# A Growth Type Explanation for Capital Structure Persistence

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Abstract

Recent research has revealed a persistent cross-sectional pattern in leverage ratios but found it difficult to explain. We show that growth-type (largely revealed early on) can parsimoniously explain the persistent dispersion in leverage. Using a two-way independent sort on firm initial market-to-book ratio and asset tangibility in early IPO years, we classify firms into three growth-types (low, mixed and high). We find that on average, low-growth firms have significantly higher leverage, high-growth firms have significantly lower leverage, and mixed-growth firms are in the middle. Growth-type is persistent and characterizes firms in profound ways. For example, throughout the years, low-growth firms focus on more tangible investments while high-growth firms tilt overwhelmingly toward R&D investments. Interestingly, while heavy issues of new equity by high-growth firms push their low leverage ratios even lower, it is the huge decreases in retained earnings—due to the expensing or amortizing of relentless R&D or intangible investments that pay off slowly—instead of issues of new debt that pull the leverage ratios back and help sustain leverage persistence. As the growth-type story suggests, we find that growth-type predetermines firms' persistent pecking order preference in external finance. We are able to show that it is growth-type rather than market timing that best explains leverage persistence.

Key Words: Capital Structure, Initial Growth Type, Persistence, External Finance, Market Timing,

JEL Classification Code: G14, G32, G34

This paper presents a firm growth-type story that can parsimoniously explain the persistent cross-section of leverage ratios documented by Lemmon, Roberts and Zender (2008). Modigliani and Miller's (1958) seminal work suggests that capital structure will interact with market imperfections such as agency conflicts and information asymmetries. Optimal capital structures are responses to these market imperfections that would otherwise have caused more severe investment inefficiencies. A persistent cross-sectional pattern in leverage likely reflects persistent forms of capital market imperfection across firms. We argue that firm growth-types can give rise to important specifications of market imperfection.

Firm growth-type in association with market imperfection can be understood through two firm characteristics: asset type and asymmetric information type. It is well recognized in the literature that types of asset and asymmetric information are important for specifying market imperfections (Myers, 1977; Myers and Majluf, 1984; Zingales, 2000). Less emphasized in the literature, however, are the combinations of these two firm characteristics and hence market imperfections that firms face can be persistent. 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, and 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 which arises from assets-in-place than from growth opportunities, and other firms may always have more asymmetric information which arises from growth than from assets-in-place.

The finance literature has shown that the types of asset and asymmetric information, usually 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 underlies Myers' (1984) pecking order in financing where new equity is the last resort (Myers and Majluf, 1984). 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 equity financing, as costs of new equity in this situation can be much lower than predicted by the classic Myers-Majluf model.

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, where overvaluation is actually about assets-in-place (Harris and Raviv, 1991). Equilibrium behavior is different for issuing firms where asymmetric information arises mainly from growth opportunities. In effect, not all equity issues are lemons: especially 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

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[1] The generalized Myers-Majluf model predicts that an increase in asymmetric information about 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 new equity financing and do not seem to suffer the classic adverse selection effect. See the literature review for more details.

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 necessarily firm specific and whose attachment to the firm can be very uncertain. 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. Following the definition of Lemmon, Roberts and Zender (2008), initial average is an average over the initial 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 to 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. While Lemmon, Roberts and Zender (2008) attribute the persistent leverage dispersion largely to unobserved firm heterogeneity, our growth-type story—though unable to explain the full persistent dispersion—is able to shed new light on capital structure theory and corporate finance in general.

Our three growth types are persistent and rooted in firm fundamentals in profound ways. Not only do firm fundamentals such as investment styles persistently differ by growth type but also does financing behavior. While there is no overarching pattern for Myers' (1984) pecking order, we find that growth type presets firms' persistent pecking order preference in external finance, consistent with our growth-type story in which types of asymmetric information spawn a growth-type-determined pecking order in financing. Finally, we show that it is growth type rather than market timing that best explains long-run capital structure. We leave the detailed summary of these results to the conclusion.

The rest of the paper proceeds as follows. Section I reviews the literature. Section II details our growth type story for leverage persistence and shows supporting evidence. Section III examines the structure of funding sources or financing mix by growth type, and shows how a persistent financing mix helps maintain leverage persistence. Section IV shows that growth type underlies firms' persistent pecking order preference in dynamic external finance, and growth type rather than market timing ultimately dictates capital structure. Section V concludes.

## I. Literature Review

In this section, we first discuss why leverage persistence gives rise to important questions about capital structure (Section I.A), and then review related capital structure theories in detail (Section I.B).

### A. Main Issues in view of Leverage Persistence

Researchers are unsure about what lies behind the persistent cross-sectional pattern of capital structure (Lemmon, Roberts and Zender, 2008). 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 issues that cast doubt on all three theories: contradictory facts that they cannot explain.

If we apply the tradeoff theory, leverage persistence may mean either existence of target leverage or lack of capital structure rebalancing. In tradeoff theory, firms weigh costs and benefits of debt at the margin to maintain optimal capital structures. This theory emphasizes capital structure adjustment towards optimal targets if shocks push firms away from their optimum targets. However, early research has shown that highly profitable firms maintain low leverage (Rajan and Zingales, 1995), indicating a weak tradeoff adjustment force using the debt tax shield (Graham 2000).

A classic answer comes from Myers' (1984) pecking order theory. Because financial slack is valuable for mitigating the underinvestment problem due to asymmetric information (Myers and Majluf, 1984), costs of asymmetric information create a pecking order of financing: first internal funds, then debt and, as the last resort, new equity due to adverse selection (Myers 1984). The pecking order theory does not recognize target leverage and capital structure rebalancing. Further findings of slow adjustment in leverage indeed trouble the tradeoff theory (Rajan and Zingales, 1995; Shyam-Sunder and Myers, 1999; Fama and French, 2002; Frank and Goyal, 2003).

But the pecking order theory has its own serious problems. Research has found that small growth firms, although fraught with severe information asymmetries, issue a lot of new equity but do not seem to face high adverse selection costs (Rajan and Zingales, 1995; Helwege and Liang, 1996; Fama and French, 2002; Frank and Goyal, 2003). In view of the evidence on the slow adjustment of leverage, this equity-friendly phenomenon (especially in high growth firms) motivated the market timing theory of Baker and Wurgler (2002). They posit that the capital structure is the cumulative outcome of attempts to time the equity market. This 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' staying 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). 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) complains 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 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 mainly focuses on costs and benefits of debt. The dynamic capital structure model can explain spikes in new debt issues over time but it is unclear whether new debt issues, in practice, are meant to be adjustments toward a target (Chang and Dasgupta, 2008). Second, the well-known negative relationship between firm growth (usually measured by market-to-book ratio, as in Smith and Watts, 1992, Barclay, Smith and Watts, 1995) and leverage can hardly imply the benefits of equity financing by high growth firms in the classic Myers and Majluf (1984) framework (Rajan and Zingales, 1995; Fama and French, 2002). Myers (1977) explains that it is tangible assets that give rise to debt capacity; as a result, high growth firms with a lot of intangible assets including growth options tend to avoid debt to prevent the problem of debt overhang.

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 this implies that high growth firms are willing to swallow 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) is consistent with a luckily-cheap-equity view under exploitable market timing, which means 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 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 century ago) that we actually understand very little if N firms have N specific leverage targets that we cannot really explain.

### B. Related Capital Structure Theories

The tradeoff theory and the Myers (1984) pecking order theory have long dominated the field of corporate capital structure (Section B.1.). Market timing for external finance is also an important aspect of capital structure choice. The arrival of the market timing theory of Baker and Wurgler (2002) seems to take advantage of existing theories' weaknesses (Section B.2). However, most researchers (perhaps misled by the perception that information asymmetries must cause adverse selection) have paid scant attention to the type of asymmetric information that can give rise to benefits of outside equity (Section B.3).

#### B.1. The Tradeoff Theory versus the Pecking Order Theory

Capital structure theories all agree that firms weigh the marginal costs and benefits of various sources of financing in order to determine corporate leverage ratios. But they disagree on what the dominating costs and benefits are. In the tradeoff theory (starting with Modigliani and Miller, 1963), costs of debt come from concerns over bankruptcy and agency conflicts, while benefits of debt arise from the tax shield and the disciplining role of debt. Too much debt can create an asset substitution problem (Fama and Miller, 1972; Jensen and Meckling, 1976) that tends to push firms into financial distress or even bankruptcy. It can also cause debt overhang, forcing firms with more growth opportunities to under-invest (Myers, 1977). On the other hand, too little debt makes firms waste a valuable tax shield, and renders firms unable to discipline empire-building managers (Jensen, 1986; Stulz, 1990). While costs and benefits of debt vary with firm characteristics, it is these opposing factors that help maintain corporate capital structure at an optimum. The tradeoff theory posits that if shocks push firms away from their optimal leverage, the tradeoff forces enable firms to adjust back toward their optimal target leverage.

Empirical research has been successful in identifying firm characteristics that are directly related to these costs and benefits of debt. Firm size, asset tangibility, profitability, and market-to-book ratio are important firm characteristics commonly accepted in the literature (Titman and Wessels, 1988; Rajan and Zingales, 1995, also with international data). Larger firms are more diversified and have easier access to capital markets, allowing firms to lower the risk and costs of debt. Having more tangible assets as collateral increases liquidation value and hence lowers the cost of debt. Higher profitability creates more room for a tax shield but causes rising concerns about wasteful managerial spending. Both of these also call for more debt. Higher market-to-book ratios can reflect more valuable investment opportunities, thus requiring less debt to avoid problems of moral hazard and debt overhang. Empirical research has confirmed that these relationships, except for profitability, 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 effect of tax benefits of debt in increasing firm value seems to be muted. Graham (2000) makes it clear that the use of a tax shield by profitable firms seems much less vigorous than suggested by tradeoff theory.[2] It has been puzzling

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[2] A deeper issue Graham (2000) raises is debt conservatism, that is, managers seem reluctant to sit on the optimal level of debt according to the traditional tradeoff theory. There are two explanations to debt conservatism. First,

researchers that, when looking at a cross section, firms with higher profitability are reluctant to use more debt.

The pecking order theory of Myers (1984) offered an explanation to this puzzle. 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 are especially valuable for future investment because financial slack allows firms to undertake new investment that firms would otherwise give up at unacceptably high dilution costs from using outside equity. Note that an increase in retained earnings or internal equity will mechanically weigh down leverage. In general, 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, and finally new equity as the last resort.

Myers (1984) suggested that adjustment costs of external finance must be so high that the pecking order of financing undermines tradeoff forces and prevent observed leverage ratios from reaching a target. Early studies using the partial adjustment models show that firms seem to adjust toward 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 (see also Chang and Dasgupta, 2008). In a comprehensive study, Fama and French (2002) conclude that the speed of adjustment is slow and that targets are so soft that the evidence cannot distinguish the tradeoff theory from pecking order theory in a dynamic sense. They also confirm that while the old problem with the tradeoff theory remains, after controlling for profitability as a proxy for investment opportunities, the pecking order theory also has its

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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.

own problems: 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.

The apparent low cost of new equity, even when big information gaps prevail, undermines the pecking order theory. Low cost of new equity for less levered growth firms, however, not only creates a negative relationship between market-to-book ratio and leverage—a pattern that is consistent with, for example, the debt-overhang implication in Myers (1977)—but also tends to produce persistence in capital structure, compatible with a slow speed of adjustment. The dynamic capital structure choice models of Fisher, Heinkel and Zechner (1989) and Goldstein, Ju, and Leland (2001) justify a target range that also tolerates persistence in capital structure under dynamic adjustment costs (Leary and Roberts, 2005). But both the tradeoff theory and the dynamic choice models focus on costs and benefits of debt, leaving equity as a residual variable in firm valuation. Without explicit treatment of the costs and benefits of equity, the reasons behind firms' equity issuing behavior remains unclear (behavior that affects capital structure and hence firm value).

### B.2. Market Timing

Dynamic costs and benefits of equity financing drives 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). 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 costs of market imperfections (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. 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 costs of equity introduced by Myers and Majluf (1984), but they cannot explain why there may be benefits from issuing new equity.

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.

### B.3. The Generalized Myers and Majluf Framework

In a rational market, can new equity issues be welcomed by investors at large? This is possible under certain conditions. Cooney and Kalay (1993) point out that if asymmetric information about growth is not limited to positive net present value (NPV) projects as in the original Myers and Majluf (1984) model, 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—which can potentially cloud new equity issues as pointed out by Jung, Kim and Stulz (1996).

The generalized Myers and Majluf model described by Cooney and Kalay (1993) and 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.[3] This could not 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.[4]

Why would an increase in uncertainty over growth opportunities facilitate rather than inhibit new equity issues under asymmetric information? The intuition is as follows. In the classic equilibrium with adverse selection caused by asymmetric information about assets-in-place valuations, undervalued firms are clearly separated from overvalued firms when issuing new equity. However, this separation is

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[3] 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 Oyvind Norli (2007) for a review of the announcement effects for seasoned new equity issues.

[4] 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.

unlikely to occur when asymmetric information about growth opportunities, rather than about assets-in-place, predominates. Unlike in the classic equilibrium, 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.[5] 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. The classic concept of equity issue lemons is only relevant when firm value is dominated by 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.[6] 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.

## II. Initial Growth Type and Leverage Persistence

In this section, first, we argue that growth type gives rise to distinct forms of market imperfection that affect capital structure differently; and we define initial growth type (II.A). Next, we describe the data (II.B), and document the persistent leverage ratios sorted by growth-type (II.C). We then show that our growth-type reflects persistent firm fundamentals (II.D).

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[5] 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 an increase in uncertainty over growth but not in expected growth per se that causes the announcement effect of equity issuance to increase.

[6] One may argue that if this prediction is true, managers can manipulate accounting figures so as to increase uncertainty over firm valuations. But such account-manipulated uncertainty is much more effective 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.

### A. Growth Type and Capital Market Imperfection

Asymmetric information is ubiquitous, causing capital market imperfections. 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 new investment, or growth opportunities. 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 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. Later finance research found that different types of asymmetric information have totally different implications for corporate financing behavior.

As summarized in Table 1, 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 (Cooney and Kalay, 1993; Wu and Wang, 2005). When asymmetric information about growth dominates, new equity issues are not necessarily overvalued and 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 are based more on growth opportunities than on assets-in-place can enjoy cheaper new equity.

The extent of information asymmetries may vary over time; however, the dominance of a particular type of asymmetric information likely remains stable. 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 dominates. 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 firm 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. Therefore, we prefer to examine the relation between the current capital structure and growth type identified as far back as possible. Such a relation exists if growth type is stable and determines capital structure despite huge 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 2, 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. 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 1 suggests that growth type affects the relative costs of external finance with debt versus outside equity. As shown in Table 2, the 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.

### B. The Data

Our full sample is from the COMPUSTAT database for the period of 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 code 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 A.

### C. 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 obvious: average leverage ratios by growth type, regardless of whether they are measured by book (Panel A) or 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).

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 3, 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 is least contaminated by future market sentiment, can explain future capital structure.

Tangibility is highly persistent, although updated tangibility eventually overtakes initial tangibility. In Table 4, we trace how often firms change from initial growth type to growth type based on updated 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 3, dominates initial tangibility in determining current capital structure. Thus, although both market-to-book and tangibility are time-varying, growth type seldom changes 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 5 shows 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*-values 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 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 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 Baker and Wurgler's (2000) proposed market timing factor has a component of the 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 be caused by current market timing.

### D. Firm Fundamentals Sorted by Initial-growth-type

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

As shown in Panel A of Table 6, 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 *t*-values, the differences in terms of group means are always significant in Panel A of Table 6, consistent with the stability of growth type as reported in Table 4. These slow evolutions of market-to-book and tangibility (that jointly underlie 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 6 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 6 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. However, by separating profitable firms from loss-making firms each year, we can see that profitable G3 firms on average, catching up G2 firms, deliver significantly higher profits than do profitable G1 firms in the late 10-year period. 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 A of Table 6. 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 6 further details how the three growth-types persistently differ in terms of asset growth rate and investment style. The patterns are clear. 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 should place different emphases on tangible and intangible investments. As shown in the rest of Panel C of Table 6, investment styles 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 on average, annual investment 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.

This persistent investment style pattern suggests that low growth type (G1) entails a tangible investment style that focuses on more tangible assets, and high growth type (G3) entails an intangible investment style that tilts overwhelmingly towards intangibles. What is more, 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 6 further reports the persistent differences in sales growth, cash holdings and propensity to pay dividends. As shown in the left block of Panel C, 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 activity, and the high market-to-book ratios of G3 firms do reflect a fundamental content.

As shown in the two remaining blocks of Panel C of Table 6, 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 of 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, as those 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 6, where are their high cash holdings from? We examine this issue in the next section: it must come from new equity issues.

In summary, we show that growth type is rooted in firm fundamentals that are largely persistent. 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, 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.

## III. Financing Mix of New Investment by Initial-growth-type

In this section, we show that the structure of financing sources or financing mix of corporate investment persistently differs by growth type. We group firms by initial-growth-type as done in the previous section, and 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 early 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 intangible investments for an extended period; this explains their high cash holdings documented in Table 6. In studying the optimal cash holdings, Opler, Pinkowitz, Stulz and Williamson (1999) find that the determinants of cash 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 is behind high cash holdings which are achieved largely through heavy issues of new equity; and we also know from the previous section that high-growth type firms have significantly lower debt 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 converging upward eventually (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 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.

With 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 play off slowly. Despite of 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 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 take place in a world with changing asymmetric information, 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.

## IV. Determining Capital Structure: Growth Type or Market Timing?

Managers have incentive to time the market. Market timing for external finance occurs when a firm's external finance increases in response to a higher market-to-book ratio. This is largely a phenomenon of within-firm variation. However, it is one thing to say that market timing exists, but quite another to say that market timing determines long-run capital structure. In this section, first, we show how growth type affects within-firm variations in external finance in response to time-varying firm characteristics (Section IV.A). Then, we test our growth-type explanation against the market timing explanation in a two-horse race for determining capital structure (Section IV.B).

**A. Time-variation in External Finance by Growth Type**

Short-term variation in year-by-year leverage ratios often contains detailed information about both tradeoff forces and effects of asymmetric information. 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 the IPO market timing effect, if any, from our analysis. However, including the data from these earlier years 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 A.1, we focus on the results for market-to-book ratios and profitability, both having tradeoff and pecking order preference implications. In subsection A.2, we discuss the results for the other leverage determinants we use.

### A.1. Response to Market-to-book Ratio and Profitability

*Market-to-book Ratio*. As shown in Table 7, for all growth-types, an increase in market-to-book ratios significantly facilitates net issues of debt (Δdebt/Asset) as well as net issues of 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 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, is resolved by the generalized Myers-Majluf framework, which shows that costs and benefits of new equity issues depend on types of asymmetric information.

Even in the Myers and Majluf (1984) framework of 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 Graham and Harvey (2001) survey study, 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 the 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 a growth-type-determined pecking order preference in external finance, consistent with the generalized fair market timing view. As shown in Table 7, 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 to issue 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 to issue equity as market conditions improve. On the other hand, G1 firms are much keener than G2 firms on issuing debt, who 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 evidence suggests that growth type dictates firms' distinct pecking order preference in external finance that looks apparently like market timing.[7]

*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

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[7] One may argue that this growth-type-determined pecking order preference in external finance is 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 growth firms in particular are more likely to go for new equity when coming to external finance. But Myers (1977) does not explain why outside equity investors are willing to provide cheap equity for growth firms.

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 7, 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 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. 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 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 7, when their losses increase, high growth firms (G3) issue more new equity than other firms. This within-firm effect is a pronounced result (slope estimate of -0.1857 and a *t*-value 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, certainly not relying on dividend signaling, supports the current high market valuations. This suggests that evidence of accounting losses and no dividends may not necessarily imply financial constraints and hinder investments especially in intangibles.[8] As explained by

[8] 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.

the generalized Myers-Majluf model, high growth firms can tap into outside equity—not necessarily under duress (as predicted by Myers and Majluf, 1984).

In sum, 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 a growth-type-determined pecking order 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 while 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.

### A.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 7, unlike debt issues, new equity issues (if we also consider market equity) by firms of higher growth types, 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-value of 17.05 in book equity); this contributes to lowering 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 7, there are significantly negative slope estimates for firm size everywhere. But this evidence can also 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).[9] 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.

**B. Determining Capital Structure with a Two-horse Race: Growth Type versus Market Timing**

The market timing argument of Baker and Wurgler (2002) suggests that new equity issues have a large, permanent effect on leverage, and interpret the low, persistent leverage ratios of high growth firms as these firms' defiance of tradeoff forces (see also Welch, 2004). In response to the market timing argument, recent literature motivated by the tradeoff theory with dynamic adjustment costs has shown that firms tend to issue new debt quite quickly to neutralize equity issue spikes (Leary and Roberts, 2005). In addition, Faulkender and Petersen (2005) find that the leverage effect from an increase in equity financing over the past year is tiny, also suggesting timely adjustments of capital structure. All this careful research casts doubt on the market timing argument for capital structure determination. Since the tradeoff theory is not motivated by costs and benefits of equity, the fact that growth firms are more equity oriented still seems to make Baker and Wurgler's argument intuitively appealing.

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[9] 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).

Baker and Wurgler (2002) claim that "capital structure is the cumulative outcome of attempts to time the equity market." Their supporting evidence comes from the high significance of their market-timing factor in explaining long-run capital structure. The Baker-Wurgler market timing factor for each firm at time *t* is an external-finance-weighted average of past market-to-book ratios:

$$B\&W\ MtB_{efwa,t-1} = \sum_{s=0}^{t-1} \frac{e_s + d_s}{\sum_{r=0}^{t-1} (e_r + d_r)} \left( \frac{M}{B} \right)_s \qquad (1)$$

where $e_s$ and $d_s$ or $e_r$ and $d_r$ are past annual net equity and debt issues in year *s* or *r* from year 0, the IPO year, to year *t-1* , and $(M/B)_s$ is the annual market-to-book ratio in year *s*.

However, as Hovakimian (2006) and Kayhan and Titman (2007) point out, B&W $MtB_{efwa,\ t-1}$ is a catch-all factor that contains market timing as well as information on growth opportunities. Hovakimian (2006) argues that an average of past market-to-book ratios embedded in B&W $MtB_{efwa,\ t-1}$ better captures information about genuine growth opportunities than recent market-to-book (which is used as a control variable in Baker and Wurgler, 2002). Liu (2006) also confirms that a simple average of past market-to-book ratios is as good as B&W $MtB_{efwa,\ t-1}$. Furthermore, Kayhan and Titman (2007) decompose B&W $MtB_{efwa,\ t-1}$ into two components: (1) a covariance between external finance and market-to-book (scaled by average external financial) and (2) a simple average of past market-to-book ratios. They also find it is the second component that mainly contributes to the significance of B&W $MtB_{efwa,\ t-1}$. Despite these doubts on the market timing argument, the debate may not be easily settled. The simple average of past market-to-book ratios, however, is tangled with the long-term market timing concept in Kayhan and Titman (2007). What if Baker and Wurgler (2002) add that a historical average of market-to-book ratios reflects average market timing?

We design a new test that can rule out the market timing determination argument even if market timing is at work. We construct an initial-growth-type-determined factor, Initial $MtB_{efwa,\ t-1}$, by replacing

$(M/B)_s$ in B&W $\text{MtB}_{\text{efwa, t-1}}$ with our initial market-to-book, Initial MtB:

$$Initial\ MtB_{efwa,t-1} = \sum_{s=0}^{t-1} \frac{e_s + d_s}{\sum_{r=0}^{t-1}(e_r + d_r)} Initial\ \text{MtB} \quad (2)$$

In the logic of Baker and Wurgler's market timing, the variation in B&W $\text{MtB}_{\text{efwa, t-1}}$ captures spikes of external finance arising from managers' timely responses to favorable, prevailing market-to-book ratios, $(M/B)_s$. By contrast, in Initial $\text{MtB}_{\text{efwa, t-1}}$, we simply direct managers' responses to initial market-to-book only. Thus, our variable in (2) by design has no market timing implications, because current year-by-year external finance is unlikely to be motivated by managers' timing of the initial market conditions.[10] Rather, this variable captures our growth type determination story, as initial market-to-book contains strong information on growth type that presets firms' distinct pecking order preference in external finance.

Before we put the competing variables in a two-horse race, we first report results of separated runs using the regression test of Baker and Wurgler (2002). As reported in Table 8, slope estimates for the Baker-Wurgler factor, B&W $\text{MtB}_{\text{efwa, t-1}}$ are significant up to 15 years, after controlling for recent capital structure determinants, $\text{MtB}_{\text{t-1}}$ (market-to-book), $\text{PPE}_{\text{t-1}}$ (tangibility), $\text{Profit}_{\text{t-1}}$ (profitability), and $\text{LnSale}_{\text{t-1}}$ (firm size). These replicated results are qualitatively similar to those of Baker and Wurgler (2002), Hovakimian (2006), and Liu (2006). Likewise, the slope estimates for our factor, Initial $\text{MtB}_{\text{efwa, t-1}}$, are equally significant in the same context. The separated runs are the substitution approach. Thus, our factor is at least as good as Baker and Wurgler's.

Baker and Wurgler (2002) claim that their market timing factor captures within-firm variation in capital structure, because the lagged market-to-book is used to control for cross-firm variation. This is

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[10] One may argue that market timing works through initial market-to-book and starts during the IPO. But Alti (2006) finds that both hot and cold IPOs have similar pre-IPO leverage ratios, and the large IPO effect to push down leverage ratios vanishes within a couple of years as the leverage ratios reverse back to their pre-IPO level.

incorrect because B&W $MtB_{efwa,\ t-1}$ actually captures much of the cross-firm variation in capital structure, as pointed out by Hovakimian (2006). While a clean cut between cross- and within-firm variations is econometrically difficult, Initial $MtB_{efwa,\ t-1}$, is able to rule out the market timing determination argument. Thus, our two-horse race can offer a clean test.[11]

As shown in Table 8, in the horse race, Initial $MtB_{efwa,\ t-1}$ turns out to be always significant while rival B&W $MtB_{efwa,t-1}$ is significant only temporally in year 10. For example, in year 15, the slope estimate for Initial $MtB_{efwa,\ t-1}$, is significant, –1.46 (t-value = –3.80), and the slope estimate for B&W $MtB_{efwa,t-1}$ is insignificant, 0.03 (t-value = –0.04). Using the Fame-MacBeth (FM) method for the total period in calendar time, the average slope estimate for Initial $MtB_{efwa,\ t-1}$, is highly significant, –1.65 (t-value = –9.840), and the average slope estimate for B&W $MtB_{efwa,t-1}$ is insignificant, -0.07 (t-value = –0.30). Thus, Initial $MtB_{efwa,\ t-1}$ subdues the market timing variable, B&W $MtB_{efwa,t-1}$.

It is true that our initial growth type might be tangled with possible firm overvaluations at IPO. Yet we are unaware of any claim in the literature that current market timing is motivated by managers' timing back firm overvaluations lagged by several years. Our interpretation is unambiguous: growth type, already revealed during early IPO years, underlies firms' distinct financing behavior that shows persistence, and ultimately dictates future capital structure. Our growth-type-determined factor accommodates growth-type-determined financing behavior that allows for fair market timing, but rules out market timing determining capital structure.

## V. Conclusion

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[11] Hovakimian (2006) shows that the future external-finance-weighted average of market-to-book ratios is as good as the past external-finance-weighted average of market-to-book ratios in Baker and Wurger (2002), and his finding is conceptually able to rule out the market timing determination. Yet most econometricians have concerns about a future regressor in explaining the current dependent variable.

This paper advances a growth-type theory of capital structure that can explain leverage persistence parsimoniously. The growth-type story suggests that growth type gives rise to persistent market imperfection and predetermines firm financing in response. We identify, early on in IPO years, three growth-types of U.S. non-financial and non-utility firms for the period from 1971 to 2005. We find that the three initial growth-types significantly determine future leverage ratios across firms: firms of low-growth-type (G1) have persistently high leverage, firms of high-growth-type (G3) have persistently low leverage, and firms of mixed-growth-type (G2) are always in the middle. While previous research attributed the leverage persistence largely to unobserved firm heterogeneity, the growth-type story helps shed new light on capital structure theories and corporate finance in general.

Three more major findings are consistent with the growth-type story. First, growth type is rooted in firm fundamentals that also show persistence. On average, G1 firms always have low market-to-book and high asset tangibility while G3 firms always have high market-to-book and low tangibility. G1 firms focus on more tangible investments while 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. High cash holdings by G3 firms are stockpiled through heavy new equity issues. The generalized Myers-Majluf model in the literature predicts that an increase in asymmetric information that arises more from growth opportunities than from assets-in-place tends to facilitate rather than inhibit new equity issues. Contrary to the prediction of the classic Myers-Majluf model, this insight, befitting high growth firms fraught with asymmetric information about growth, has been less emphasized in the literature.

Second, we find that the financing mix persistently differs by growth type. While there is little difference in net debt issues across the growth types, the other two funding sources, net equity issues and changes in retained earnings, are persistently pronounced for high growth firms (G3): they issue by far more equity to fund their relentless R&D investments, and have equally more negative changes in retained earnings—a result of their expensing or amortizing of the R&D or intangible investments that pay off slowly. This helps us understand how leverage persistence is maintained for high growth firms: while heavy issues of new equity push their low leverage ratios even lower, it is huge decreases in retained earnings that pull the leverage ratios back and help sustain leverage persistence. The existing literature, however, often suggests net debt issues to be the major rebalancing force in general.

Third, the growth-type story suggests that types of asymmetric information spawn a growth-type-determined pecking order in financing. It is true that we find that firms of all growth types tend to step up debt and equity issues significantly in response to an increase in their market-to-book ratios—clear evidence that market timing is at large. Yet growth type presets firms' distinct pecking order preference in external finance. We show that in response to improved market conditions, while low growth firms (G1) are equally keen to issue debt and equity, high growth firms (G3) are much keener to issue equity than debt. This is consistent with the notion of growth-type-based fair market timing which does not need to assume firm overvaluations in external finance. In addition, all firms tend to issue more debt in response to an increase in their profitability. This result from within-firm variation is consistent with the tradeoff theory that, however, fails badly in the cross-firm variation in capital structure as shown in the literature. We find that growth type affects the strength of the tradeoff force: low growth firms (G1) are much keener than high growth firms (G3) to issue debt. As a whole, our detailed results of within-firm variation in external finance provide a picture of intricate financing dynamics that contains elements of both tradeoff force and growth-type-determined pecking order in financing.

In the end, we show that our growth-type factor—which is constructed to rule out the market timing determination argument—wins out in a two-horse race to determine long-run capital structure. We conclude it is growth type and not market timing that best explains the persistent cross-section of capital structure. If managers cannot change growth type, they cannot alter long-run capital structure through market timing.

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**Appendix A: Variable Definitions**

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)<br>(i) Book Leverage<br>(ii) Market Leverage | <br>Total Debt / Asset<br>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 only 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<br>(i) Book Value<br><br>(ii) Market Value<br> | The change in net equity, or net equity issue<br>(i) [Sale of Common and Preference Stock (108)<br>– Purchase of Common and Preference Stock (115)]<br>(ii) [$Shares_t$ (25) * $Adjust_t$ (27)<br>– $Shares_{t-1}$ * $Adjust_{t-1}$] * [$Price_{t-1}$ (199)/ $Adjust_{t-1}$ + $Price_t$ / $Adjust_t$ ]/2 |
| ΔRE | The change in retained earnings (36) |

**Table 1: Types of Asymmetric Information and New Equity Financing**

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

**Table 2: 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 Assets-in-place | Low Growth (G1) | Low | High |
| High | High | Mixed | Mixed Growth (G2) | ↓ | ↑ |
| Low | Low | Mixed | Mixed Growth (G2) | | |
| High | Low | AI about Growth | High Growth (G3) | High | Low |

**Table 3: 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*-values 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 4: 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 | | | | |
| | G1 | 97% | 3% | 0% |
| IGT | G2 | 5% | 94% | 1% |
| | G3 | 0% | 5% | 95% |
| Panel B: Simple average | | | | |
| | G1 | 94% | 6% | 0% |
| IGT | G2 | 3% | 94% | 3% |
| | G3 | 0% | 2% | 98% |

**Table 5: Significance of Persistent Leverage Gaps 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*-value for Mean Difference | *p*-value for Median Difference | *t*-value for Mean Difference | *p*-value for Median Difference | *t*-value for Mean Difference | *p*-value for Median Difference | *t*-value for Mean Difference | *p*-value 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 6: Persistent 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*-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 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 7: 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*-values are in parentheses.

| | | $\Delta$Debt/Asset$_t$ | | $\Delta$Net Equity/Asset$_t$ | | | |
|---|---|---|---|---|---|---|---|
| | | | | 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 |

**Table 8: Capital Structure Determination: Growth Type versus Market Timing**

This table shows the results of a two-horse race between our growth type view and the market timing view using the regression in Table III of Baker and Wurgler (2002). The table reports the regression results first for individual event years and then for the total period of 1971 to 2005 (where we drop the data for event year 0, 1, 2) using the FM method (Fama and MacBeth, 1973). Initial $MtB_{efwa,\ t-1}$ is our initial growth-type-based variable for each firm in year *t*:

$$InitialMtB_{efwa,t-1} = \sum_{s=0}^{t-1} \frac{e_s + d_s}{\sum_{r=0}^{t-1}\left(e_r + d_r\right)} InitialMtB \tag{2}$$

where $e_s$ and $d_s$ or $e_r$ and $d_r$ are past annual net equity and debt issues in year *s* or *r* from IPO or event year 0 to year *t-1*, and InitialMtB is initial market-to-book (the average of the earliest three years as defined before). B&W $MtB_{efwa,\ t-1}$ is the original Baker-Wurgler market timing factor, and Initial $MtB_{efwa,\ t-1}$ in (2) is the same as B&W $MtB_{efwa,\ t-1}$ except that we replace annual market-to-book ratio in year *s* in B&W $MtB_{efwa,\ t-1}$ with our time-invariant InitialMtB. To meet the data requirement in Baker and Wurgler (2002) as closely as possible, we prepare the regression sample as follows. (i) We exclude utilities (SIC 4900 – 4949) and financials (SIC 6000 – 6999) of the COMPUSTAT data from 1971 to 2005. (ii) For each firm, we define the first year in which COMPUSTAT reports market value data (Data199 times Data25) as event year zero. (iii) We require firms to have a CRSP share code 10 or 11, and have market equity data for December of year *t* to be in the CRSP sample of that year. (iv) We require firms to have non-missing data for total assets (Data6) of a minimal value of \$10 million between event year 0 and the year firms exit COMPUSTAT. (v) We follow the definition in Baker and Wurgler (2002) to obtain the dependent variable, book leverage, the Baker-Wurgler market timing factor, B&W $MtB_{efwa,\ t-1}$, and control variables, $MtB_{t-1}$ (market-to-book), $PPE_{t-1}$ (tangibility), $Profit_{t-1}$ (profitability) and $LnSale_{t-1}$ (firm size). (vi) We drop firm year observations where annual market-to-book ratio, B&W $MtB_{efwa,\ t-1}$, or Initial $MtB_{efwa,\ t-1}$ exceed 10, or where annual book leverage ratio is greater than unity. (vii) We truncate the weights in definition (2) following Baker and Wurgler (2002): whenever a weight is negative, we set the weight to be zero—thus, the weights do not necessarily sum up to unity in the sample. Intercept estimates are not reported. N stands for firm observations, and for the total period of 1971 to 2005 is the annual average number of firms. The event year *t*-values are based on the White-robust standard errors. *t*-values are in parentheses.

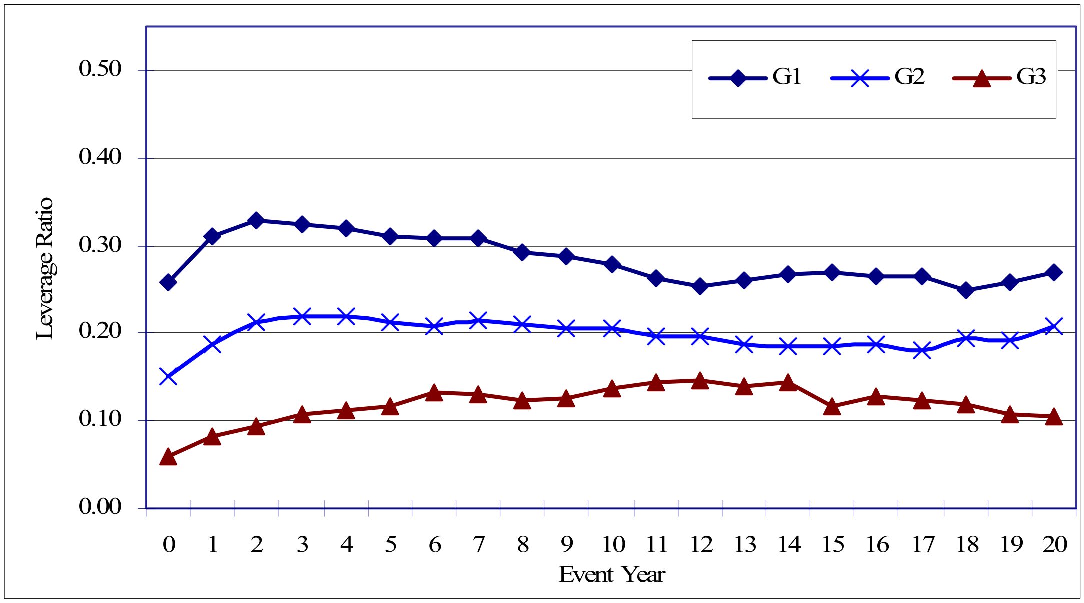
| Event Year *t* | N | Initial $MtB_{efwa, t-1}$ | B&W $MtB_{efwa, t-1}$ | $MtB_{t-1}$ | $PPE_{t-1}$ | $Profit_{t-1}$ | $LnSale_{t-1}$ | Adj. $R^2$ |
|---|---|---|---|---|---|---|---|---|
| Year 3 | 5,904 | | -1.81 | -3.08 | 0.12 | -0.18 | 3.56 | 0.179 |
| | | | (-6.68) | (-10.37) | (10.00) | (-9.13) | (20.32) | |
| | | -2.16 | | -2.92 | 0.12 | -0.19 | 3.54 | 0.186 |
| | | (-9.23) | | (-10.79) | (9.58) | (-9.77) | (20.22) | |
| | | -2.36 | 0.29 | -3.01 | 0.12 | -0.19 | 3.54 | 0.186 |
| | | (-6.40) | (0.68) | (-10.06) | (9.57) | (-9.76) | (20.22) | |
| Year 5 | 4,799 | | -2.02 | -3.06 | 0.12 | -0.24 | 3.05 | 0.177 |
| | | | (-7.93) | (-10.32) | (8.70) | (-9.25) | (15.71) | |
| | | -2.11 | | -3.43 | 0.11 | -0.24 | 3.05 | 0.188 |
| | | (-11.14) | | (-13.38) | (8.12) | (-9.18) | (15.80) | |
| | | -2.32 | 0.34 | -3.57 | 0.11 | -0.24 | 3.06 | 0.188 |
| | | (-7.76) | (0.85) | (-11.80) | (8.12) | (-9.16) | (15.84) | |
| Year 10 | 2,707 | | -2.67 | -2.72 | 0.07 | -0.39 | 2.14 | 0.170 |
| | | | (-7.66) | (-6.17) | (4.23) | (-10.10) | (8.80) | |
| | | -2.11 | | -3.68 | 0.07 | -0.37 | 2.24 | 0.173 |
| | | (-9.35) | | (-9.29) | (3.87) | (-9.53) | (9.42) | |
| | | -1.40 | -1.27 | -3.13 | 0.07 | -0.38 | 2.16 | 0.175 |
| | | (-4.08) | (-2.39) | (-6.76) | (3.86) | (-9.66) | (8.93) | |
| Year 15 | 1,490 | | -1.27 | -4.54 | 0.04 | -0.40 | 2.33 | 0.145 |
| | | | (-2.71) | (-7.35) | (1.52) | (-7.61) | (7.15) | |
| | | -1.45 | | -4.82 | 0.03 | -0.39 | 2.36 | 0.153 |
| | | (-4.98) | | (-8.24) | (1.28) | (-7.30) | (7.46) | |
| | | -1.46 | 0.03 | -4.84 | 0.03 | -0.39 | 2.37 | 0.153 |
| | | (-3.80) | (0.04) | (-7.47) | (1.27) | (-7.28) | (7.35) | |
| FM 1971-2005 | 1790 | | -1.79 | -1.83 | 0.06 | -0.51 | 2.79 | |
| | | | (-19.27) | (-3.78) | (7.27) | (-9.52) | (10.73) | |
| | | -1.63 | | -2.02 | 0.05 | -0.51 | 2.87 | |
| | | (-22.66) | | (-3.69) | (6.45) | (-9.74) | (10.99) | |
| | | -1.65 | -0.07 | -1.84 | 0.05 | -0.51 | 2.87 | |
| | | (-9.84) | (-0.30) | (-3.56) | (6.57) | (-9.67) | (11.41) | |

**Figure 1**

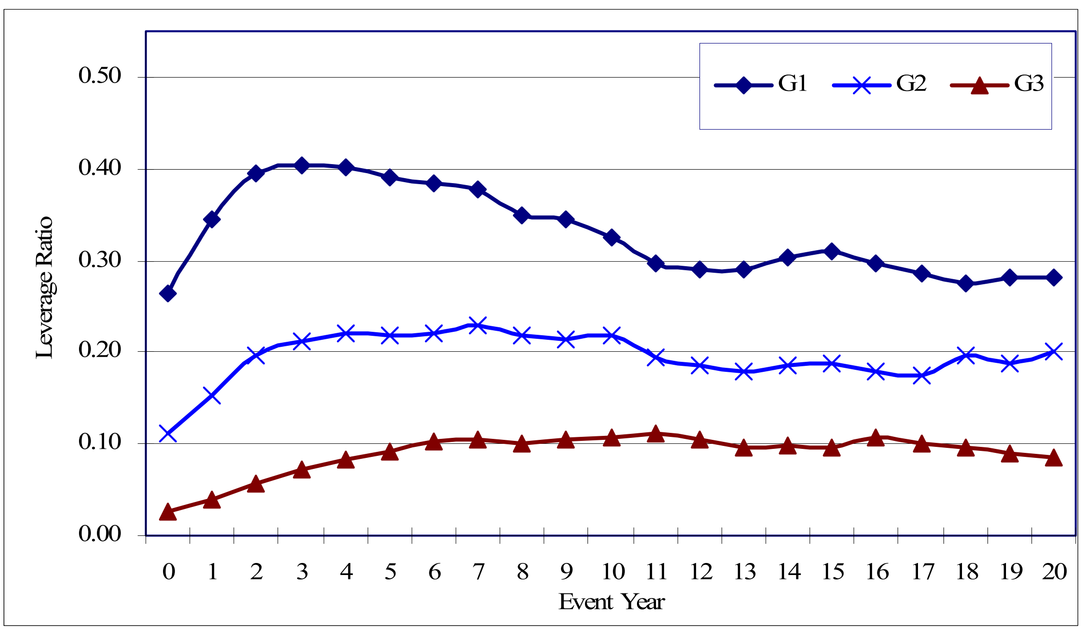
**Leverage Ratios Sorted on Initial Growth Type by Event Time**

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 A.

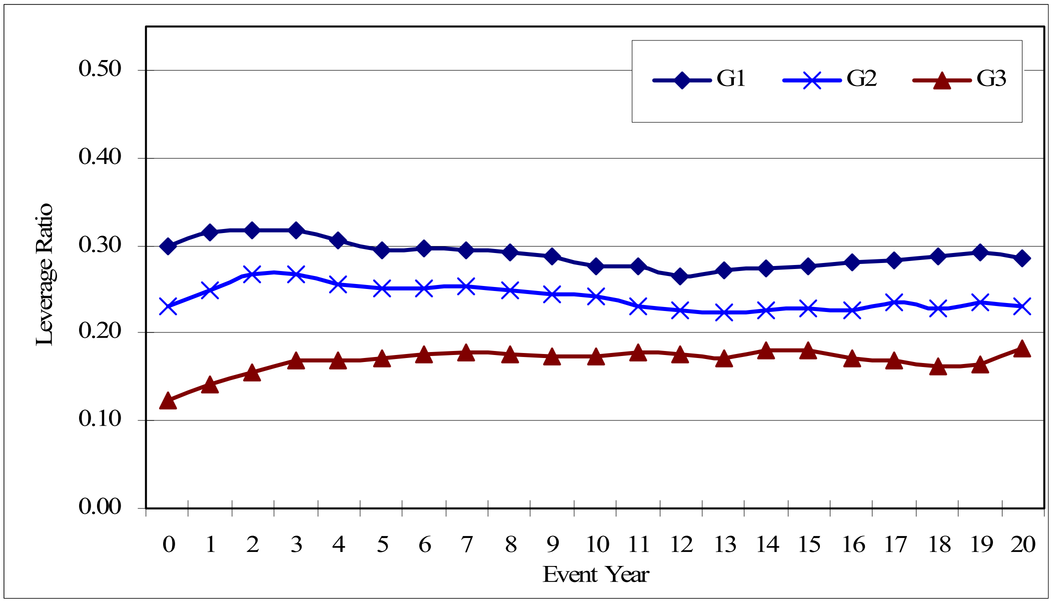
Panel A: Book Leverage with the IPO Sample




Panel B: Market Leverage with the IPO Sample



Panel C: Book Leverage with the Full Sample




Panel D: Market Leverage with the Full Sample

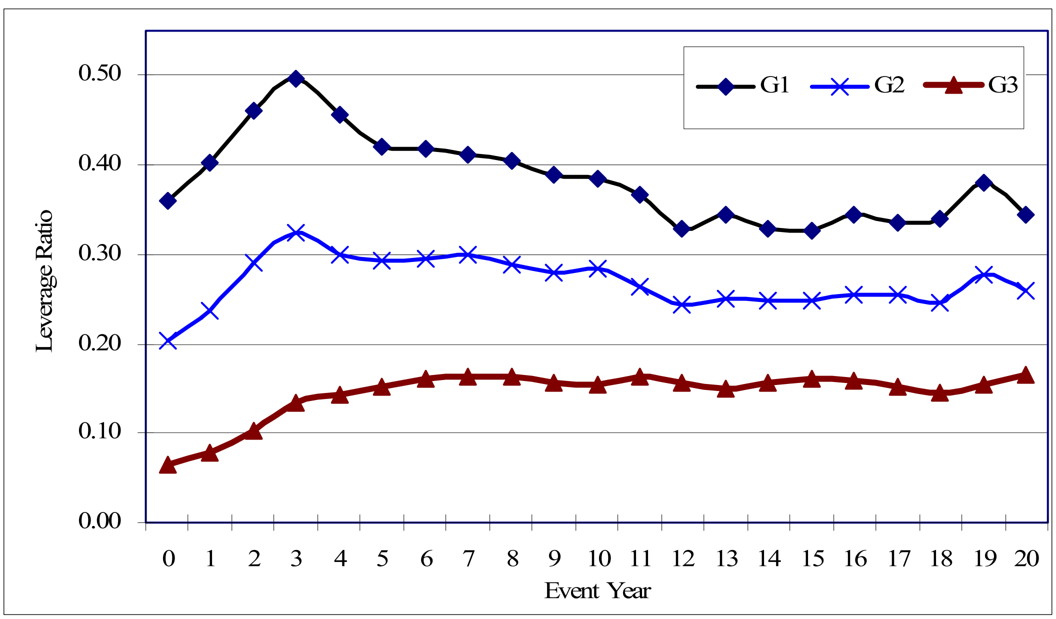
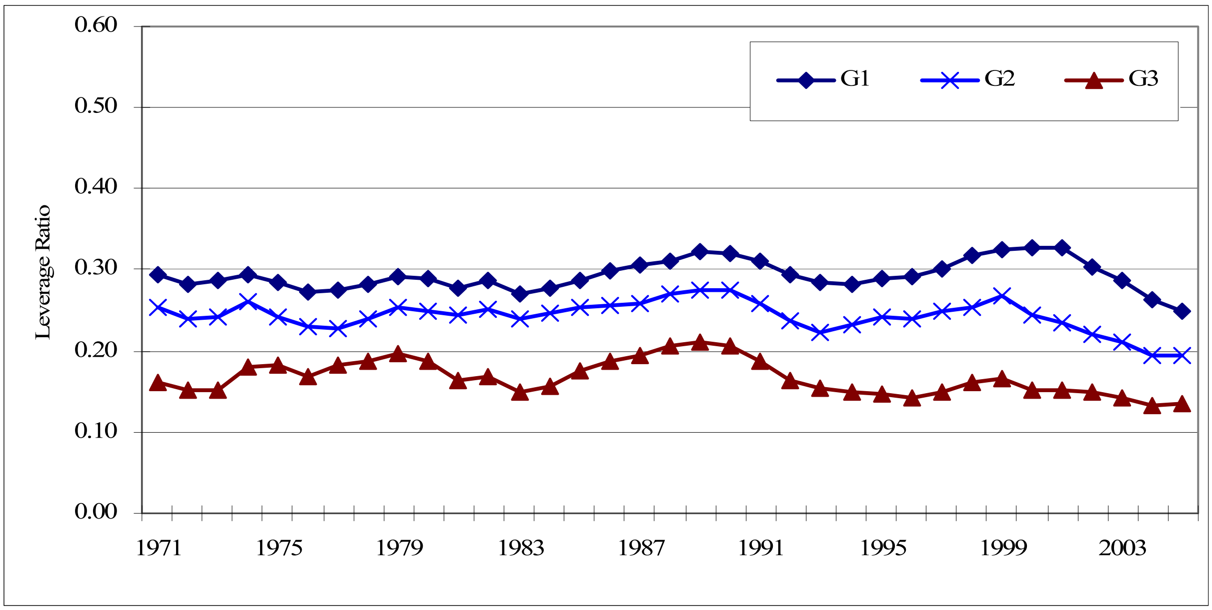


**Figure 2**

**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

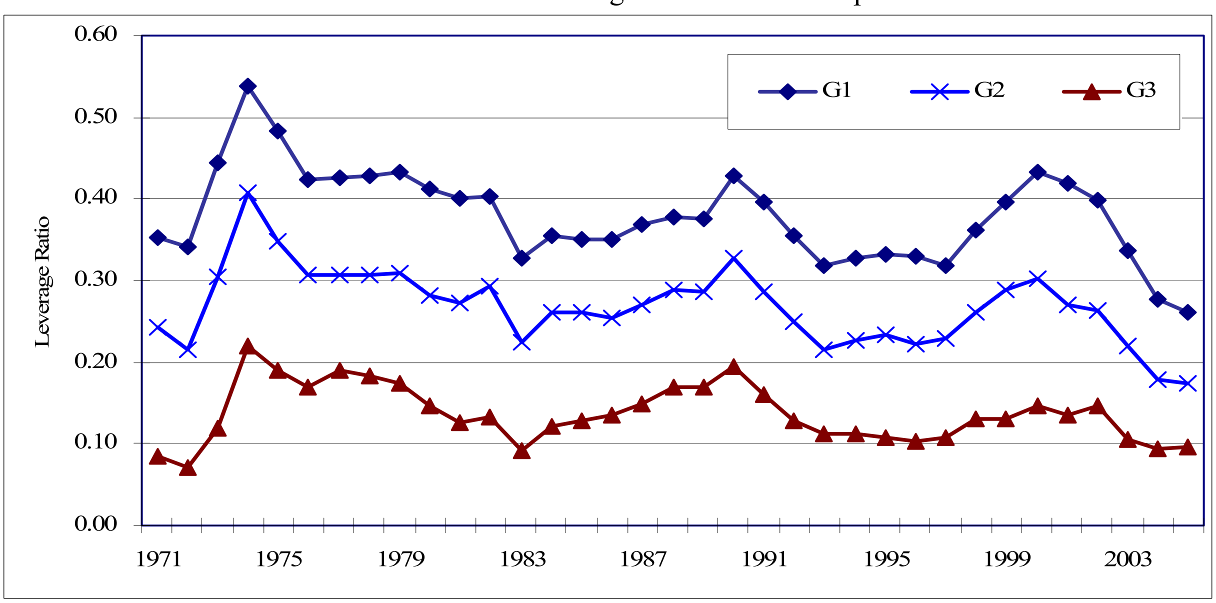
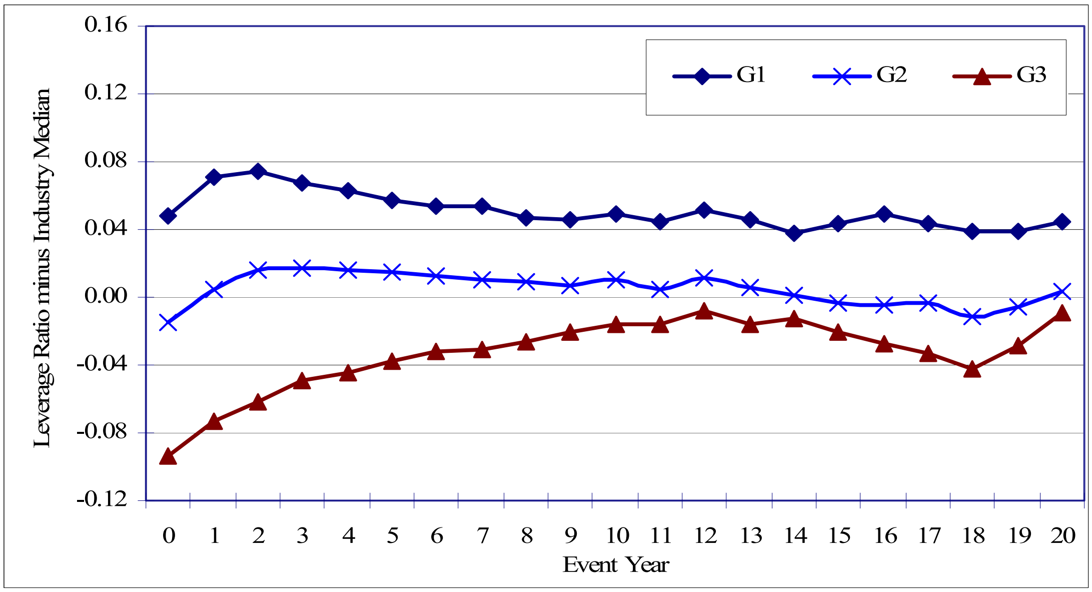


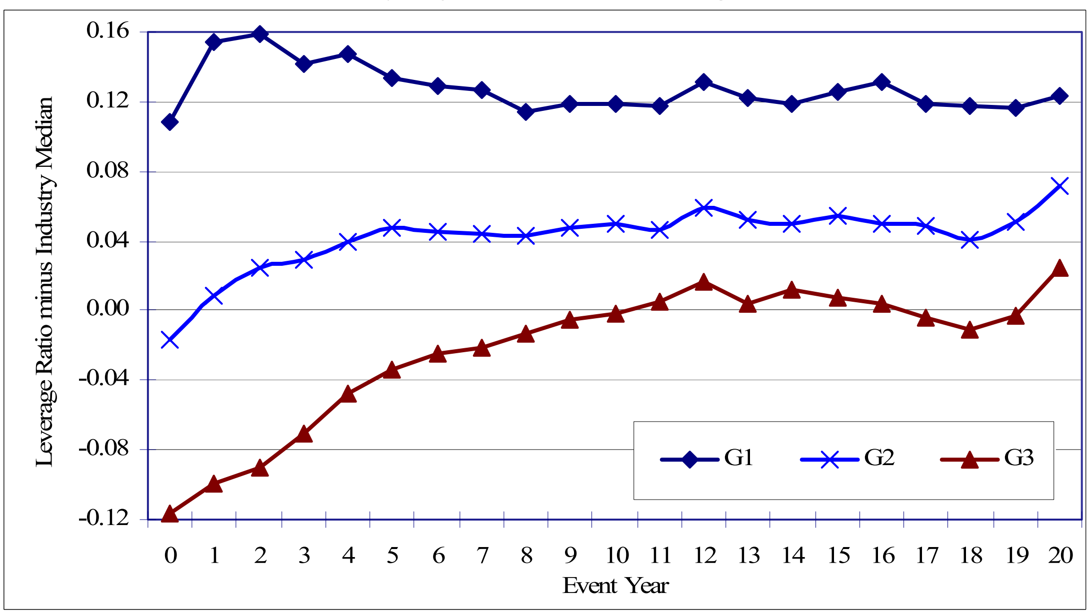
**Figure 3: Industry-adjusted Leverage Ratios with the Full Sample**

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.

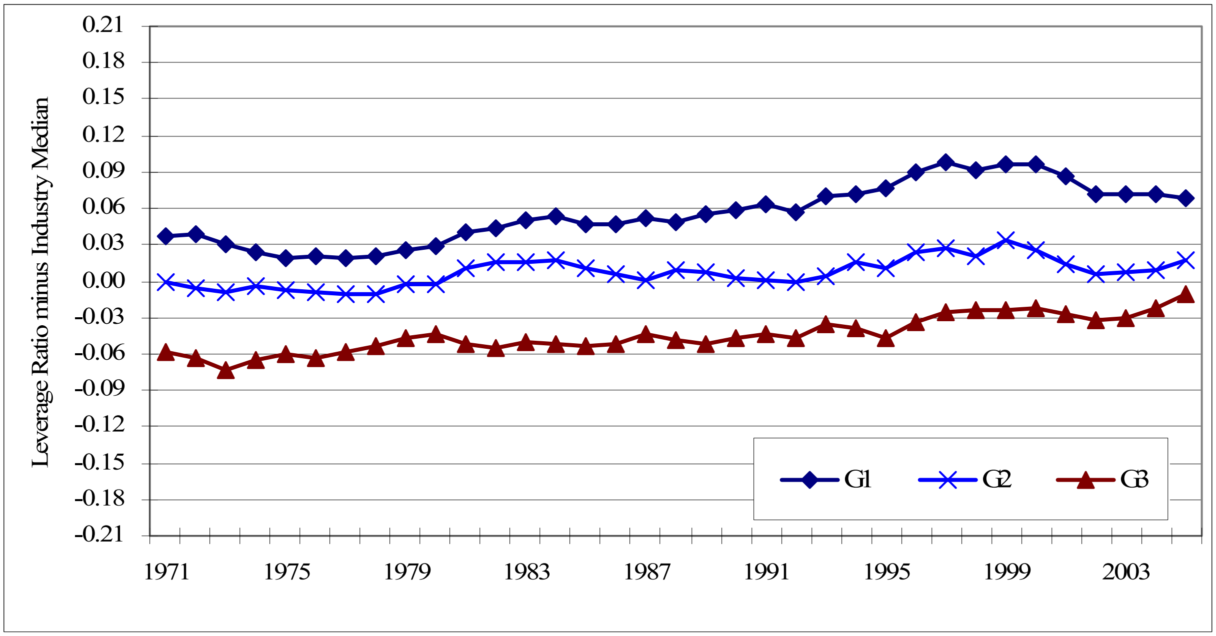
**Panel A: Industry-adjusted Book Leverage in Even Time**




**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**

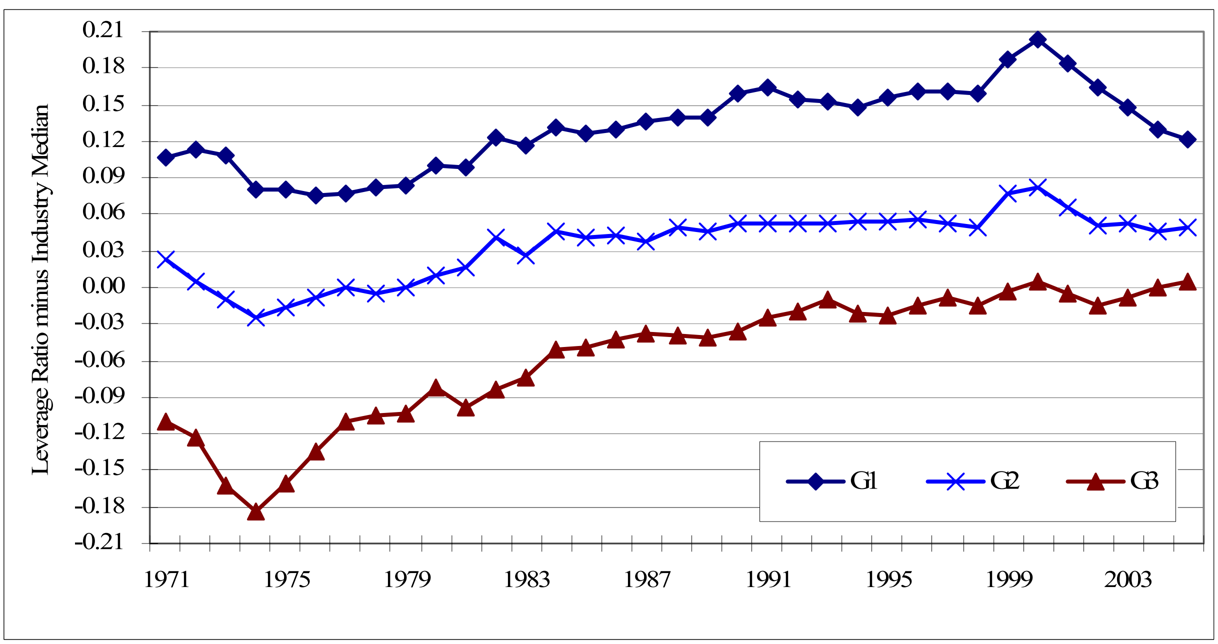
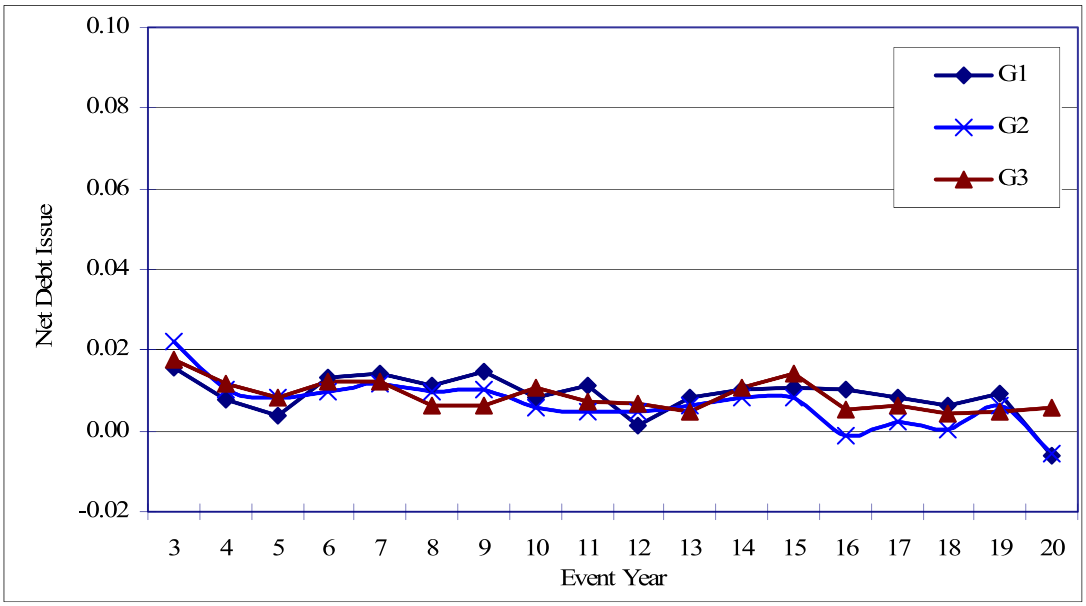


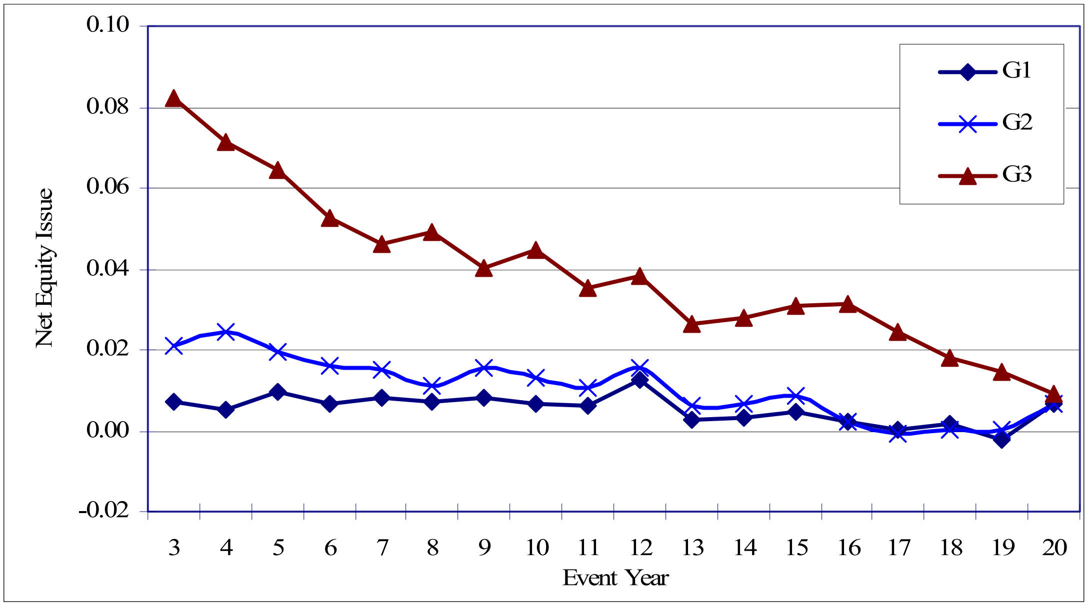
**Figure 4: Financing Mix by Initial Growth Type**

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)