2.973	2.424	−0.018	−1.507
	(0.470)	(1.208)	(2.147)	(1.755)	(0.153)	(1.583)
Year fixed effects	✓	✓	✓	✓	✓	✓
Float	✓	✓	✓	✓	✓	✓
Pol. Order	3^{rd}	3^{rd}	3^{rd}	3^{rd}	3^{rd}	3^{rd}
S.E Clustering	Firm	Firm	Firm	Firm	Firm	Firm
Observations	1,161	1,161	1,161	1,161	1,160	1,161
R^2	0.468	0.745	0.317	0.485	0.920	0.600
Adjusted R^2	0.201	0.616	−0.027	0.226	0.880	0.400
Residual Std. Error	0.433 (df = 772)	1.113 (df = 772)	1.978 (df = 772)	1.617 (df = 772)	0.141 (df = 771)	1.458 (df = 772)
Note:						*p<0.1; **p<0.05; ***p<0.01

Table 6: Second-stage Results - Passive Ownership and Debt Structure Types, only firms with multiple types of debt

This table presents the estimates of the second-stage results, presented in Equation (5), and described in Section 5, following Appel et al. (2018), for the sub-sample of firms with only multiples types of debt, according to the debt structure categorization proposed by Colla et al. (2013). The dependent variables, presented in columns 1-6, are the specific debt structure types present in firm's i debt structure in period t. $\widehat{Passive\%}$ is the (instrumentalized) percentage of shares held by passive investors relative to the total. The specification includes year and firm fixed effects and Float-Adjusted Market Capitalization as controls, as well as 1^{st}, 2^{nd}, and 3^{rd} order polynomials for $MktCap_{i,t}$. Standard errors (clustered at the firm-level) are in parenthesis. *, **, *** denote statistical significance at 10, 5, and 1 percent, respectively.

	Dependent variable:					
	log(*Commercial Paper*)	log(*Leases*)	log(*Revolving Credit*)	log(*Senior Bonds*)	log(*Sub. Bonds*)	log(*Term Loans*)
	(1)	(2)	(3)	(4)	(5)	(6)
$\widehat{\text{Passive}}$ %	0.557**	−0.378	1.321**	−0.168	−0.285	1.575**
	(0.266)	(0.435)	(0.659)	(0.655)	(0.224)	(0.737)
Year fixed effects	✓	✓	✓	✓	✓	✓
Float	✓	✓	✓	✓	✓	✓
Pol. Order	3^{rd}	3^{rd}	3^{rd}	3^{rd}	3^{rd}	3^{rd}
S.E Clustering	Firm	Firm	Firm	Firm	Firm	Firm
Observations	1,754	1,754	1,754	1,754	1,753	1,754
R^2	0.649	0.788	0.622	0.748	0.604	0.623
Adjusted R^2	0.495	0.696	0.457	0.638	0.431	0.457
Residual Std. Error (df = 1219)	0.730	1.195	1.811	1.800	0.615	2.025
Note:						*p<0.1; **p<0.05; ***p<0.01

Table 7: Second-stage Results - Passive Ownership and Firms' Fundamentals

This table presents the estimates of the second-stage results, presented in Equation (5), and described in Section 5, following Appel et al. (2018), according to the debt structure categorization proposed by Colla et al. (2013). The dependent variables, presented in columns 1-6, are the different firms' fundamentals at period $t+1$. *Assets* is defined as the firms' book value of total assets, and it is estimated in the natural logarithm format. *Cash Holdings* is defined as the ratio of cash, cash equivalents and short-term financial instruments to Total Assets. *Leverage* is defined as Total Debt divided by Total Equity. *Cash Flow* is defined as the ratio of firms' Cash Flow to Total Assets. *LT Debt (%)* is the ratio of Long-Term Debt relative to Total Assets, and *ST Debt (%)* is defined as the ratio of Short-Term Debt relative to total Assets. *Div (%)* is defined as the ratio of Dividends Paid to Total Assets. the $\widehat{Passive}$% is the (instrumentalized) percentage of shares held by passive investors relative to the total. The specification includes year and firm fixed effects and Float-Adjusted Market Capitalization as controls, as well as 1^{st}, 2^{nd}, and 3^{rd} order polynomials for $MktCap_{i,t}$. Standard errors (clustered at the firm-level) are in parenthesis. *, **, *** denote statistical significance at 10, 5, and 1 percent, respectively.

	Dependent variable:							
	log(Assets)	Cash Holdings (%)	PPE (%)	Leverage	Cash Flow (%)	LT Debt (%)	ST Debt (%)	Div (%)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\widehat{\text{Passive}}$ %	−0.180	−0.015	0.026	−0.827	0.005	0.004	−0.004	−0.089
	(0.124)	(0.016)	(0.027)	(0.755)	(0.020)	(0.050)	(0.050)	(0.067)
Year fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
Float	✓	✓	✓	✓	✓	✓	✓	✓
Pol. Order	3^{rd}	3^{rd}	3^{rd}	3^{rd}	3^{rd}	3^{rd}	3^{rd}	3^{rd}
S.E Clustering	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Observations	1,752	1,752	1,752	1,752	1,752	1,752	1,752	1,744
R^2	0.968	0.927	0.978	0.486	0.361	0.631	0.631	0.601
Adjusted R^2	0.958	0.903	0.971	0.318	0.152	0.510	0.510	0.471
Residual Std. Error	0.203 (df = 1320)	0.046 (df = 1320)	0.038 (df = 1320)	2.026 (df = 1320)	0.061 (df = 1320)	0.140 (df = 1320)	0.140 (df = 1320)	0.154 (df = 1313)
Note:								*p<0.1; **p<0.05; ***p<0.01

Table 8: Second-stage Results - Passive Ownership and Debt Structure Types - Varying on Asset Terciles

This table presents the estimates of the second-stage results, presented in Equation (5), and described in Section 5, following Appel et al. (2018), according to the terciles of the distribution of Total Assets, defined on an yearly basis. The dependent variable, $HHI_{i,t+1}$, is the debt concentration index, as shown in equation (3), following Colla et al. (2013). $\widehat{Passive}\%$ is the (instrumentalized) percentage of shares held by passive investors relative to the total. The specification includes year and firm fixed effects and Float-Adjusted Market Capitalization as controls, as well as 1^{st}, 2^{nd}, and 3^{rd} order polynomials for $MktCap_{i,t}$. Standard errors (clustered at the firm-level) are in parenthesis. *, **, *** denote statistical significance at 10, 5, and 1 percent, respectively.

	Dependent variable:		
	$HHI_{i,t+1}$		
	1^{st}	2^{nd}	3^{rd}
	(1)	(2)	(3)
$\widehat{\text{Passive}}$ %	-0.202^{**}	0.109	-0.131
	(0.092)	(0.187)	(0.243)
Year fixed effects	✓	✓	✓
Float	✓	✓	✓
Pol. Order	3^{rd}	3^{rd}	3^{rd}
S.E Clustering	Firm	Firm	Firm
Observations	520	559	507
R^2	0.686	0.693	0.609
Adjusted R^2	0.489	0.528	0.445
Residual Std. Error	0.195 (df = 319)	0.190 (df = 363)	0.208 (df = 357)
Note:			*p<0.1; **p<0.05; ***p<0.01