Understanding the Fundamental Persistence of Corporate Capital Structure

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This version: August 2010

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The authors wish to thank Alon Brav, Yingmei Cheng, Sudipto Dasgupta, Andrea Eisfeldt, Andrew Hertzberg, Lawrence Khoo, Robert Korajczyk, Michael Lemmon, Deborah Lucas, Robert McDonald, Micah Officer, Mitchell Petersen, Dragon Tang, Annette Vissing-Jorgensen, Yi-Ling Wu and seminar/conference participants at the 2008 CICF in Dalian (China), the 2008 NTU International Conference on Finance in Taipei (Taiwan), the 2010 City University of Hong Kong International Conference on Corporate Finance and Financial Markets, CUHK, HK Polytechnic University, HKU, HKUST, KU Leuven, Northwestern University, the University of Hawaii, and the University of Miami for helpful discussions and comments.

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Abstract

When predicting future leverage ratios, the explanatory power of initial residual leverage falls quickly over time, while initial standard leverage determinants retain much of their explanatory power. To make sense of this fundamental persistence, we show that growth-type (identified by a two-way sort on firm initial market-to-book ratio and asset tangibility) can parsimoniously span significantly dispersed and persistently different leverage ratios. Different growth-types suggest persistently distinct investment styles (of tangible investments versus R&D or intangible investments). This gives rise to specific market imperfections and hence induces different financing behaviors. Therefore, growth-type plays a stable role in anchoring long-run capital structure.

Key Words: Capital Structure, Persistence, Initial Determination, Fair Market Timing, Growth Type Compatibility

JEL Classification Code: G14, G32, G34

1. Introduction

Lemmon, Roberts and Zender (2008) document a pattern of persistently distinct leverage ratios across firms. They argue that unexplained initial leverage heterogeneities largely contribute to this persistence and suggest that standard leverage determinants in the literature, such as market-to-book ratios, tangibility, profitability and firm size, have little business in explaining capital structure persistence. Since many empirical models in the literature rely on these leverage determinants, they conclude that "…our findings paint a somewhat dim picture of existing empirical models of capital structure..."

This paper shows that standard leverage determinants are vital to understanding capital structure persistence. When we isolate the unexplained initial leverage ratios, measured by the sum of intercept and residuals from the cross-sectional regression of initial leverage ratios on initial standard leverage determinants, we find that the initial leverage determinants have impressively stable explanatory power while the high explanatory power of the unexplained initial leverage (in predicting future leverage ratios) drops quickly over time. For example, after 20 years, the initial leverage determinants retain 46.8 percent of initial explaining power whereas unexplained initial leverage only 10.8 percent. Thus, understanding how the initial firm fundamentals contribute to long-run capital structure persistence is important. This is a direction not pursued by Lemmon, Roberts and Zender (2008).

To make sense of this fundamental persistence, we present a firm growth-type view that can parsimoniously explain what fundamentally causes leverage ratios across firms to be persistently different. The seminal work of Modigliani and Miller (1958) suggests that capital structure does not matter unless it interacts with market imperfections such as agency conflicts and information asymmetries. Optimal capital structures are responses to these market imperfections that would have otherwise caused more severe investment inefficiencies. A pattern of persistently distinct leverage ratios likely reflects persistently distinct forms of capital market imperfection across firms. We argue that firm growth-types can give rise to such persistently distinct specifications of market imperfection.

Firm growth-type in association with market imperfection can be understood through firm

characteristics: asset type and asymmetric information type. It is well recognized in the literature that types of asset and asymmetric information are important in specifying market imperfections (e.g., Myers, 1977; Myers and Majluf, 1984; Zingales, 2000). Less emphasized in the literature, however, are these firm characteristics (if meaningfully sorted) and hence market imperfections that firms face can somehow be persistent, creating non-ergodic corporate behavior.

First, asset type market imperfection that gives rise to agency conflicts (e.g., Myers, 1977) can be persistent; some firms always have more tangible than intangible assets; conversely, other firms always have more intangible than tangible assets. Second, the asymmetric information type market imperfection can also be relatively stable over time; some firms may always have more asymmetric information about assets-in-place than about growth opportunities, and other firms may always have more asymmetric information about growth than about assets-in-place.

The finance literature has shown that the types of asset and asymmetric information, often correlated in reality, affect the capital structure. First, firms with more tangible assets relative to intangible assets—including growth opportunities—tend to have higher leverage ratios (e.g., Myers 1977). Second, it is well known that asymmetric information about assets-in-place as described by Myers and Majluf (1984) underlies Myers' (1984) pecking order in financing where new equity is the last resort. But while asymmetric information about assets-in-place tends to inhibit new equity issues, asymmetric information about growth opportunities can facilitate new equity issues by high-growth firms. The latter result is predicted by the generalized Myers-Majluf model developed by Cooney and Kalay (1993) and Wu and Wang (2005).[1] Thus, firms with more asymmetric information about growth are keener to use

[1] The generalized Myers-Majluf model predicts that an increase in asymmetric information that arises mainly from growth helps facilitate new equity issues and can in some cases even produce a positive announcement effect of new equity issues. This insight is important. For one thing, it resolves the pecking order puzzle articulated by Fama and French (2002, 2005), that is, why small growth firms, fraught with lots of asymmetric information, rely heavily on

equity financing, since the costs of new equity in this situation can be much lower than predicted by the classic Myers-Majluf model.[2]

A cornerstone of behavioral corporate finance is the premise that new equity issues at high valuations—where uncertainty about growth opportunities tends to increase with the level of growth prospects—are mainly responses to market overvaluations (Stein, 1996). The insight from the generalized Myers-Majluf model suggests that this overvaluation assumption is not necessarily true. The overvaluation concept is deeply rooted in the classic Myers and Maluf (1984) view about the adverse selection effect which arises actually from overvaluation about assets-in-place (Harris and Raviv, 1991). Equilibrium behavior is different for issuing firms where asymmetric information arises mainly from growth opportunities. As a result, not all equity issues are lemons, especially during the issues by high-growth firms fraught with a lot of asymmetric information about growth opportunities.

To make an explicit connection between firm-growth-types and the specifications of market imperfection, we rely on two important leverage determinants found in the literature: the market-to-book ratio and asset tangibility. In a world with asymmetric information, a combination of a low market-to-book ratio and high tangibility tends to characterize low-growth-type firms where asymmetric information tends to arise more from assets-in-place than from growth. Conversely, a combination of a high market-to-book ratio and low asset tangibility tends to reflect high-growth-type firms where asymmetric information is likely to arise more from growth than from assets-in-place. An example is Zingales' (2000) New Firm with predominant intangibles including growth opportunities that are not

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new equity financing and do not seem to suffer the classic adverse selection effect. See the literature review for more details.

[2] The recent asset pricing literature has also shown that an increase in uncertainty about future profitability improves the current market-to-book ratio and lowers the cost of equity (Pastor and Veronesi, 2003, 2005). However, unlike the generalized Myers-Majluf model, this literature is unable to address one of the central issues in corporate finance: tensions between existing and new investors regarding external financing. Thus, the generalized Myers-Majluf model provides a complementary result indispensible for the robustness of this asset pricing literature.

necessarily firm specific and whose attachment to the firm can be very uncertain. This is perhaps because human capital is not easily held captive within a firm. The remaining less lopsided combinations such as a high market-to-book ratio and high tangibility, and a low market-to-book ratio and low tangibility, indicate a mixed-growth-type. Thus, our definition of growth type is empirically tractable.

We use initial market-to-book ratios and tangibility to perform a two-way independent sort with breakpoints at medians. We define an initial average as a time-series average over the first three years after the initial public offering (IPO). Our initial-sorted three groups of COMPUSTAT non-financial and non-utility U.S. firms of low-, mixed- and high-growth-types (G1, G2, and G3) show significant differences in group mean leverage ratios at every cross section for event years through year 20 and calendar years for 1971-2005. Identified at the birth of corporate public life, firms of low-growth-type (G1) on average always have high future leverage ratios, firms of high-growth-type (G3) always have low future leverage ratios, and firms of mixed-growth-type (G2) stay persistently in between.

Lemmon, Roberts and Zender (2008) find that when firm fixed effects are included, the significance of leverage determinants commonly used in the literature drops drastically in panel data regressions. This result does not mean these standard leverage determinants are not important in the cross section of capital structure. It simply indicates that the within-firm time variation in these explanatory variables is on average much smaller than their cross-sectional variation which is mechanically absorbed by the firm fixed effects (Parsons and Titman, 2008, p. 24). Such small average time variation does not mean that identifiable fundamental forces are weak. For example, Denis and McKeon (2010) show that large debt issues driven by operational needs, mainly for tangible investments, can result in a permanent jump in leverage ratios. Such tangible investment needs fit low growth type, which can predict high leverage ratios but not the timing of such an *ex post* jump.

In our growth-type view, there is "growth type compatibility" in corporate finance, that is, different growth types suggest distinct investment styles and accordingly distinct financing behaviors. We find that low growth type implies persistently tangible investments whereas high growth type relentless

R&D or intangible investments, whenever corporate investments arise. Growth type also dictates firms' persistently distinct pecking orders in external finance, because types of asymmetric information spawn growth-type-determined pecking orders in financing. This explains more than Myers' (1984) pecking order, which is mainly based on the asymmetric information about assets-in-place. Thus, the novelty of this paper is focused on high growth type.

The rest of the paper proceeds as follows. Section 2 reviews the literature. Section 3 provides the rationale for our growth type view on leverage persistence and presents its direct evidence. Section 4 examines how growth type also predetermines the financing mix. Section 5 shows how growth type dictates firms' persistently distinct pecking orders in dynamic external finance. Section 6 concludes.

2. Literature Review

In this section, we first discuss why leverage persistence gives rise to important questions about capital structure (Section 2.1), and then review the roles of market timing (Section 2.2) and the generalized Myers and Majluf model (Section 2.3).

2.1 Main Issues in View of Leverage Persistence

The three competing capital structure theories popular in the literature—the tradeoff theory, Myers' (1984) pecking order theory, and the recent market timing theory of Baker and Wurgler (2002)—all seem to be consistent with leverage persistence. The trouble is that there are various concerns that cast doubt on all three theories: contradictory facts that they cannot explain.

If we apply the tradeoff theory, leverage persistence may mean either the existence of target leverage or a lack of capital structure rebalancing, and hence leverage persistence does not necessarily lend support to the tradeoff theory. In tradeoff theory, firms weigh the costs and benefits of debt at the margin to maintain optimal capital structures. The costs of debt come from concerns over bankruptcy and agency conflicts such as assets substitution (Fama and Miller, 1972; Jensen and Meckling, 1976) and debt overhang (Myers, 1977), while the benefits of debt arise from, for example, the tax shield (Modigliani

and Miller, 1963) and the disciplining role of debt (Jensen, 1986; Stulz, 1990). This theory emphasizes capital structure adjustment towards optimal targets if shocks push firms away from their optimum targets.

Empirical research has been successful in identifying firm characteristics that are directly related to these costs and benefits of debt. Market-to-book ratio, asset tangibility, profitability and firm size are important firm characteristics commonly accepted in the literature (e.g., Titman and Wessels, 1988; Rajan and Zingales, 1995). Except for profitability, these relationships are consistent with the tradeoff theory (Fama and French, 2002). In tests controlling for other non-tax factors, results from both Fama and French (1998) for U.S. firms and Wu and Xu (2005) for Japanese firms, show that the valuation effect of tax benefits of debt seems to be muted, further indicating the tradeoff theory's trouble with profitability. Graham (2000) makes it clear that the use of a tax shield by profitable firms seems much less vigorous than suggested by tradeoff theory.[3] In short, the important tradeoff force via profitability fails disappointingly—evidence considered by Fama and French (2002) as a "big scar" to the tradeoff theory.

The pecking order theory of Myers (1984) was supposed to offer an explanation. Asymmetric information about assets-in-place tends to inhibit new equity financing because of tensions between existing shareholders and new investors due to adverse selection (Myers and Majluf, 1984). As a result, retained earnings (as internal equity) are especially valuable for future investment because financial slack allows firms to undertake new investment that they would otherwise give up at unacceptably high dilution costs from using outside equity. The pecking order theory suggests that when new investment opportunities arise, firms follow a pecking order in financing: they first use retained earnings, then debt,

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[3] There are two specific explanations to this debt conservatism, that is, managers seem reluctant to sit on the optimal level of debt according to the traditional tradeoff theory. First, Zwiebel (1996) argues that although debt is a hard claim that keeps a tight grip on managers (Hart and Moore, 1995), self-interested managers have the incentive and discretion to dodge the discipline imposed by higher debt levels; as a result, it is optimal for them to choose lower debt levels as long as the levels are not sufficiently low to invoke takeover threat. Second, Graham, Lang and Shackelford (2004) find that option deductions at profitable firms are important non-debt tax shields and substitute for interest deductions.

and finally new equity as the last resort. This theory does not recognize leverage target but can be consistent with leverage persistence.

Myers (1984) suggested that adjustment costs of external finance must be so high that the pecking order of financing undermines tradeoff forces and prevents observed leverage ratios from reaching a leverage target. Early studies using the partial adjustment models show that firms seem to adjust towards leverage targets (Auerbach, 1985; Jalilvand and Harris, 1984). But Shyam-Sunder and Myers (1999) later challenged the statistical testing power of the partial adjustment models. In a comprehensive study, Fama and French (2002) conclude that while the speed of adjustment seems too slow, the pecking order theory also has a "deep wound": small growth firms, apparently fraught with severe information asymmetries, actually issue a lot of new equity and do not seem to face high adverse selection costs (See also Rajan and Zingales, 1995; Helwege and Liang, 1996)

The market timing argument of Baker and Wurgler (2002) suggests that new equity issues have a large, permanent effect on leverage, and interprets the low, persistent leverage ratios of high growth firms as these firms' defiance of tradeoff forces (see also Welch, 2004). This market timing theory also does not recognize target leverage and robust capital structure adjustment. In effect, the market timing theory inherits the spirit of Myers' (1984) pecking order theory in that persistent leverage ratios are consistent with firms' tendency to stay away from target leverage ratios even in the long run.

Disagreements with Baker and Wurgler (2002) come mainly from two lines of research. First, Leary and Roberts (2005) find a clustered but quick rebalance from new debt issues after equity issues, consistent with a target range argument under dynamic adjustment costs (Fisher, Heinkel and Zechner, 1989; Goldstein, Ju, and Leland, 2001). Faulkender and Petersen (2005) also find that changes in leverage following an increase in equity financing over the past year are tiny, also suggesting timely adjustments of capital structure. In addition, many managers surveyed by Graham and Harvey (2001) tend to accept a soft target concept for leverage. A target range is also consistent with the findings of Fama and French (2002) that firms seem to adjust toward a soft target. But Fama and French (2002) argue that a soft target

is also consistent with a dynamic version of the pecking order in financing suggested by Lemmon and Zender (2004).

Second, Hovakimian (2006) and Kayhan and Titman (2007) directly question the interpretation of the results from the market timing variable in Baker and Wurgler (2002). Hovakimian (2006) argues that this market timing factor actually contains strong information about firm growth opportunities. Kayhan and Titman (2007) further point out that it is not the short-term market timing component that drives the Baker and Wurgler results.

To defend Baker and Wurgler (2002), Huang and Ritter (2008) argue that the center of debate should be the apparent benefits of new equity for firms with high valuations (they actually mean overvalued firms) but the above criticisms alike all avoid addressing this issue. Indeed, Graham and Harvey (2001) document that the managers they surveyed—especially those from small growth firms—tend to believe that new equity is cheap (relative to other funding sources).

The challenge by Huang and Ritter (2008) is highly relevant. First, the dynamic adjustment costs argument usually assumes high costs of equity and mainly focuses on the costs and benefits of debt. The dynamic capital structure model can explain spikes in new debt issues but it is unclear whether new debt issues, in practice, are meant to be adjustments toward a target (Chang and Dasgupta, 2009; Denis and McKeon, 2010). Second, the well-known negative relationship between firm growth and leverage can hardly imply the benefits of equity financing by high growth firms in the classic Myers and Majluf (1984) framework, as already noticed by Rajan and Zingales (1995) and Fama and French (2002). Myers (1977) explains that it is tangible assets that give rise to debt capacity; conversely, high growth firms with a lot of intangible assets including growth options tend to avoid debt to prevent the problem of debt overhang. This argument, however, does not say that high growth firms should have low costs of equity.

Viewed from a dynamic setting, Lemmon and Zender (2004) suggest that high growth firms stockpile cash through new equity issues to preserve debt capacity for the future. But future debt capacity cannot be a first-order concern by many firms that have persistently low or zero leverage. Even if debt

capacity is relevant, this argument would imply that high growth firms are willing to stomach high costs of new equity now for low debt issuing costs in the future (Fama and French, 2005). In contrast, the market timing theory of Baker and Wurgler (2002) leans directly on cheap new equity largely under the exploitable market timing view that managers are able to issue new equity to exploit market overvaluation (reflected in recent high market-to-book ratios) in an irrational equity market (Stein, 1996).

The debate over the explanatory powers of existing theories (as discussed above) warrants a call for rethinking the theory behind capital structure. For one thing, if we do not know much about why firms maintain their long-run leverage ratios, the target leverage specifications using various observed firm characteristics based on the tradeoff theory are bound to miss the "target". While Fama and French (2002) show a "snail slow" adjustment speed to question the tradeoff theory, Flannery and Rangan (2006) instead find much quicker rebalancing in leverage ratios, after they consider unobserved firm heterogeneities in target leverage ratios. But the new problem is (as Myers, 1984, already warned more than a quarter of a century ago) that we actually understand very little if N firms have N specific leverage targets that we cannot really explain and determine ex ante.

2.2 Market Timing

Market timing in external finance is related to within-firm or time-variation in capital structure but may or may not affect the cross section of long-run capital structure. Dynamic costs and benefits of external finance drive firm market timing behavior. Firms time the market especially with new equity issues: they issue equity when stock prices run up and business conditions become more favorable. Bayless and Chaplinsky (1996) find that the announcement effects of equity issues are on average significantly better during high issuing volume periods (hot market) than during low issuing volume periods (cold market). Managers admit that they do consider pre-issuance stock price appreciations (Graham and Harvey, 2001). In effect, there are two distinct notions of market timing in the literature. They can be called "fair market timing" and "exploitable market timing".

Early views of fair market timing associate price run-ups and improving business conditions with

a reduction in asymmetric information about assets-in-place, both individually (Korajczyk, Lucas, McDonald, 1990, 1993) and market-wide (Choe, Masulis, and Nanda, 1993). The announcement effects of new equity issues, on average, reflect the costs of market imperfection (such as information asymmetries) that would not appear in a perfect market. Firms seek to make dynamic financing decisions to mitigate such market imperfections.

The dynamic adverse selection model of Lucas and McDonald (1992) also suggests fair market timing. The model keeps information asymmetry about assets-in-place constant over time but allows firms to delay new projects (albeit at a cost). Like in Myers and Majluf (1984), only overvalued firms issue equity. Because of this ability to delay, separation between the over- and under-valued firms becomes sharper. The model can explain issuers' pre-announcement stock price run-ups (see also the recent real options model of Carlson, Fisher, Giammarino, 2006). Price run-ups are also consistent with investors' consecutive upward revisions of investment opportunities, but Lucas and McDonald (1992) point out that this argument is not enough to explain why on average prices drop at new equity issuance, a phenomenon also predicted by the Myers and Majluf (1984) model. These early views of fair market timing may well explain how firms mitigate the adverse selection costs of equity introduced by Myers and Majluf (1984), but they cannot explain why overwhelming benefits may arise from new equity issues.

Market conditions, often based on market-to-book ratio as a proxy for growth opportunities, may also represent a window into investor irrationality. Motivated by the existence of outside irrational investors suggested by Stein (1996), the market timing theory of capital structure in Baker and Wurgler (2002) favors the view of exploitable market timing, namely, rational managers exploit overvaluations in an irrational stock market. As a result, Baker and Wurgler (2002) suggest that it is the complete history of external finance in response to timely overvaluations that dictates long-run capital structure.

2.3 The Generalized Myers and Majluf Framework

Can new equity issues face little adverse-selection discount somehow systematically in a rational market? The answer is yes. Cooney and Kalay (1993) show that if asymmetric information about growth is not

limited to positive net present value (NPV) from new projects as in the original Myers and Majluf (1984) model, equity issuance equilibrium can change so that new equity issues can in some cases be unambiguously good news. This is confirmed by Wu and Wang (2005) who incorporate private benefits of self-interested controlling shareholders/managers into the Myers-Majluf framework. The extension in Wu and Wang (2005) solves the incentive compatibility problem ignored by Cooney and Kalay (1993), and hence is able to impose an explicit control for investor concern about overinvestment due to empire building—which can potentially cloud new equity issues as pointed out by Jung, Kim and Stulz (1996).

The generalized Myers and Majluf model described by Wu and Wang (2005) shows that an increase in asymmetric information that arises from growth opportunities rather than assets-in-place can facilitate new equity issues, and in some cases, even produce a positive announcement effect.[4] This cannot happen in the classic setting, in which the adverse selection effect always dominates. Myers and Majluf (1984) point out that asymmetric information about growth does not influence new equity issues if asymmetric information about assets-in-place is absent (see also Myers, 2003). Perhaps this conclusion has contributed to the general impression that it is asymmetric information about assets-in-place, but not about growth, that is important for new equity financing decisions.[5]

Why would an increase in uncertainty that arises from growth opportunities facilitate rather than inhibit new equity issues under asymmetric information? The intuition is as follows. In the classic

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[4] A positive announcement effect of new equity issues is usually found in private placement (Wruck, 1989; Hertzel and Smith, 1993). Private issuers, however, are mainly small firms. See Wu, Wang and Yao (2005) for an explanation of why a positive announcement effect for small issuers can be consistent with the generalized Myers-Majluf framework. Also see Eckbo and Masulis (1995) and Eckbo, Masulis, and Norli (2007) for a review of the announcement effects for seasoned new equity issues.

[5] Early studies, as summarized in Harris and Raviv (1991), propose various settings to contradict the central prediction of the adverse-selection effect in Myers and Majluf (1984). The later developed framework of Cooney and Kalay (1993) and Wu and Wang (2005), however, has the least deviation from the original Myers and Majluf (1984) setting. The advantage to stick to this framework is that it limits new problems to a minimum – problems that often arise due to the introduction of new assumptions or settings whose full implications are yet to be examined.

equilibrium with adverse selection, undervalued firms are separated from overvalued firms when issuing new equity. However, this separation is unlikely to occur when asymmetric information about growth opportunities (instead of assets-in-place) predominates. In this situation, firms with undervalued growth opportunities may be willing to accept a smaller share of the NPV of new investments, because the issuers would otherwise have ended up with nothing.[6] This situation is likely to occur if potential issuers have few assets-in-place relative to growth opportunities and hence are less concerned about share dilution. It follows that not all new equity issues are lemons and hence the adverse-selection discount reduces or becomes even reversed accordingly. The classic concept of equity issue lemons is only relevant when firm value and its asymmetric information arise mainly from assets-in-place.

The generalized Myers-Maljluf model provides an explanation for why high growth firms are not good candidates to fall under duress in the sense of Myers and Majluf (1984) in issuing new equity.[7] Most importantly, this generalized Myers-Majluf model implies that if firms do not experience a fundamental change in types of asymmetric information, their financing behavior will be largely persistent. In other words, it is the innate firm type that underlies persistent firm financing behavior and capital structure.

3. Firm Fundamentals, Initial Growth Type and Leverage Persistence

In this section, we start by showing that the explanatory power of initial leverage determinants for future leverage ratios is relatively more stable, compared to that of unexplained initial information on leverage (Section 3.1). To understand fundamental persistence, first, we conceptually identify firm growth type, which gives rise to distinct forms of market imperfection that affect capital structure differently; then we

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[6] Note that the rational expectation assumption imposes unbiased expected growth under asymmetric information here. The simulation results in Table 5 of Wu and Wang (2005) show that it is the increase in uncertainty over growth but not in expected growth per se that mainly causes the announcement effect of equity issuance to improve.

[7] One may argue that if this prediction is true, managers can manipulate accounting figures so as to increase uncertainty over firm valuations (see the similar situation faced by Pastor and Veronesi, 2003, 2005). But such

empirically define initial growth type (Section 3.2). Next, we document the persistently different leverage ratios sorted by initial growth type (Section 3.3). Lastly, we show that many corporate finance variables sorted by initial growth type are meaningfully persistent (Section 3.4).

3.1 Retained Explanatory Power: Explained versus Unexplained Initial Information

Lemmon, Roberts and Zender (2008) argue that future leverage ratios are mainly related to unexplained initial leverage heterogeneities. What they did not emphasize is that initial standard leverage determinants contain stable information on future leverage ratios. An initial variable is the three-year average of annual variables in event year 0, 1, and 2 where event year 0 is the first data entry year (which is simply the IPO year for many firms). See the detailed descriptions for data and variables in Appendix A and B.

As shown in Panel A1 of Table 1 using the full sample, the future book leverage ratios of a particular event year are regressed on four initial leverage determinants: market-to-book ratio (MtB), asset tangibility (Tang), profitability (Profit) and firm size (LnSize). The slope estimates for these variables are all reliably significant. The adjusted R^2 is 14.1% for event year 3 initially and decreases when the predicting horizon increases, for example, to 6.6% by year 20, but still retaining 46.8 percent of the initial explanatory power.

To isolate unexplained initial information on leverage, we need to control for these initial leverage determinants. As shown in Panel B1 of Table 1, the slope estimates for initial residual leverage (Initial ResLev) which measures unexplained initial information on leverage are also robustly significant. Initial ResLev is the sum of the intercept and residual from a cross sectional OLS regression of initial leverage ratios on the four initial leverage determinants. The strong significance of Initial ResLev on average seems to indicate that much of the future leverage ratios are initially determined but not explained, as concluded by Lemmon, Roberts and Zender (2008). But we show here that the high explanatory power of

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account-manipulated uncertainty is much more relevant for assets-in-place than growth opportunities, not to mention that managers have to keep the level of market expectations from dropping at the same time.

this unexplained initial information drastically weakens in the long-run: the adjusted R^2 in Panel B1 drops quickly over time, from 50.9% initially in year 3 to 5.5% by year 20, retaining only 10.8 percent of the initial explanatory power.

To ensure this result is not caused by the mix of short- and long-lived firms in the sample, we also examine firms that survive for at least 20 years. As shown in Panel A2 and B2, we again see a similar result: relatively much stable for the initial leverage determinants, with initial determinants retaining 46.2 percent of the initial explaining power by year 19 (Panel A2) and Initial ResLev only 12.1 percent (Panel B2). Note that we show results for year 19 instead of 20 in Panels A2 and B2, since the numbers of adjusted R^2 of year 20 in Panel A1 and B1 are already for the survivors. Our findings suggest that unlike unexplained initial firm heterogeneities in leverage, initial standard leverage determinants of four already have a much stable role in anchoring capital structure persistence and are worth exploring in more detail.

3.2 Growth Type and Capital Market Imperfection

To understand the fundamental persistence of capital structure, we need to examine the structure of market imperfection. Asymmetric information is ubiquitous, causing capital market imperfections that include related agency conflicts. Asymmetric information that gives rise to information advantages for managers or corporate insiders can arise from a firm's assets-in-place as well as growth opportunities or added value from future investments. It may be that some firms have more asymmetric information from assets-in-place than from growth opportunities; conversely, other firms have more asymmetric information from growth opportunities than from assets-in-place. This distinction gives rise to a firm-type phenomenon where a certain type of asymmetric information predominates in a firm. The MM theorem (Modigliani and Miller, 1958) implies that specifications of market imperfection affect corporate capital structures. Finance research has found that different types of asymmetric information have totally different implications for corporate financing behavior.

As summarized in Table 2, if asymmetric information arises more from assets-in-place than from

growth, issues of outside equity are more likely to suffer the adverse selection effect of Myers and Majluf (1984), and such firms follow Myers' (1984) pecking order in financing. In contrast, if asymmetric information arises more from growth than from assets-in-place, an increase in asymmetric information helps facilitate new equity issues as shown by the generalized Myers-Majluf model. When asymmetric information about growth dominates, new equity issues are not necessarily overvalued; in fact, some of them may even be undervalued. As a result, their new equity issuing prices are on average higher than predicted by Myers and Majluf (1984). Thus, issuers whose valuations under asymmetric information are based more on growth opportunities than on assets-in-place can enjoy cheaper new equity. One implication is that despite big information gaps, high growth firms can use new equity as a natural curb on bank rent extraction which the information production literature has been silent about (Wu, Sercu and Yao, 2009).

The extent of information asymmetries may vary over time; however, the dominance of a particular type of asymmetric information likely persists. If so, a firm's financing behavior and hence capital structure can be persistent. To test this, our next task is to find a suitable proxy to measure asymmetric information type.

A combination of firm market-to-book ratio and asset tangibility can reveal the type of asymmetric information that dominates in a firm. In the literature, market-to-book ratio is commonly used as a proxy for growth opportunities and intangible assets. Assets tangibility, when used as a proxy for assets-in-place, examines asset type, which is highly correlated with the type of asymmetric information that is dominant. In a world with asymmetric information, the higher a firm's market-to-book ratio, the more likely it is for the firm to have more asymmetric information arising from growth opportunities. Likewise, the higher a firm's tangibility (under asymmetric information), the more likely it is for the firm to have more asymmetric information about assets-in-place than about growth. Thus, we can use growth type to summarize the combined implications of asset and asymmetric information types as discussed above.

Firms can be fundamentally different depending on how their valuations are created. At one end of the spectrum there are firms whose valuation and valuation uncertainty come mainly from assets in place. This situation is well understood in the literature. At the other end there are firms whose valuation and valuation uncertainty come mainly from new investment opportunities. Such growth opportunities usually arise from firms with innovative human capital and an investment style that emphasizes intangible investments (e.g., Zingales, 2000). We shall call the first type of firm low-growth-type firms, and the second type of firm high-growth-type firms. Of course, in the real world, firms fall right across this spectrum of firm growth type.

We hope to find a clean proxy for growth type. Current market-to-book is likely to be contaminated by prevailing market conditions that may indicate irrational sentiment, and hence tends to cause controversy over its interpretations when we examine current capital structure. Therefore, we prefer to examine the relationship between the current capital structure and growth type identified as far back as possible. Such a relationship exists if growth type is stable and fundamentally determines capital structure despite time variations in market-to-book ratios.

We define initial growth type using a two-way independent sort on a firm's initial market-to-book ratio and asset tangibility. Following Lemmon, Roberts and Zender (2008), an initial variable is the three-year average of annual variables at event year 0, 1, and 2. For each firm, event year 0 is its IPO year or its first data entry year if the IPO date information is not available. With breakpoints at medians, our two-way sort generates four portfolios of firms in terms of initial value: low market-to-book ratio and high tangibility (LH), low market-to-book ratio and low tangibility (LL), high market-to-book ratio and high tangibility (HH), and high market-to-book ratio and low tangibility (HL).

We rearrange the four portfolios into three firm groups. As summarized in Table 3, the lopsided LH firms are low-growth-type firms (G1). The lopsided HL firms are high-growth-type (G3). When asymmetric information is important, low-growth-type firms (G1) are most likely to have more

asymmetric information about assets-in-place than about new investment opportunities. Conversely, high-growth-type firms (G3) are most likely to have more asymmetric information about investment opportunities than about assets-in-place (AIP). For the less lopsided LL and HH firms, it is unclear which type of asymmetric information predominates. So we treat the remaining two firm portfolios (LL and HH) as mixed-growth-type firms (G2). There are fewer of the less lopsided LL or HH firms than the LH or HL firms because market-to-book ratio and asset tangibility are highly negatively correlated. As a result, the mixed G2 firms have roughly the same number of firms as each of the two other types. The initial number of firms for the G1, G2 and G3 firm groups is 1260, 1425 and 1496 (the IPO sample), and 2670, 3600, and 3938 (the full sample).

The theoretical basis summarized in Table 2 suggests that growth type affects the relative costs of external finance with debt versus outside equity. As shown in Table 3, the financing cost structure by growth type suggests that low-growth-type firms (G1) are more debt financing oriented and high-growth-type firms (G3) are more equity financing oriented. Note that the claim that high-growth-type firms (G3) are able to enjoy cheap outside equity can be best rationally understood in the generalized Myers-Majluf framework. Thus, we expect that firms of low growth type (G1) have high leverage ratios and firms of high growth type (G3) have low leverage ratios, with firms of mixed type (G2) being in between.

3.3 Leverage Ratios Sorted by Initial-growth-type

Figure 1 plots group means of leverage ratios by initial growth type for each event year up to year 20. A persistent pattern is clear: average leverage ratios by growth type, regardless of whether they are measured by book (Panel A) or by market leverage (Panel B), stay separate over time. The leverage persistence pattern also holds after including those firms where we take their first COMPUSTAT data entry year as the IPO year (Figure C and D). These plots provide our *prima facie* evidence for firm growth type to explain the leverage persistence highlighted by Lemmon, Roberts and Zender (2008).

To support the notion that growth type parsimoniously explains the persistence pattern as shown

in Figure 1, we examine the long-run explanatory power of initial market-to-book ratio and initial tangibility. We control for year *t-1* leverage determinants: market-to-book ratio, asset tangibility, profitability, firm size, industry and dividend (their slope estimates are largely consistent with the findings in the literature). Note that the last four leverage determinants as well as market-to-book ratio and tangibility are widely used in the literature (Bradley, Jarrell and Kim, 1984; Titman and Wessels, 1988; Rajan and Zingales, 1995; Fama and French, 2002; among others).[8]

Time-varying year *t-1* market-to-book and tangibility contain updated information on growth type as well as market noise (especially in market-to-book). As shown in Table 4, without this updated information, both initial market-to-book and initial tangibility significantly explain future capital structures up to 20 years. More important, adding updated information on growth type cannot wash away the information content of initial growth type. While updated tangibility completely overtakes initial tangibility when firms age, initial market-to-book still has long-run explanatory power beyond that contained in noisy updated market-to-book ratios. This evidence is important because it is market-to-book as a noisy proxy for either corporate growth opportunities or market sentiment (leading to hard-to-overcome mispricing) that causes controversy over its interpretations in the literature. Our results here show that initial market-to-book, which pushes potential market sentiment as far back as possible, can explain current capital structure, leaving little implication for timely, opportunistic market timing.

Although updated tangibility eventually overtakes initial tangibility, tangibility is highly persistent. In Table 5, we trace how often firms change from initial growth type to growth type based on updated

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[8] We have tried single sorts (into quartiles) on initial values for market-to-book, tangibility, profitability, or firm size. Only the sort on tangibility produces a clearly dispersed pattern for leverage persistence. While this pattern tells a lot of truth about debt capacity from assets-in-place (or tangibility) as suggested by Myers (1977), we believe that our two-way sort that incorporates initial market-to-book best characterizes the valuation framework of assets-in-place and growth opportunities that is indispensable in addressing costs of new equity, for example, in Myers and Majluf (1984). Note that two-way sorts based on initial tangibility and other variables than market-to-book cannot produce a clearly dispersed pattern for leverage persistence as shown in Figure 1 (available on request).

tangibility (using the same two-way sort except for initial tangibility being replaced by updated tangibility each year). We find that there is a strong diagonal effect in the transition matrix for the three growth types. On average, firms stay within the same group of growth type at least 94 percent of the time over 20 years. This strong stability of growth type implies high persistence of tangibility although updated tangibility, as shown in Table 4, dominates initial tangibility in determining current capital structure. Thus, despite time varying of both market-to-book and tangibility, the three growth types seldom change over time.

We then examine if growth-type-determined leverage persistence holds in calendar time as well. As shown in Figure 2, the three mean leverage ratios continue to stay apart by calendar year. Not surprisingly, corporate capital structure when measured by book leverage (Panel A) varies less with the market and economy than when measured by market leverage (Panel B). The important message here is that despite the ups and downs of market conditions or market sentiment, the gaps persist in the group mean leverage among the three growth-types.

Table 6 shows that the gaps between the growth-types are statistically significant in terms of group means and medians of leverage over event time. We see huge *t*-stats and zero *p*-values everywhere. Year-by-year results and the calendar time results are similar in significance (not shown but available on request).

One may suspect that the leverage persistence patterns mainly reflect an industry effect, because each of our growth types may exclusively contain a cluster of industries. But as shown in Figure 3, where we control for individual industry medians according to the Fama-French classification of 38 industries, the persistence patterns are still evident for industry-adjusted leverage among the three initial industry-adjusted growth types. Note that industry-adjusted leverage is defined as leverage ratio minus industry median leverage, and initial industry-adjusted growth type is from a two-way sort based on initial market-to-book ratio minus initial industry median market-to-book, and initial tangibility minus initial industry

median tangibility. This means that our concept of growth type can explain leverage persistence even after controlling for an industry effect. We believe that growth type is more fundamental than an industry identity in determining capital structure.

The implication of our evidence on leverage persistence in relation to initial growth type is unambiguous. In empirical studies on capital structure, researchers often use market-to-book ratios as a proxy for investment opportunities. It is well known that market-to-book ratios also contain information about not only macroeconomic conditions (Korajczyk and Levy, 2003) but also possible market misvaluations (Stein, 1996). This makes inference difficult.

Hovakimian (2006) and Kayhan and Titman (2007) argue that the historical average of past market-to-book ratios is more likely to measure investment opportunities than temporary market conditions and misvaluations. They challenge Baker and Wurgler's (2002) conclusion, since the market timing factor proposed by Baker and Wurgler (2000) has a component of the time-series average of past market-to-book ratios. But a historical average of market-to-book ratios is still clouded by "long-term market timing" (Kayhan and Titman, 2007), and also perhaps "average" market timing concerns. In contrast, our growth-type is identified from the earliest possible dates, and is least likely to have causality in favor of the market timing determination. One may argue that if market timing drives an IPO, the initial growth type inevitably tangles with the IPO market timing. But Alti (2005) shows market conditions for both cold and hot IPOs do not seem to have a long lasting effect on future capital structures because he finds that the immediate IPO effect on leverage is largely erased within a couple of years.

3.4 Firm Fundamentals Sorted by Initial-growth-type

Our argument for growth-type-determined leverage persistence is based on the slow evolution of growth type. In this section, we show that our growth-type concept is consistent with persistently distinct firm fundamentals in profound ways.

As shown in Panel A of Table 7, the three group means of market-to-book ratios change slowly

over time, where we report annual averages for the four packed periods, year 3-5, 6-10, 11-15, and 16-20. The low growth type group (G1) climbs from 0.71 in the early years to 1.01 in the last 5 event years while the high growth type group (G3) decreases from 2.45 to 2.04 in the same setting. Likewise, the two lopsided groups also show some converging development in terms of tangibility, decreasing in G1 and increasing in G3. Despite these convergence forces, the lopsidedness in market-to-book ratio and tangibility that starts at the very beginning and defines the three growth-types does not seem to disappear over time. As indicated by the *t*-stats, the differences in terms of group means are always significant in Panel A of Table 7, consistent with the stability of growth type as reported in Table 5. These slow evolutions of market-to-book and tangibility (which jointly characterize firm growth type) at the group level are also consistent with a general tendency for leverage ratios to revert to long-run means.

Panel A of Table 7 also shows that growth type is negatively correlated with firm size. This comes as no surprise given that firm size is positively correlated with tangibility. While firms of all growth-types grow, the gaps in firm size, despite the tendency to narrow, remain significant over the 20-year period.

Panel B of Table 7 shows that profitability and growth type are consistently negatively related. On average, profitability is steadily around 13 percent per annum for G1 firms, around 11.5 percent for G2 firms, and the smallest for G3 firms over time. Low and mixed growth firms (G1 and G2) are always significantly more profitable than high growth firms, although the improvement in profitability (from losses in the earlier years to 7.16 percent per annum in the last 5 years) is pronounced for G3 firms. If we separate profitable firms from loss-making firms each year, however, we can see that profitable G3 firms on average, catching up G2 firms, deliver significantly higher profits than do profitable G1 firms in the year 11-15 and 16-20 periods. In effect, the negative relationship between profitability and growth type is largely driven by loss-making firms, as explicitly shown in the right block of Panel B of Table 7. The dispersion in profitability *ex post* (between profitability >0 and profitability<0) across the growth-types suggest that larger swings in profitability go with higher growth type. This is consistent with the nature of increasing uncertainty over better growth prospects for firms with higher growth opportunities.

Panel C of Table 7 further details how the three growth-types persistently differ in terms of asset growth rate and investment style. The patterns are clear as well. As firms age, on average, firms of low growth type (G1) always have significantly lower annual asset growth than firms of high growth type (G3). This is shown in the left block of Panel C. Given our definition of growth type, firms of different growth types are expected to place different emphases on tangible and intangible investments. As shown in the rest of Panel C, investment styles indeed persistently differ across the growth-types. To show the differences, for example, in the year 6-10 period, firms of low (G1), mixed (G2) and high growth type (G3) have an average annual capital expenditure, Capex (tangible investments), of 7.60, 7.00, and 5.35 percent of the previous year's total assets. But they make annual average investments in R&D (intangible investments), in reversed order, of 2.32, 4.39, and 12.58 percent of the previous year's total assets, respectively. The differences across the three growth types are all statistically significant.

The persistently distinct investment styles suggest that low growth type (G1) entails a tangible investment style which focuses investments on tangible assets, and high growth type (G3) entails an intangible investment style which tilts overwhelmingly towards intangibles. More precisely, while the persistent gap in the tangible investments (Capex/A) between G1 and G3 is some 2 percent of total assets, the persistent gap in the intangible investments (R&D/A) between them is huge, about 10 percent of total assets in absolute value. Apparently, firms of high growth type (G3) make relentless investments in intangibles; this is likely to be what underlies their high market-to-book ratios over time.

Panel D of Table 7 further reports the persistent differences in sales growth, cash holdings and propensity to pay dividends. As shown in the left block of Panel D, low-growth-type firms (G1) have significantly lower annual sales growth rate than mixed-growth-type firms (G2), which in turn have significantly lower sales growth rate than high-growth-type firms (G3). For example, in the year 6-10 period, the average sales growth rates are 12.20, 13.91, and 22.19 percent, respectively. Here as well, like as was shown for intangible investment, G3 firms stand out in annual sales growth. Sales reflect real economic activities, and the high market-to-book ratios of G3 firms do have a fundamental content.

As shown in the two remaining blocks of Panel D of Table 7, G3 firms have by far the largest cash holdings, and are least likely to pay dividends. For example, during the period from year 6 to year 10, on average, G1, G2 and G3 firms have cash holdings of 8.27, 13.17, and 23.35 percent of the previous year's total assets, and their probabilities to pay dividends are 64.21, 48.06, and 23.28 percent, respectively. There are significant, persistent differences between the G1, G2 and G3 groups.

The finding of the pronouncedly high cash holdings for G3 firms should not give rise to the free cash flow concern, because G3 firms have persistently high market-to-book ratios. Using a sample of 89 U.S. firms with large cash holdings for 1986-1991, Mikkelson and Partch (2003) also document that high cash holdings are unlikely to hinder firm valuation, since these firms have high R&D investments and asset growth. All this suggests that high cash holdings allow relentless investments in intangibles; and at the same time the market must believe that their intangible investment is the engine for high growth, and they do deliver high sales and asset growth. This belief is unlikely due to dividend signaling, as G3 firms are least likely to pay dividends. But, given the least profitability of G3 firms as shown in Panel B of Table 7, where are their high cash holdings from? We show evidence in the next section.

In summary, we show that growth type meaningfully cuts firm fundamentals to produce persistent patterns. Low-growth-type firms (G1) focus on tangible investments and grow with a tangible-investment style. In contrast, high-growth-type firms (G3) make much more intangible investments and grow with an intangible-investment style. In line with this pattern, G1 firms continue to have low market-to-book, high asset tangibility, enjoy steady profitability and are most likely to pay dividends. In sharp contrast, G3 firms continue to have high market-to-book, low tangibility, achieve by far higher asset and sales growth rates, and somehow stockpile much more cash. It is this persistence in firm fundamentals that underlies the stability of growth type. Yet, unless we understand the relationship between growth type and financing behavior, it is difficult to make any inferences about how leverage persistence is maintained. We examine this issue in the next section.

4. Financing Mix of New Investment by Initial-growth-type

For each growth type, we calculate the group means for the three funding sources of new investment: annual net debt issues, net equity issues and changes in retained earnings, respectively, over event time. Figure 4 plots out these variables starting from year 3. Note that we skip the first three years (year 0, 1 and 2) to purge the IPO phenomenon in which abnormal new equity issues can reach more than 50 percent of total assets for G3 firms, for example (not reported in the figure here). Comparing across the three growth-types, while there is not much difference in net debt financing (shown in Panel A), distinct patterns emerge for both net equity issues (Panel B) and changes in retained earnings (Panel C).

As shown in Panel B of Figure 4, year-by-year issues of outside equity line up well with the growth-types. For almost 20 years, high-growth-type (G3) firms issue significantly more equity than both low- and mixed-growth types (G1 and G2), albeit converging down eventually. G2 firms issue more equity than G1 firms until about year 11, although there is not much difference between G1 and G2 later. The evidence about heavy equity financing by G3 firms is especially interesting. Heavy equity financing makes it possible for G3 firms to stockpile cash to fund R&D investments for an extended period (see also Kim and Weisbach, 2008). This explains their high cash holdings documented in Table 7.

In studying the optimal cash holdings, Opler, Pinkowitz, Stulz and Williamson (1999) find that the determinants of cash holdings are closely related to the determinants of debt, but leave the question: "To what extent are cash holdings and debt two faces of the same coin?" Our finding here reveals that high-growth type underlies high cash holdings that are achieved largely through new equity issues; and as shown in the previous section, high-growth type firms have significantly lower debt (leverage) ratios.

The heavy equity financing by G3 firms would weigh down their leverage ratios considerably if there were no force rebalancing the ratios. As shown in Panel C of Figure 4, changes in retained earnings also persistently differ across the growth types. G2 is less than G1 most of time. G3 is less than both G1 and G2 for almost 20 years, albeit eventually converging upward (in the negative territory). It is interesting that the pattern is more pronounced for high-growth-type firms (G3). Their huge decreases in retained earnings tend to mirror their huge new equity issues, as shown in Panel B. This suggests that for

high-growth firms (G3), it is the huge decreases in retained earnings that prevent heavy equity financing from changing the leverage ratio. This is in sharp contrast to the general finding by Leary and Roberts (2005) that net debt issues are the main rebalancing force against new equity issues.

For high-growth firms (G3), their huge decreases in retained earnings or big accounting losses simply reflect the expensing or amortizing of their relentless R&D or intangible investments that pay off slowly. Despite uncertainty about their growth prospects, the market continues to expect high future payoffs (including from future investments) eventually, as evidenced by their high market-to-book ratios.

Given that the choice of IPO may reflect initial market timing, why do the firms that we identify as high growth type at IPO still persistently rely on new equity financing as they grow? If we stick with the exploitable marketing timing argument of Stein (1996) and Baker and Wurgler (2002), we have to come to the conclusion that these firms are always able to exploit outside investors because of market overvaluations that occur persistently, not just at IPO. However, persistence of this kind is incompatible with exploitable market timing as a timely and opportunistic phenomenon. In contrast, the fair market timing view based on the generalized Myers-Majluf model suggests that, while market timing is likely to occur according to changing market conditions, it is growth type instead of market timing that dictates firms' distinct pecking order preference in external finance.

This growth-type-determined pecking order preference seems intricate. For one thing, Fama and French (2005) find no overarching pattern for asymmetric information costs, or more precisely, adverse selection costs, to prevent new equity issues—that is, most firms seem to issue equity more frequently than suggested by Myers and Majluf (1984). Below we show, in particular, how the generalized fair market timing view can shed new light on this puzzling finding.

5. Time-variation in External Finance by Initial Growth Type

Managers have incentive to time the market. Market timing for external finance occurs when a firm's external finance increases in response to better market conditions or a higher market-to-book ratio for

whatever reasons. Market timing is very general but it is largely a phenomenon of within-firm variation.

Short-term variation in year-by-year leverage ratios often contains detailed information about both tradeoff forces and effects of information asymmetries. These tradeoff forces and asymmetric information effects interact with market conditions, as described by various theories. Researchers have attempted to compare competing theoretical predictions. Research designs in previous studies vary from the Logit models (e.g. Hovakimian, Opler, Titman, 2001; Hovakimian, 2004) to the augmented or modified adjustment models (e.g., Shyam-Sunder and Myers, 1999; Fama and French, 2002; Flannery and Rangan, 2006), and can also be as straightforward as portfolio sorts (e.g., Fama and French, 2005). Perhaps because all the theories have significant overlaps, results from this literature taken together are mixed regarding which theory dominates (Fama and French, 2002, 2005).

Our task here is less burdensome. We simply aim to show how growth type affects within-firm variation in external finance in response to time-varying firm characteristics. We use the full sample but exclude the initial period that we used to identify the firm growth type (event years 0-2). We wish to purge any IPO effect, if any, from our analysis. Including the data from these earlier years, however, does not qualitatively alter our regression results (results available on request).

We use a pooled OLS regression with firm fixed-effects to demonstrate within-firm variations, and with a growth-type dummy to pick up the effect of growth-type. Our firm characteristics, commonly used in the literature, are market-to-book (MtB), tangibility (Tang), profitability (Profit), firm size (LnSize), Industry Median Leverage (Ind_median), and dividend payer status (DivPayer, a dummy variable), all lagged by one year. In subsection 5.1, we focus on the results for market-to-book ratios and profitability, both having tradeoff and pecking order implications. In subsection 5.2, we discuss the results for the other leverage determinants we use.

5.1 Response to Market-to-book Ratio and Profitability

Market-to-book Ratio. As shown in Table 8, for all growth-types, an increase in market-to-book ratios significantly facilitates both net issues of debt (Δdebt/Asset) and equity (ΔNetEquity/Asset). The

results are similar if we measure net equity issues by market value (as shown in the next two columns). It is not really surprising that as market conditions improve, future cash flows generated from both assets-in-place and new investment opportunities are expected to increase and hence firms tend to increase external finance for expansion. As widely shown in the literature, issues of outside equity tend to follow issuers' stock price run-ups (Taggart, 1977; Marsh, 1982; Asquith and Mullins, 1986; Korajczyk, Lucas, and McDonald, 1991; Jung, Kim, and Stulz, 1996).

Recently, Fama and French (2005) have shown that most firms issue new equity quite often, and they conclude that the asymmetric information costs described in Myers and Majluf (1984) are not relevant to equity issues at large, as new equity does not look like last resort financing. This puzzle, however, can be resolved by the generalized Myers-Majluf view, which shows that the costs and benefits of new equity issues depend on types of asymmetric information.

Even in the Myers and Majluf (1984) framework with dominant asymmetric information about assets-in-place, asymmetric information costs make firms skip profitable new investments, only if the adverse share dilution effect from taking outside equity overwhelms the benefits from the new investments. Market conditions that can work through year-by-year market-to-book ratios are likely to disrupt this equation from time to time. According to the survey study of Graham and Harvey (2001), managers confirm that they do consider firm valuations when deciding on new equity issues. This is consistent with the fair market timing views based on time-varying asymmetric information about assets-in-place (Korajczyk, Lucas, McDonald, 1990, 1993; Choe, Masulis, and Nanda, 1993) and the dynamic adverse selection model (Lucas and McDonald, 1992). But these traditional views are silent about why high growth firms (G3) find new equity issues especially attractive during hot markets. This is the situation where the uncertainty over growth is likely to increase with growth prospects, befitting high-growth firms fraught with asymmetric information about growth. Thus, the generalized Myers-Majluf view fills this void in the fair market timing literature.

Comparing net issues of debt and equity, the slope estimates for market-to-book ratios indicate

distinct growth-type-determined pecking orders in external finance, consistent with the generalized fair market timing view. As shown in Table 8, both debt and equity issues by low-growth firms (G1) significantly respond to rising market-to-book ratios, with slope estimates of 0.0110 and 0.0118, respectively. Thus, G1 firms seem to be equally keen in issuing both debt and equity as market conditions improve. The responses by high-growth firms (G3) are also significant. However, the response through debt issues (with a slope estimate of 0.0023) is much weaker than the response through equity issues (with a slope estimate of 0.0161). While all kinds of firms issue new equity (more pronouncedly if measured in market value), G3 firms are keener in issuing equity as market conditions improve. On the other hand, G1 firms are much keener than G2 firms on issuing debt, which in turn are keener than G3 firms. Thus, G1 firms are more debt oriented relative to G2 and G3 firms, and G3 firms are more equity oriented relative to G1 and G2 firms. The findings suggest that growth type dictates firms' distinct pecking order preference in external finance—digging deeper than market timing.[9]

Profitability. Profits are the paramount reason for a tradeoff adjustment force due to the tax-shield. While it is well known that this force fails in the cross section of capital structure, we show here that the profitability-based tradeoff force works in the right direction in within-firm year-by-year variations of capital structure. As shown in Table 8, an increase in profitability significantly increases debt issues by G1, G2, and even G3 firms (slope estimates are 0.0745, 0.0554, and 0.0167, respectively). At the same time, however, an increase in profitability seems to cause all growth types to issue significantly less equity as the slope estimates are all negative. In other words, new equity issues are more

[9] One may argue that the growth-type-based pecking orders in external finance are also consistent with the tradeoff explanation based on Myers (1977). It suggests that an increase in market-to-book ratio reflects more investment opportunities and hence more potential for the debt overhang problem; it follows that high growth firms in particular are more likely to go for new equity when it comes to external finance. But Myers (1977) does not explain why outside equity investors are willing to provide cheap equity for these firms, and such an argument is apparently at odds with Myers and Majluf (1984).

likely to arise when firms lack profits. All this suggests that firms that become more profitable issue more debt and less equity, and the tradeoff force is the strongest for G1 firms and the weakest for G3 firms.

This pattern for within-firm external finance in response to time-varying profitability also seems to suggest Myers' (1984) pecking order in financing where new equity is deemed to be the last resort, although this prediction is muted for high-growth-type firms. Our findings are in line with what other researchers have found. For example, Frank and Goyal (2003) find that Myers' (1984) pecking order works well for firms with more tangible assets—likely to be G1 and perhaps G2 firms. In addition, Fama and French (2002) find that the two competing theories can have significant overlaps.

Firms of high-growth-type (G3) are the main focus of this paper. As shown in Table 8, when their losses increase, high growth firms (G3) issue more new equity compared to other firms. This within-firm effect is a pronounced result (slope estimate of -0.1857 and a *t*-stat equal to -49.56), echoing the plots of financing mix in Figure 4. Losses in high growth firms simply reflect their expensing or amortizing vigorous investments in R&D or intangibles that pay off slowly. It appears that the market expects high future payoffs, including from future new investments, to arrive eventually—perhaps not necessarily in terms of profits. This market expectation, unlikely through dividend signaling, supports the current high market valuations. This suggests that evidence of accounting losses and lack of dividends may not necessarily imply financial constraints and hinder investments especially in intangibles.[10] As explained by the generalized Myers-Majluf model, high growth firms can tap into outside equity—not necessarily under duress as described by Myers and Majluf (1984).

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[10] See the debate between Fazzari, Hubbard and Petersen (1997, 2000) and Kaplan and Zingales (1998, 2000) over financial constraints inferred from the investment-cashflow sensitivity. Much of the debate in the theory of capital and investment focuses on adjustment costs of capital. The fact that outside investors can rationally provide cheap new equity will shed light on this research.

In summary, while Fama and French (2005) rightfully conclude that an overarching pecking order described by Myers (1984) does not seem to exist, we show that types of asymmetric information spawn growth-type-determined pecking orders in external finance. In effect, both market timing and tradeoff forces are evident in within-firm variations of external finance. The market timing evidence here that all firms tend to step up external finance with improving market conditions (via market-to-book ratios) is totally different from the finding in Baker and Wurgler (2002). They show that low leverage firms tend to raise funds when market conditions are good whereas high leverage firms tend to raise funds when market conditions are poor. As Hovakimian (2006) points out, this main finding of Baker and Wurgler (2002) is mainly from cross-firm variation rather than within-firm variation in capital structure, and hence cannot be really interpreted as market timing evidence (see also Liu, 2009).

5.2 Response to Other Leverage Determinants

The results for the other variables are largely circumstantial, and we focus our discussions on those with high significance. As shown in Table 8, unlike debt issues, new equity issues (if we also consider market equity) by types of higher growth, respond significantly to an increase in tangibility. In particular, the response of new equity issues by G3 firms is the strongest (slope estimate of 0.0953 with a t-stat of 17.05 in book equity); this contributes to the lowering of their leverage ratios. Recall that the well-known positive relationship between tangibility and leverage ratios in the literature is a cross-sectional phenomenon. But here the evidence is from time variation. Thus, there is no contradiction. Rather this result implies that despite improved tangibility in helping new equity issues by high growth firms, the growth in their asset tangibility does not alter their low rank position in the cross section of tangibility.

As a pure control variable, firm size tends to be negatively correlated to a dependent variable with total assets being its denominator. As shown in Table 8, there are significantly negative slope estimates for firm size everywhere. But the within-firm evidence is likely to indicate that firms seek less external finance when they grow bigger—a firm maturity effect. Interestingly, growth type also presets the paths of maturity: for firms of low growth type (G1), the maturity effect is only slightly stronger in net debt

issues (with a slope estimate of -0.0112) than in net equity issues (-0.0108); in contrast, for firms of high growth type (G3), the maturity effect is much stronger in net equity issues (with a slope estimate of -0.0308) than in net debt issues (-0.0080).[11] The maturity process, however, is slow as shown in Figure 4.

The results for the industry median leverage and the dividend payer dummy are significant for all growth types only with debt issues. The findings suggest that more debt issues follow a decrease in industry median leverage, perhaps reflecting a general mean reversion in leverage ratios; past dividend payers are more likely to issue more debt.

6. Summary and Conclusions

To make sense of the fundamental persistence of capital structure, this paper suggests a parsimonious view based on firm "growth type". We identify, at the beginning of firm public life, three growth-types of U.S. non-financial and non-utility firms for the period from 1971 to 2005. The three growth types are defined according to a two-way sort on initial firm market-to-book ratio and asset tangibility. We find that the three initial growth-types span significantly dispersed and persistently distinct leverage ratios across firms: firms of low-growth-type (G1) have significantly high leverage, firms of high-growth-type (G3) have low leverage, and firms of mixed-growth-type (G2) are significantly in the middle.

Initial growth type offers an astute way to categorize firms in at least three important aspects. First, growth type parsimoniously captures an overarching pattern for firm fundamentals. To start, G1 firms on average always have low market-to-book and high asset tangibility whereas G3 firms always have high market-to-book and low tangibility. Moreover, G1 firms focus on tangible investments whereas G3 firms tilt overwhelmingly toward R&D or intangible investments. Relative to low growth firms (G1), high growth firms (G3) have faster asset and sales growth and higher cash holdings, and are much less likely to pay dividends. G2 firms fall between G1 and G3 firms in terms of the above firm characteristics. All

[11] The firm size effect on new equity issues is also consistent with the argument for a firm size as a proxy for dominance of asymmetric information type (Wu and Wang, 2005; Wu, Wang and Yao, 2005).

these patterns are consistent with the growth type view. For one thing, high cash holdings by G3 firms are stockpiled typically through heavy issues of new equity. The generalized Myers-Majluf model predicts that an increase in asymmetric information that mainly arises from growth opportunities instead of assets-in-place tends to facilitate rather than inhibit new equity issues. Contrary to the prediction of the classic Myers-Majluf model, this insight, that new equity issues befits high growth firms fraught with asymmetric information about growth, has been largely ignored in the literature.

Second, we find that persistently different financing mixes tend to fit distinct investment styles in line with growth type. While there is little difference in new debt issues (relative to total asset) across the growth types, the other two funding sources, new equity issues and changes in retained earnings in the financing mix, are persistently pronounced for high growth firms (G3) compared to other firms—namely, G3 firms issue much more equity to fund their relentless R&D investments, and have equally more negative changes in retained earnings as a result of the R&D investments that are typically expensed and usually have a slow payoff. This helps us understand how leverage persistence is maintained for high growth firms: while heavy issues of equity push their low leverage ratios even lower, it is huge decreases in retained earnings (or accounting losses) that reduce the total equity and pull the leverage ratios back, helping sustain low leverage persistence. The existing literature, however, often suggests net debt issues to be the major rebalancing force in general.

Third, types of asymmetric information spawn growth-type-determined pecking orders in financing. This can be viewed as a result of growth type compatibility in corporate finance. We find that firms of all growth types significantly step up debt and equity issues to fund new investments in response to an increase in their market-to-book ratios (or market conditions)—evidence that fair market timing is at work. But firms' persistently distinct pecking orders in external finance depend on growth type. We show that in response to improved market conditions, while low growth firms (G1) are equally keen in issuing debt and equity, high growth firms (G3) are much keener in issuing equity than debt. This is consistent with the notion of growth-type-based fair market timing, which does not need to assume firm

overvaluations due to irrationality in external finance. Under the fair market timing view, if managers cannot change firm growth type, they cannot alter long-run capital structure through market timing.

Growth type also sheds light on tradeoff theory. Although tradeoff theory seems to fail in the cross-firm variation in capital structure as shown in the literature, it works well for the within-firm variation. In response to an increase in their profitability, all firms tend to issue more debt, consistent with the tradeoff theory. Interestingly, growth type affects the strength of tradeoff forces here: low growth firms (G1) are much keener than high growth firms (G3) in issuing debt. As a whole, our detailed results of within-firm variation in external finance provide a picture of intricate financing dynamics that contain elements of both tradeoff forces and growth-type-determined pecking orders in financing.

It is likely that firms with similar growth types attract and accommodate similar types of human capital which is competitively available, underlying persistently distinct corporate investment styles. This gives rise to persistently distinct specifications of market imperfection (such as types of asymmetric information and related agency conflicts) and enforces growth type compatibility in corporate finance, producing the fundamental persistence of capital structure.

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Appendix A: Data Description

Our full sample is from the COMPUSTAT database for the period from 1971 to 2005. As a subsample, our initial public offering (IPO) sample, excluding spin-offs and unit offers, includes COMPUSTAT firms that have an IPO date (using information from Securities Data Company, SDC) between January 1, 1971 and December 31, 2003.

We process the data for our COMPUSTAT firms as follows. (1) We exclude utilities (SIC 4900 – 4949) and financials (SIC 6000 – 6999). (2) For each firm, we define event year 0 as the year in which SDC reports the firm's IPO date, or if the IPO date is not available, the first year in which COMPUSTAT reports its market equity value, or stock price (Data item: 199) times Common Shares Outstanding (54). (3) We exclude firms that have annual market equity data for less than three years consecutively. (4) We intersect the COMPUSTAT firms in year *t* with CRSP (NYSE, AMEX and NASDAQ) firms that have share codes of 10 and 11 and have market equity data for December of year *t* to be in the CRSP sample of that year. (5) We require non-missing data to calculate book and market leverage, market-to-book ratio, tangibility, profitability and firm size. (6) We restrict book and market leverage ratio to be no greater than unity, and market-to-book ratio to be no greater than 20.

Restrictions up to this point leave 132,546 firm year observations. (7) We further trim firm year observations for these variables: tangibility, profitability, firm size, asset growth rate, sales growth rate, Capex, R&D, cash holdings, net debt issue, net equity issue (in book and market value), and change in retained earnings, by the top and bottom 0.5 percent of each variable, and we do this simultaneously to avoid excessive trimming. We end up with 122,909 firm year observations. The construction of our variables is detailed in Appendix B.

Appendix B: Variable Definition

All the numbers in the parentheses refer to the COMPUSTAT data item number.

Total Debt	Short-term Debt (34) + Long-term Debt (9)
Market Equity	Stock Price (199) * Common Shares Outstanding (54)
Asset	Total assets (6)
Leverage (L)	
(i) Book Leverage	Total Debt / Asset
(ii) Market Leverage	Total Debt / (Total Debt + Market Equity)
Market-to-Book (MtB)	[Market Equity + Total Debt + Preferred Stock (10) – Deferred Tax (35)] / Asset
Tangibility (Tang)	[Inventory (3) + Property, Plant and Equipment (8)] / Asset
Profitability (Profit)	Operating Income before Depreciation (13) / Asset
Firm Size (LnSize)	Natural log of (Asset * 1,000,000), where Asset is deflated by GDP deflator (in 2000 dollar)
Ind_median	Median industrial leverage according to the Fama and French classification of 38 industries
DivPayer	Dummy variable: 1 for dividend payer and 0 for non-payer
Asset Growth Rate	$[Asset_t - Asset_{t-1}] / Asset_{t-1}$
Sales Growth Rate	$[Sales_t$ (12) $- Sales_{t-1}] / Sales_{t-1}$
Investment Expenditure	$Capex_t$ (128) / $Asset_{t-1}$; $R\&D_t$ (46) / $Asset_{t-1}$ (Note that R&D missing values are replaced by zero.)
Cash Holdings	$Cash_t$ (1) / $Asset_{t-1}$
Propensity to Pay (PTP)	The percentage of dividend payers (of a firm group)
ΔDebt	The change in Total Debt, or net debt issue
ΔNet Equity	The change in net equity, or net equity issue
(i) Book Value	(i) [Sale of Common and Preference Stock (108) – Purchase of Common and Preference Stock (115)]
(ii) Market Value	(ii) $[Shares_t$ (25) * $Adjust_t$ (27) $- Shares_{t-1}$ * $Adjust_{t-1}$] * [$Price_{t-1}$ (199)/ $Adjust_{t-1}$ + $Price_t$ / $Adjust_t$]/2
ΔRE	The change in retained earnings (36)

Table 1

Retained Explanatory Power of Initial Leverage Determinants versus Unexplained Initial Firm Heterogeneities

This table reports event-time OLS regression results for the dependent variable, book leverage at event year *t*, on two sets of variables separately. Panel A shows the regression results on four initial leverage determinants: Initial MtB (market-to-book ratio), Initial Tang (tangibility), Initial Profit, and Initial Size (log of total assets deflated by GDP-deflator). Panel B shows the regression results on Initial ResLev (initial residual leverage), which is the sum of the intercept and residual from the cross-sectional regression of the initial book leverage on the four initial leverage determinants. Book leverage is the sum of short- and long-term debt divided by total assets. Persistence (in the last column in each panel) stands for the retained explanatory power of initial information, i.e., the ratio of the adjusted R^2 in event year *t* to the adjusted R^2 initially in event year 3. The sample consists of the merged CRSP/COMPUSTAT US firms excluding utilities and financials for 1971-2005. Panels A1 and B1 use the full sample, and Panels A2 and B2 use firms that survived at least for 20 years. An initial value is the average of three annual values over event years 0, 1 and 2. For each firm, event year 0 is its IPO year or its first COMPUSTAT data entry year if its IPO date information is not available from SDC (see Lemmon, Roberts and Zender, 2008). For the sake of saving the place, only results for event years 3, 5, 10, 15 and 20 (or 19 in Panels A2 and B2 to prevent repetitions) are reported. Note also that the number of firms (survivors) varies slightly with event years in Panels A2 and B2 because of trimming on some variables as described in Appendix A. The *t*-stats in parentheses are based on the White-robust standard errors.

Panel A: Initial Leverage Determinants									Panel B: Initial Residual Leverage			
Event Year *t*	Firm Obs.	Intercept	Initial MtB	Initial Tang	Initial Profit	Initial LnSize	Adj. R^2	Persistence	Intercept	Initial ResLev	Adj. R^2	Persistence
		Panel A1: Full Sample							**Panel B1: Full Sample**			
3	9,072	-0.0437	-0.016	0.2683	-0.1222	0.0112	0.141	100.0%	0.326	0.882	0.509	100.0%
		(-1.88)	(-12.76)	(28.57)	(-10.67)	(8.84)			(191.52)	(96.89)		
5	7,404	0.0377	-0.0127	0.2315	-0.0906	0.0065	0.100	70.9%	0.302	0.704	0.336	66.0%
		(1.48)	(-9.19)	(21.80)	(-7.13)	(4.70)			(140.41)	(61.16)		
10	4,199	0.0743	-0.0124	0.1778	-0.1393	0.0057	0.072	51.1%	0.276	0.473	0.161	31.6%
		(2.36)	(-7.05)	(12.12)	(-7.64)	(3.29)			(90.94)	(28.42)		
15	2,373	0.0753	-0.0157	0.1265	-0.1217	0.0072	0.058	41.1%	0.265	0.354	0.085	16.7%
		(1.86)	(-6.86)	(5.90)	(-4.74)	(3.22)			(62.13)	(14.87)		
20	1,462	-0.0743	-0.0109	0.13	-0.1827	0.0155	0.066	46.8%	0.272	0.302	0.055	10.8%
		(-1.44)	(-3.57)	(4.35)	(-4.66)	(5.50)			(46.34)	(9.29)		
		Panel A2: Survivors for 20 Years							**Panel B2: Survivors for 20 Years**			
3	1,555	0.1235	-0.0153	0.267	-0.4559	0.0038	0.171	100.0%	0.339	0.8673	0.535	100.0%
		(2.89)	(-5.65)	(10.57)	(-12.58)	(1.64)			(92.46)	(42.30)		
5	1,538	0.1774	-0.0136	0.1966	-0.3869	0.0011	0.122	71.3%	0.302	0.7186	0.401	75.0%
		(4.22)	(-5.27)	(7.83)	(-10.76)	(0.49)			(75.32)	(32.06)		
10	1,514	0.1944	-0.0142	0.1702	-0.2559	-0.0001	0.083	48.5%	0.273	0.4578	0.168	31.4%
		(4.52)	(-5.57)	(6.69)	(-7.27)	(-0.06)			(58.00)	(17.50)		
15	1,478	0.0901	-0.0145	0.0862	-0.1811	0.0076	0.052	30.4%	0.266	0.3556	0.092	17.2%
		(1.93)	(-5.20)	(3.15)	(-5.01)	(2.98)			(50.99)	(12.28)		
19	1,457	-0.0771	-0.0127	0.1459	-0.1814	0.0154	0.079	46.2%	0.276	0.3238	0.065	12.1%
		(-1.53)	(-4.29)	(4.98)	(-4.73)	(5.59)			(47.90)	(10.10)		

Table 2

Types of Asymmetric Information and New Equity Financing

Asymmetric Information about Assets-in-place (AIP) Predominates	Asymmetric Information about Growth Predominates
The Classic Myers-Majluf Framework: • Separation of Overvalued Firms from Undervalued Firms at New Equity Issues • Asymmetric Information Can Inhibit New Equity Issues Due to Adverse Selection • Myers'(1984) Pecking Order in Financing	New Insight from the Generalized Myers-Majluf Framework: • Not All Growth-oriented Issues Are Lemons Because Undervalued Firms May Issue. • An Increase in Asymmetric Information Can Facilitate New Equity Issues. • Equity Issuers Not Necessarily under Duress

Table 3

Growth Type and Cost Structure of External Finance

Firm Characteristic		Predominant Type of Asymmetric Information (AI)	Growth Type	Cost Structure of External Finance	
Market-to-book	Asset Tangibility			Debt	Equity
Low	High	AI about AIP	Low Growth (G1)	Low → High (Classic Pecking Order)	
High	High	Mixed	Mixed Growth (G2)	↓	↑
Low	Low	Mixed	Mixed Growth (G2)		
High	Low	AI about Growth	High Growth (G3)	High ← **Low** (Generalized View)	

Table 4

Explaining Future Leverage Ratios by Initial Market-to-book Ratio and Initial Tangibility

This table reports event-time OLS regression slope estimates and *t*-values for the dependent variable, leverage at event year *t*, on Initial MtB (market-to-book), Initial Tang (tangibility), MtB_{t-1}, $Tang_{t-1}$, $Profit_{t-1}$ (profitability), $LnSize_{t-1}$ (log of total assets deflated by GDP-deflator), Ind_median_{t-1} (industry median book and market leverage ratios in Panel A and B, with the 38 Fama-French industries), and $DivPayer_{t-1}$ (dummy variable = 1 for dividend payers and 0 for non-payers). The sample consists of the merged CRSP/COMPUSTAT US firms excluding utilities and financials for 1971-2005. An initial value is the average of three annual values over event years 0, 1 and 2. For each firm, event year 0 is its IPO year or its first COMPUSTAT data entry year if its IPO date information is not available from SDC (see Lemmon, Roberts and Zender, 2008). Book leverage is the sum of short- and long-term debt divided by total assets. Market leverage is the sum of short- and long-term debt divided by the sum of total debt and market equity. Panels A and B report results for book and market leverage ratios. For the sake of saving the place, only results for event years 5, 10, 15 and 20 are reported. *t*-stats in parentheses are based on the White-robust standard errors.

Event Year *t*	Firm Obs.	Initial MtB	Initial Tang	MtB_{t-1}	$Tang_{t-1}$	$Profit_{t-1}$	$LnSize_{t-1}$	Ind_Median_{t-1}	$DivPayer_{t-1}$	Adj. R^2
Panel A: Book Leverage										
5	7,360	-0.0117	0.2200			-0.1195	0.0203	0.5766	-0.1030	0.191
		(-8.49)	(18.55)			(-8.77)	(14.65)	(16.21)	(-21.07)	
		-0.0084	0.0505	-0.0080	0.1854	-0.1179	0.0204	0.5214	-0.1058	0.207
		(-5.63)	(2.31)	(-5.49)	(8.98)	(-8.89)	(14.78)	(14.55)	(-21.82)	
10	4,170	-0.0116	0.1570			-0.1510	0.0186	0.4660	-0.0761	0.138
		(-6.09)	(9.46)			(-6.00)	(11.03)	(9.11)	(-11.76)	
		-0.0108	-0.0188	-0.0052	0.2306	-0.1577	0.0193	0.3880	-0.0821	0.171
		(-5.63)	(-0.82)	(-3.25)	(10.84)	(-6.09)	(11.61)	(7.46)	(-12.84)	
15	2,354	-0.0136	0.0943			-0.1509	0.0191	0.4974	-0.0739	0.134
		(-6.07)	(4.16)			(-4.23)	(8.90)	(8.37)	(-8.57)	
		-0.0122	-0.0623	-0.0064	0.2438	-0.1672	0.0194	0.3991	-0.0780	0.181
		(-5.58)	(-2.24)	(-2.57)	(9.72)	(-4.74)	(9.38)	(6.80)	(-9.37)	
20	1,448	-0.0117	0.1197			-0.1832	0.0223	0.3368	-0.0929	0.135
		(-2.50)	(4.05)			(-2.65)	(8.18)	(4.91)	(-7.71)	
		-0.0090	0.0166	-0.0170	0.1467	-0.1614	0.0233	0.2469	-0.0964	0.161
		(-2.00)	(0.46)	(-3.71)	(4.60)	(-2.14)	(8.76)	(3.46)	(-8.09)	

Panel B: Market Leverage										
5	7,360	-0.0344	0.2584			-0.1790	0.0253	0.5016	-0.1279	0.287
		(-19.95)	(18.57)			(-12.03)	(15.64)	(22.03)	(-19.82)	
		-0.0241	0.0728	-0.0262	0.1955	-0.1859	0.0248	0.4243	-0.1271	0.316
		(-13.21)	(2.98)	(-8.14)	(8.38)	(-13.02)	(15.43)	(17.96)	(-20.04)	
10	4,170	-0.0307	0.1994			-0.2545	0.0231	0.4939	-0.0792	0.247
		(-13.21)	(10.38)			(-7.52)	(11.49)	(16.96)	(-9.73)	
		-0.0258	-0.0191	-0.0257	0.2706	-0.2739	0.0233	0.3962	-0.0837	0.298
		(-6.52)	(-0.73)	(-1.82)	(10.94)	(-7.67)	(11.56)	(10.15)	(-10.64)	
15	2,354	-0.0287	0.1344			-0.2718	0.0187	0.4460	-0.0927	0.201
		(-11.39)	(4.99)			(-6.98)	(7.51)	(9.66)	(-9.38)	
		-0.0236	-0.0397	-0.0230	0.2545	-0.2970	0.0190	0.3337	-0.0961	0.259
		(-5.97)	(-1.22)	(-1.75)	(8.81)	(-7.86)	(7.92)	(6.86)	(-10.22)	
20	1,448	-0.0256	0.1367			-0.4572	0.0195	0.4359	-0.1133	0.219
		(-7.84)	(4.04)			(-5.78)	(6.05)	(8.86)	(-8.10)	
		-0.0179	0.0143	-0.0474	0.1514	-0.3787	0.0207	0.3140	-0.1171	0.271
		(-4.77)	(0.35)	(-5.31)	(4.18)	(-5.27)	(6.67)	(6.19)	(-8.70)	

Table 5

Stability of Growth Type with Updated Tangibility

This table reports the stability of growth type when using a two-way sort on initial market-to-book and updated annual tangibility at event time *t* (GS_t), starting from initial growth type (IGT) for 20 event years. See the description of the formation of our initial growth type, G1 (low), G2 (mixed) and G3 (high) in Figure 1. In each event year *t*, we update growth type by using the same two-way sort except that initial tangibility is replaced by annual tangibility in event year *t*. The breakpoint on annual tangibility in event year *t* is the fixed median breakpoint for initial tangibility. We trace the migration from initial growth type (IGT) to updated growth type (GT_t) each event year and calculate the aggregate (Panel A) and simple (Panel B) average transition frequencies for 20 event years.

Transition Matrix from IGT to GT_t		Growth Type with Initial Tangibility replaced by Updated Tangibility in Event Year *t* (GT_t)		
		G1	G2	G3
Panel A: Aggregate Average				
IGT	G1	97%	3%	0%
	G2	5%	94%	1%
	G3	0%	5%	95%
Panel B: Simple average				
IGT	G1	94%	6%	0%
	G2	3%	94%	3%
	G3	0%	2%	98%

Table 6

Significance of Leverage Gaps Persistently across Initial Growth Types

This table reports the significance of group differences in terms of book and market leverage ratios. The three groups are formed according to their initially identified growth type: low for G1, mixed for G2 and high for G3. The significance is gauged by the t-values of the pair-wise *t* tests for differences in group mean leverage ratios, and by the p-values of the Wilcoxon Signed Ranks test under the null of equality in group medians by event year. The event years are packed into four periods where we also report the annual average number of firm groups. The full sample is used.

	Annual Average Number of Firms			Book Leverage				Market Leverage			
				G1 – G2		G2 – G3		G1 – G2		G2 – G3	
Event Year	G1	G2	G3	*t*-stat for Mean Difference	*p*-val. for Median Difference	*t*-stat for Mean Difference	*p*-val. for Median Difference	*t*-stat for Mean Difference	*p*-val. for Median Difference	*t*-stat for Mean Difference	*p*-val. for Median Difference
3 to 5	2,373	2,863	2,983	12.74	0.00	24.77	0.00	30.39	0.00	37.08	0.00
6 to 10	1,716	1,884	1,744	9.27	0.00	22.48	0.00	23.08	0.00	33.20	0.00
11 to 15	1,067	1,111	875	11.18	0.00	8.75	0.00	16.71	0.00	16.69	0.00
16 to 20	658	670	441	7.43	0.00	9.51	0.00	10.08	0.00	14.78	0.00

Table 7

Persistently Distinct Firm Fundamentals across Initial Growth Types

This table reports the evolutions of firm characteristics by initial growth type. Firm characteristics include market-to-book, tangibility, and firm size (Panel A), profitability (Panel B), asset growth rate and investment style (Panel C), and sales growth rate, cash holdings and propensity to pay dividend (Panel D). Asset and sales growth rates in year *t* are defined as the change in total assets and sales from year *t*-1 to year *t*, divided by total assets and sales in year *t-1*, respectively. Tangible and Intangible investments are Capex and R&D in year *t* divided by total assets in year *t-1*, respectively. Cash Holdings is a balance sheet variable, Cash in year *t*, divided by total assets in year *t-1*. Propensity to pay is the percentage of dividend payers of a firm group in year *t*. The three groups are formed according to their initially identified growth type: G1 (low), G2 (mixed) and G3 (high). The event years are packed into four periods. The full sample after trimming outliers is used (see the Data section).

Event Year	Pooled Mean			*t*-stat for Mean Difference		Pooled Mean			*t*-stat for Mean Difference		Pooled Mean			*t*-stat for Mean Difference	
	G1	G2	G3	G1 - G2	G2 - G3	G1	G2	G3	G1 - G2	G2 - G3	G1	G2	G3	G1 - G2	G2 - G3
Panel A: Market-to-book Ratio, Tangibility, and Firm Size															
Year	Market-to-Book					Tangibility					LnSize				
3 to 5	0.71	1.25	2.45	-31.14	-36.62	0.67	0.52	0.31	40.07	55.33	18.86	18.27	17.84	15.02	13.29
6 to 10	0.83	1.22	2.19	-24.17	-32.66	0.64	0.54	0.33	30.60	56.61	19.15	18.59	18.16	14.82	12.61
11 to 15	0.97	1.29	2.15	-15.15	-21.13	0.60	0.52	0.35	18.16	35.58	19.44	19.01	18.51	8.62	10.54
16 to 20	1.01	1.32	2.04	-10.06	-12.37	0.58	0.50	0.35	13.42	24.71	19.70	19.42	18.83	4.29	8.44
Panel B: Profitability (%)															
Year	Profitability					Profitability > 0					Profitability < 0				
3 to 5	13.68	10.13	-1.82	12.05	27.64	14.98	15.72	15.04	-4.09	3.38	-10.49	-17.54	-27.82	5.22	11.22
6 to 10	14.07	12.21	2.19	7.51	26.71	15.37	15.94	14.98	-3.62	5.34	-10.04	-16.66	-24.74	5.50	8.00
11 to 15	12.21	11.76	5.30	1.55	14.48	13.88	14.86	14.67	-5.05	0.86	-8.09	-14.05	-23.07	4.67	6.83
16 to 20	12.37	12.09	7.16	0.82	8.59	13.72	14.67	14.77	-4.07	-0.33	-9.12	-13.23	-21.50	2.55	4.52

Event Year	Pooled Mean			*t*-value for Mean Difference		Pooled Mean			*t*-value for Mean Difference		Pooled Mean			*t*-value for Mean Difference	
	G1	G2	G3	G1 - G2	G2 - G3	G1	G2	G3	G1 - G2	G2 - G3	G1	G2	G3	G1 - G2	G2 - G3
Panel C: Asset Growth and Investment Style															
Year	Asset Growth Rate (%)					Tangible Investment or $Capex_t/Asset_{t-1}$ (%)					Intangible Investment or $R\&D_t/Asset_{t-1}$ (%)				
3 to 5	9.65	13.46	22.75	-6.07	-9.35	7.11	7.32	5.54	-1.47	13.99	2.07	4.65	14.48	-21.16	-42.01
6 to 10	12.48	13.91	18.41	-2.38	-4.90	7.60	7.00	5.35	4.97	14.82	2.32	4.39	12.58	-19.27	-39.53
11 to 15	8.78	10.89	16.62	-2.80	-4.97	7.02	6.41	5.13	4.56	10.11	2.81	4.67	11.32	-13.20	-24.57
16 to 20	7.54	7.43	12.48	0.14	-4.36	6.31	5.87	4.63	3.06	8.63	2.91	4.34	10.17	-9.52	-18.64
Panel D: Sales Growth, Cash Holdings and Propensity to Pay															
Year	Sales Growth Rate (%)					$Cash_t/Asset_{t-1}$ (%)					Percentage of Dividend Payers (%)				
3 to 5	12.36	17.22	30.93	-5.96	-10.77	7.37	14.54	38.38	-20.68	-35.81	56.20	32.60	10.25	21.87	28.17
6 to 10	12.20	13.91	22.19	-2.93	-7.94	8.27	13.17	32.35	-14.52	-32.69	64.21	42.12	15.63	21.85	31.69
11 to 15	6.11	9.53	17.55	-4.40	-6.26	9.99	13.48	29.16	-7.85	-20.93	65.93	48.06	23.28	13.88	20.92
16 to 20	7.89	8.17	13.20	-0.31	-3.90	8.49	11.54	26.13	-7.29	-18.19	66.38	50.97	29.79	9.50	12.85

Table 8
Explaining Dynamic External Finance

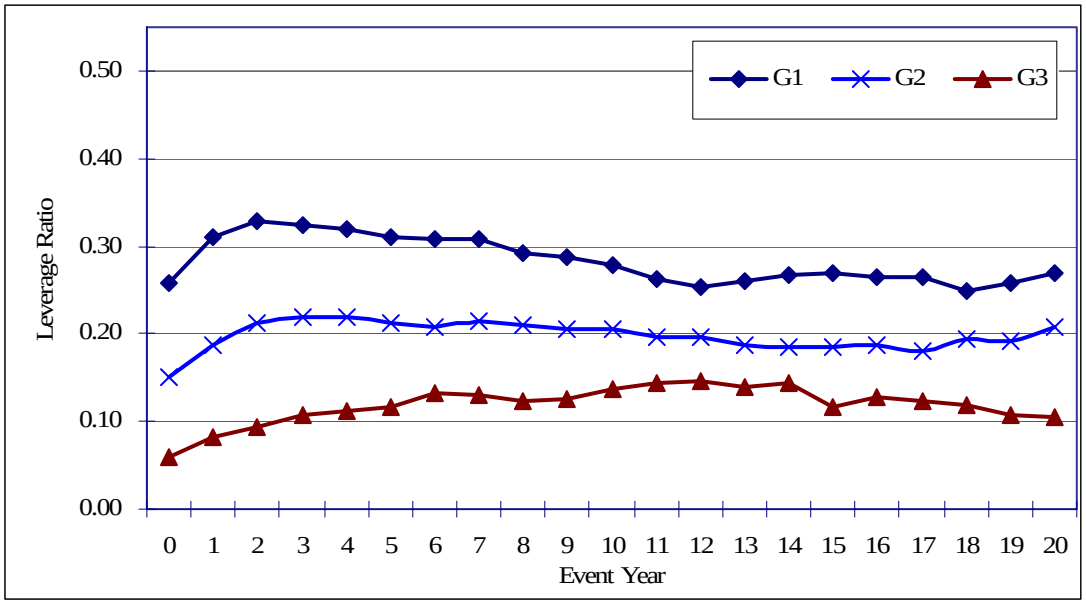
This table reports the results from the full sample pooled OLS (panel) regressions with a firm fixed effect for external finance on a list of determinants of capital structure. The dependent variable, ΔDebt, is the change in the short- and long-term debt. ΔNet Equity is the change in net equity issues in book value, that is the sale minus the purchase of common and preference stock, or in market value, that is the split adjusted change in shares outstanding times the split adjusted average stock price (see Fama and French, 2005). The changes are from t-1 to t. The dependent variable is scaled by total assets at *t*. Dummy variables for the three growth type groups (low, G1, mixed, G2, and high, G3) pick up individual group mean estimates. We drop the data earlier than event year 3. Intercept estimates are not reported. *t*-stats are in parentheses.

		ΔDebt/Asset$_t$		ΔNet Equity/Asset$_t$			
		Book Value		Book Value		Market Value	
MtB_{t-1}	G1	0.0110	(8.72)	0.0118	(10.00)	0.0287	(13.68)
	G2	0.0068	(9.75)	0.0152	(23.09)	0.0311	(26.68)
	G3	0.0023	(6.83)	0.0161	(50.96)	0.0349	(62.36)
$Tang_{t-1}$	G1	0.0165	(2.90)	0.0158	(2.97)	-0.0001	(-0.01)
	G2	0.0062	(1.18)	0.0490	(9.93)	0.0312	(3.57)
	G3	0.0106	(1.77)	0.0953	(17.05)	0.0714	(7.20)
$Profit_{t-1}$	G1	0.0745	(10.21)	-0.0455	(-6.65)	-0.0596	(-4.91)
	G2	0.0554	(9.76)	-0.0975	(-18.31)	-0.1430	(-15.15)
	G3	0.0167	(4.19)	-0.1857	(-49.56)	-0.2292	(-34.49)
$LnSize_{t-1}$	G1	-0.0112	(-11.12)	-0.0108	(-11.39)	-0.0158	(-9.43)
	G2	-0.0093	(-10.19)	-0.0144	(-16.74)	-0.0193	(-12.66)
	G3	-0.0080	(-8.49)	-0.0308	(-34.67)	-0.0524	(-33.31)
Ind_median_{t-1}	G1	-0.0394	(-2.72)	0.0015	(0.11)	-0.0187	(-0.78)
	G2	-0.0876	(-6.29)	-0.0089	(-0.68)	-0.0858	(-3.71)
	G3	-0.0865	(-5.24)	-0.0055	(-0.36)	-0.0878	(-3.20)
$DivPayer_{t-1}$	G1	0.0253	(13.81)	0.0019	(1.09)	-0.0009	(-0.30)
	G2	0.0234	(11.91)	0.0014	(0.74)	0.0023	(0.70)
	G3	0.0154	(5.45)	0.0041	(1.54)	0.0042	(0.88)
Firm FE			Yes		Yes		Yes
Obs.			76,454		76,454		76,454
R^2			0.180		0.512		0.533

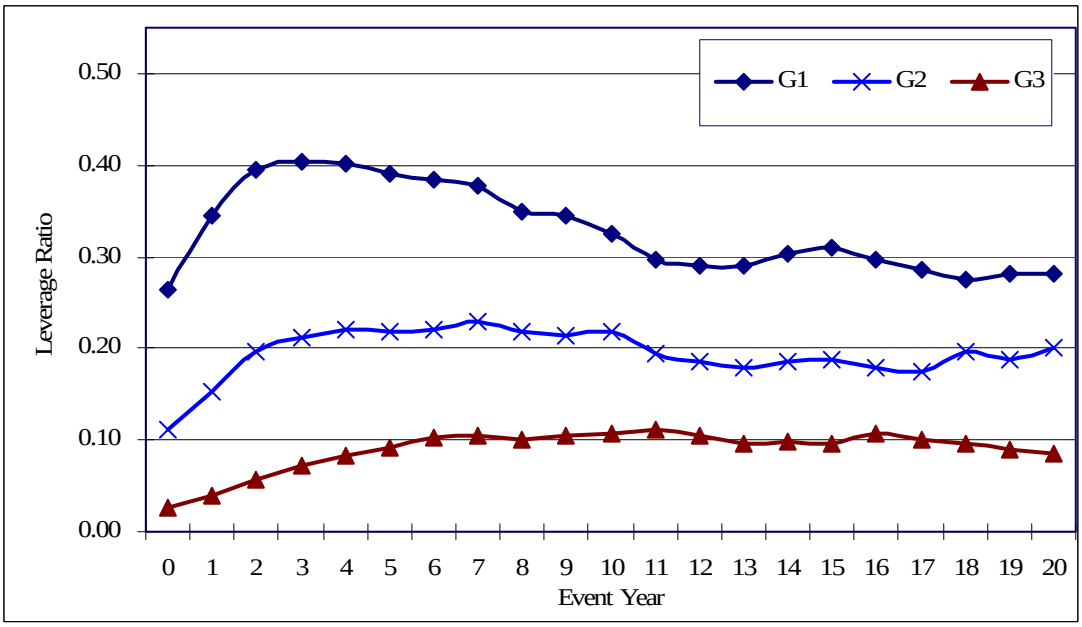
Figure 1. Leverage Ratios Sorted on Initial Growth Type by Event Time

We calculate group mean leverage ratios by initial growth type for each event year and then plot them over event time. Panels A and B report book and market mean leverage ratios using the IPO sample, and Panels C and D show the plots using the full sample. Book leverage is the sum of short- and long-term debt divided by total assets. Market leverage is the sum of short- and long-term debt divided by the sum of total debt and market equity. The full sample consists of the merged CRSP/COMPUSTAT US firms excluding utilities and financials for 1971-2005, and includes IPO firms that have the IPO date information from SDC for 1971-2003. To obtain the three initially determined growth-types, we sort firms based on initial market-to-book, MtB, and initial tangibility, Tang. An initial value is defined as the three-year average over event years 0, 1, and 2. For each firm, event time 0 is its IPO year or its first COMPUSTAT data entry year if its IPO date information is not available from SDC. The two-way independent sort with breakpoints at medians generates four portfolios (LH, HL, HH and LL). The firm group with low growth type (G1) is the portfolio of low Initial MtB and high Initial Tang (LH); the firm group with high growth type (G3) is the portfolio of high Initial MtB and low Initial Tang (HL); the firm group with mixed growth type (G2) contains the remaining two portfolios (HH and LL). The initial number of firms for the G1, G2 and G3 firm groups is 1260, 1425 and 1496 (the IPO sample), and 2670, 3600, and 3938 (the full sample). See detailed definitions of variables in Appendix.

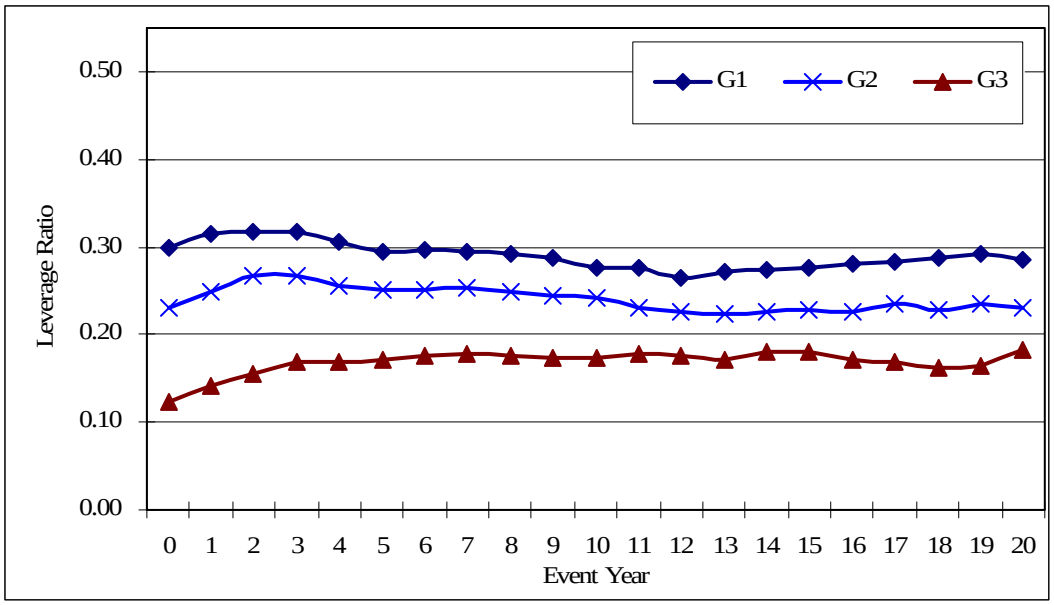
Panel A: Book Leverage with the IPO Sample



Panel B: Market Leverage with the IPO Sample



Panel C: Book Leverage with the Full Sample



Panel D: Market Leverage with the Full Sample

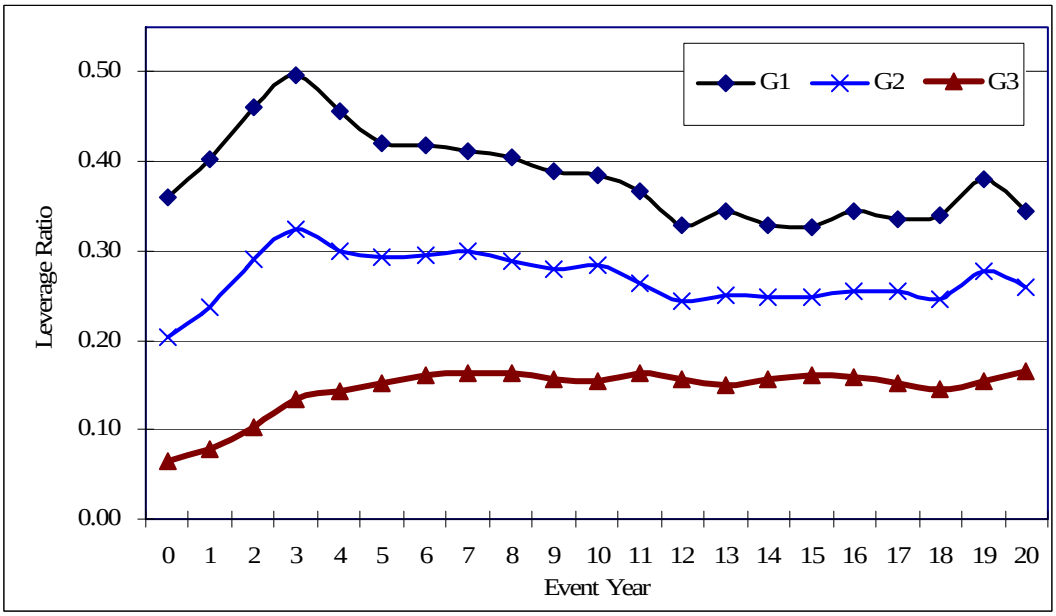
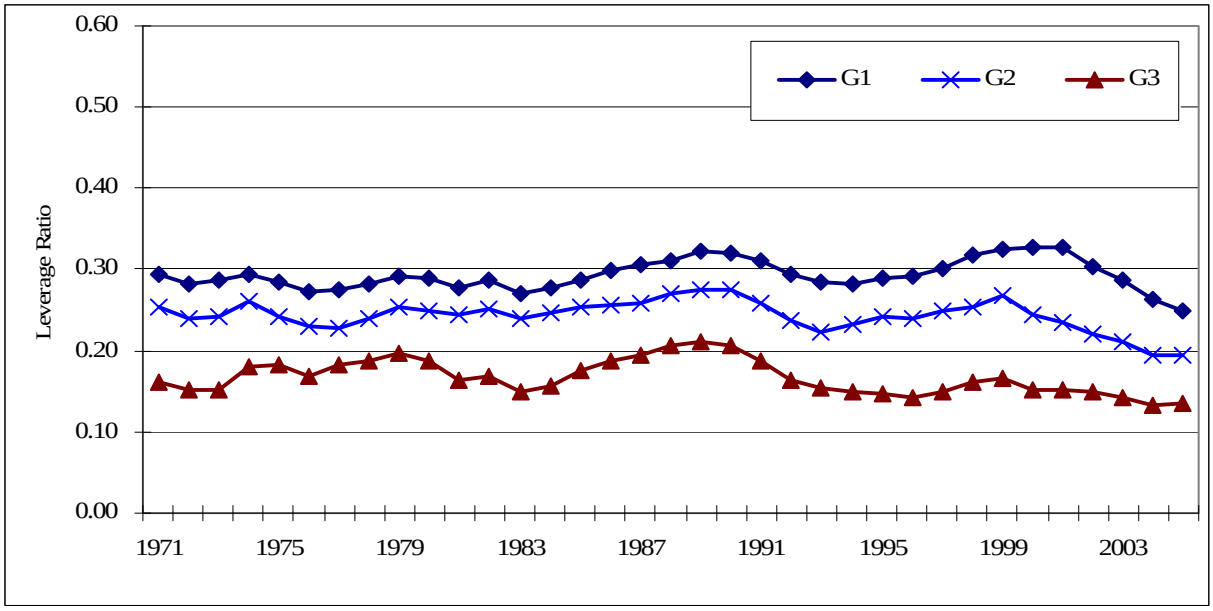


Figure 2. Leverage Ratios Sorted on Initial Growth Type by Calendar Time

We calculate group mean leverage ratios by initial growth type for each calendar year and plot them over time. See the formation of firm groups of the three growth types (G1, G2 and G3) and the definition of leverage ratios in the notes of Figure 1. The full sample is used.

Panel A: Book Leverage with the Full Sample



Panel B: Market Leverage with the Full Sample

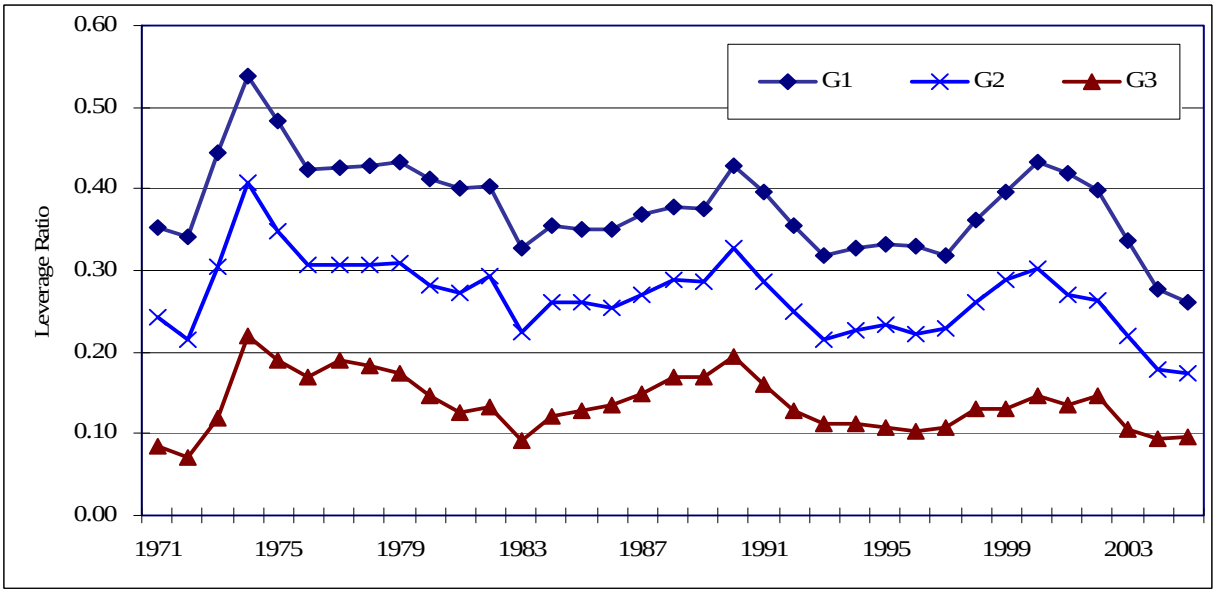
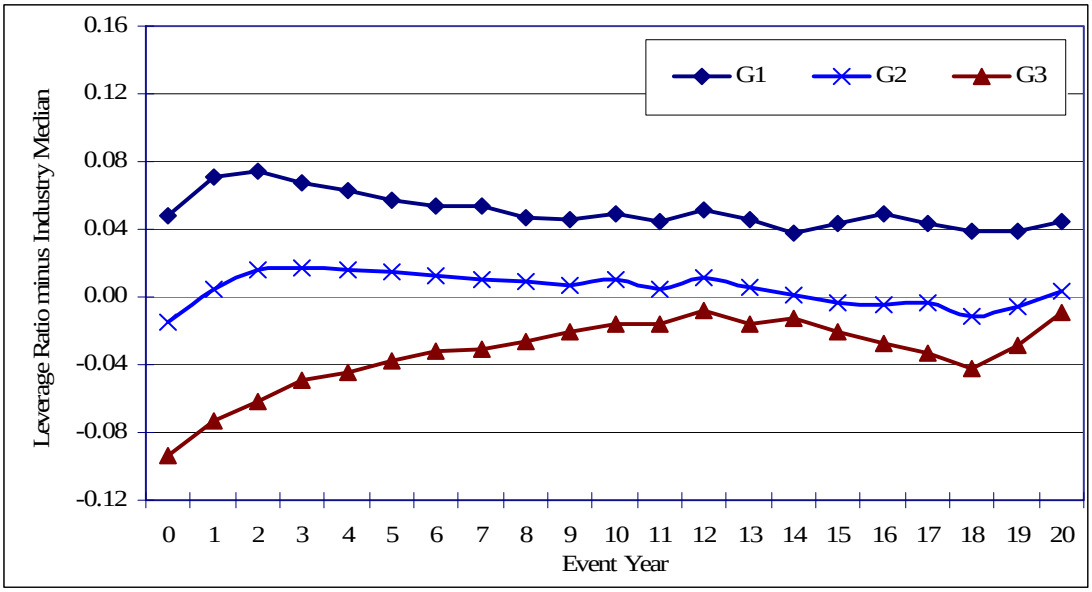


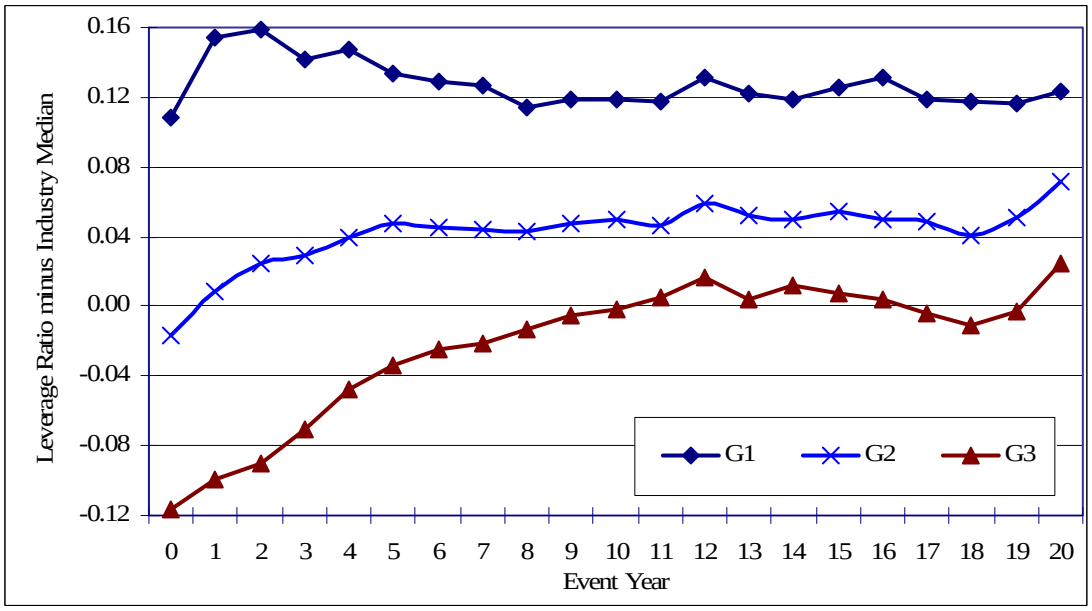
Figure 3. Industry-adjusted Leverage Ratios with the Full Sample

We form the firm groups G1-G3 the same way as in Figure 1 except that the two-way sort is based on initial market to book minus initial industry median and initial tangibility minus initial industry median. The Fama-French classification of 38 industries and the full sample are used.

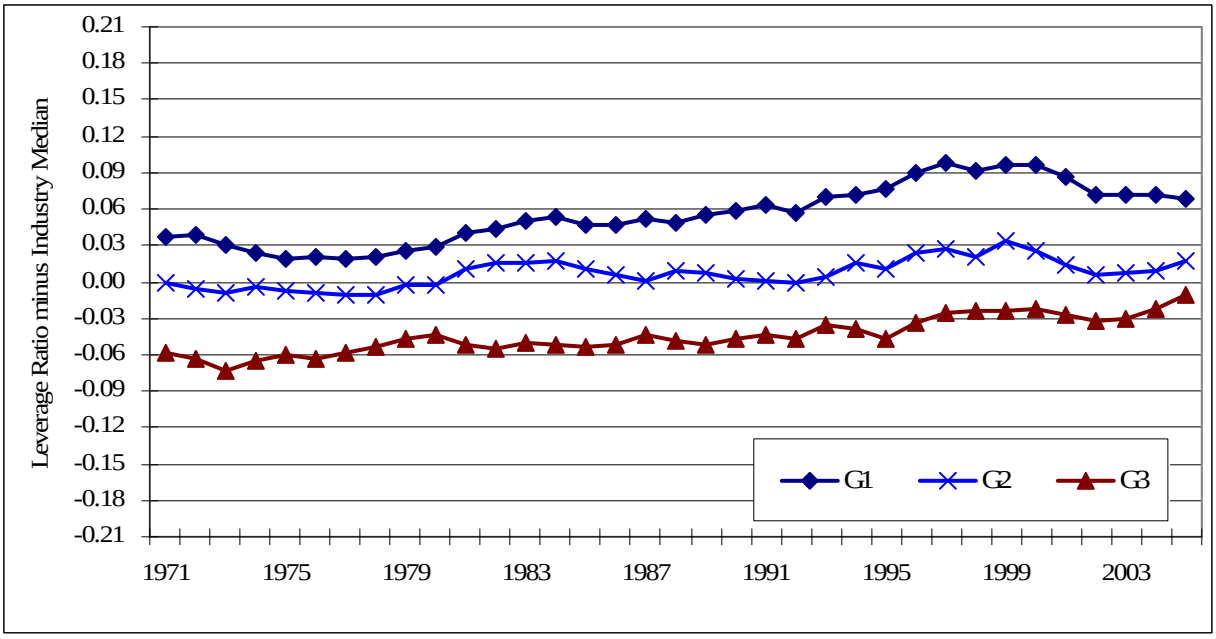
Panel A: Industry-adjusted Book Leverage in Even Time



Panel B: Industry-adjusted Market Leverage in Even Time



Panel C: Industry-adjusted Book Leverage in Calendar Time



Panel D: Industry-adjusted Market Leverage in Calendar Time

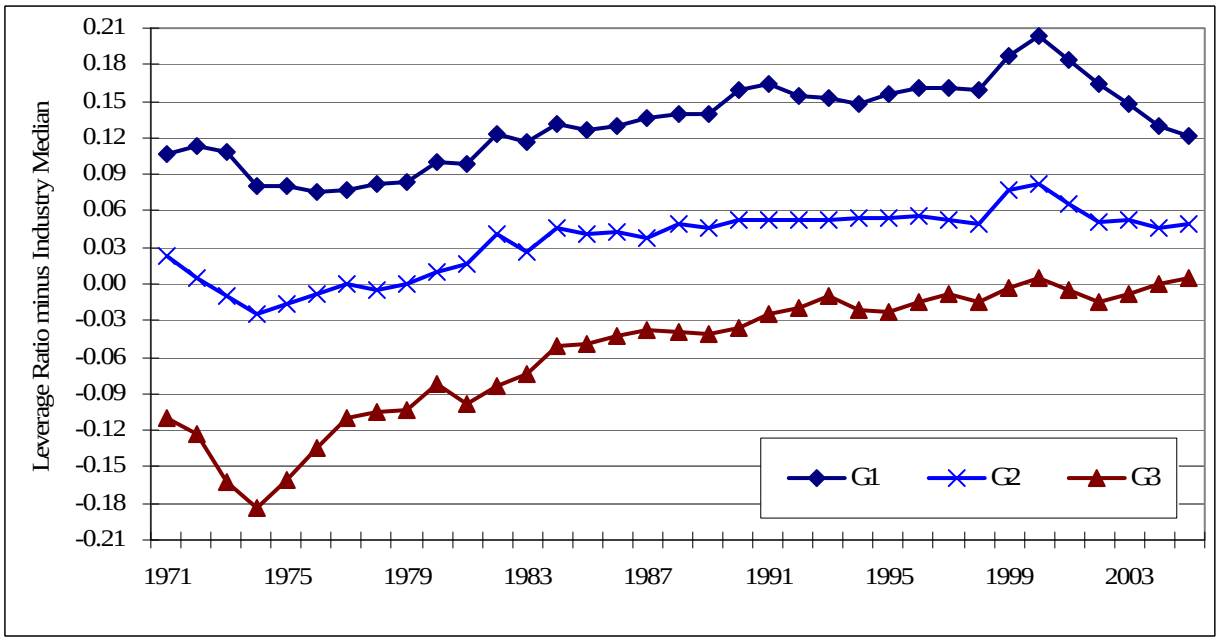
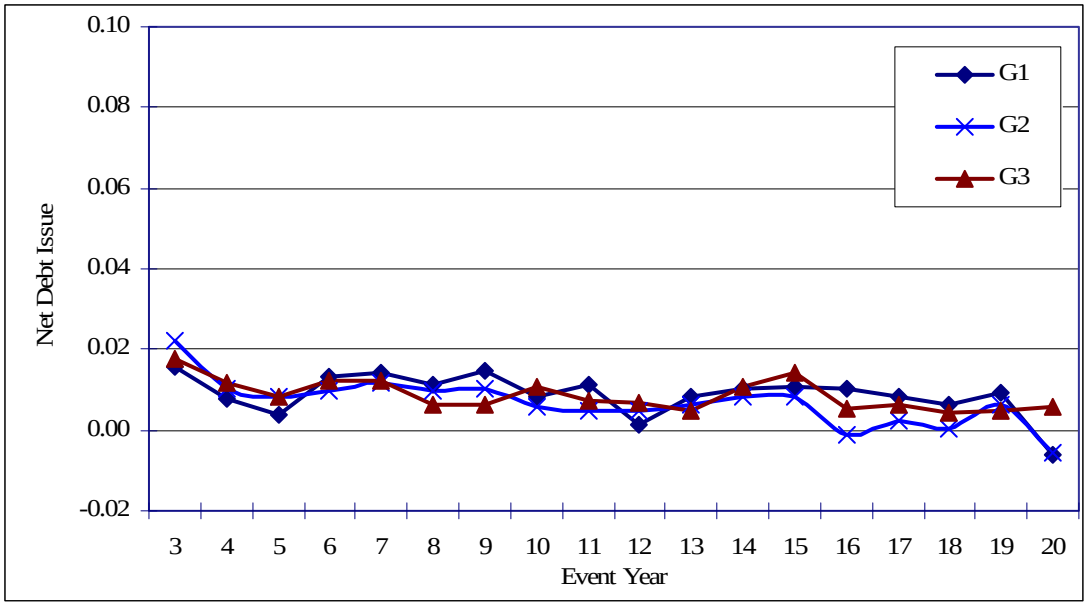


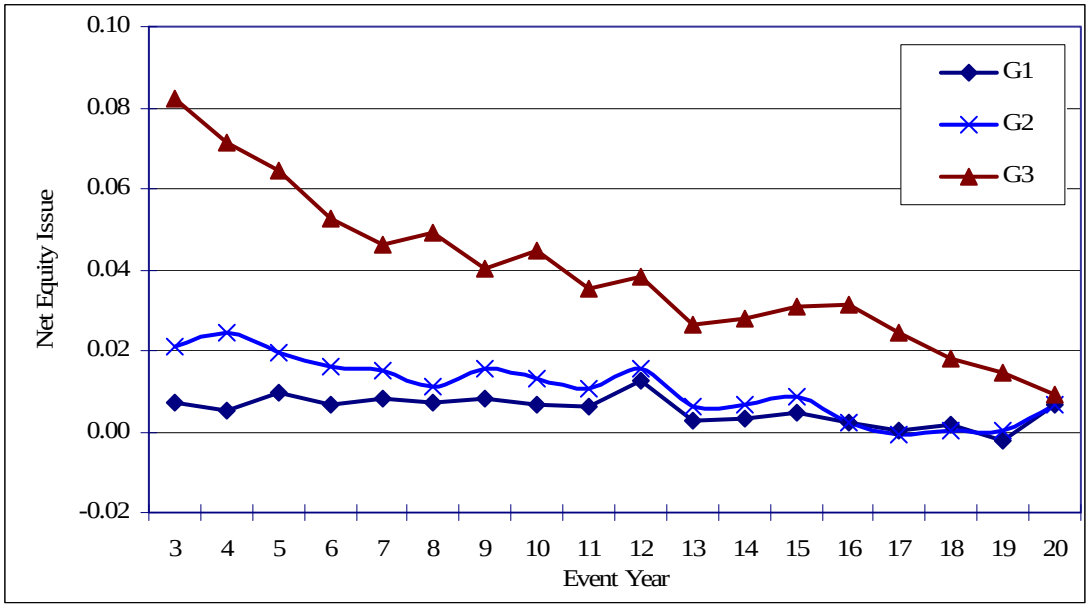
Figure 4. Financing Mix by Initial Growth Type

We calculate group means of each financing source by initial growth type for each event year and plot them over time. Three financing sources are net debt issue (Panel A), net equity issue (Panel B) and changes in retained earnings (Panel C), all scaled by total asset. See the formation of firm groups of three growth types (G1, G2 and G3) in the notes of Figure 1. The full sample is used.

Panel A: Net Debt Issue (ΔDebt/Asset)



Panel B: Net Equity Issue in Book Value (ΔNet Equity/Asset)



Panel C: Change in Retained Earnings (ΔRE/Asset)