Overvalued Equity and Financing Decisions

Ming Dong
Schulich School of Business, York University

David Hirshleifer
Merage School of Business, University of California

Siew Hong Teoh
Merage School of Business, University of California

We test whether and how equity overvaluation affects corporate financing decisions using an ex ante misvaluation measure that filters firm scale and growth prospects from market price. We find that equity issuance and total financing increase with equity overvaluation, but only among overvalued stocks, and that equity issuance is more sensitive than debt issuance to misvaluation. Consistent with managers catering to maintain overvaluation and with investment-scale economy effects, the sensitivity of equity issuance and total financing to misvaluation is stronger among firms with potential growth opportunities (low book-to-market, high R&D, or small size) and high share turnover. (*JEL* G14, G32, M41)

The inefficient markets approach to corporate finance predicts that a firm will raise more capital when it can obtain a higher price relative to fundamental value for the securities that it issues, and a relatively low price for the securities that it repurchases. By issuing more, the firm generates a profit for its existing shareholders, which, ceteris paribus, increases the long-term stock price. Furthermore, overoptimistic market valuations of investment opportunities can encourage firms to take actions to confirm such expectations (Polk and Sapienza 2009). To do so, firms may need to raise external capital. Thus, several inefficient markets theories imply that firms will raise more capital in response to overvaluation (Stein 1996; Baker, Stein, and Wurgler 2003; Gilchrist, Himmelberg, and Huberman 2005; see also the survey of Baker, Ruback, and Wurgler 2007).

Because equity is more sensitive than debt to firm value, misvaluation effects should be stronger for equity than for debt issuance. Greater net issuance of

---

We thank Ling Cen, Marie Dutordoir, Alois Geyer, Chuan Yang Hwang, Danling Jiang, Sonya Seongyeon Lim, Angie Low, Zheng Sun, Chris Veld, the editor (Matt Spiegel), and an anonymous referee; seminar participants at INSEAD, McMaster University, Nanyang Tech University, University of Glasgow, University of Iowa, University of Notre Dame, University of Roma, USC, University of Vienna, and Washington University for very helpful comments; Lin Sun and Feng Zhan for excellent research assistance; and the Social Sciences and Humanities Research Council of Canada for financial support. Send correspondence to Ming Dong, Schulich School of Business, York University, Toronto, Ontario M3J 1P3, Canada; telephone: (416) 736-2100 ext. 77945. E-mail: mdong@ssb.yorku.ca.

doi:10.1093/rfs/hhs112 Advance Access publication October 28, 2012

overvalued equity allows the firm to maximize the profit it extracts from new securityholders. This is desirable both for existing shareholders, and for a manager who wishes to increase long-term stock price. Thus, the inefficient markets approach suggests that net equity issuance will be more positively sensitive than net debt issuance to overvaluation.

Jensen (2004, 2005) argues that the effects of misvaluation on managerial behavior are especially strong among firms whose equity is substantially overvalued. As he discusses, the managers of firms with overvalued equity face especially intense pressure to prepare to undertake ambitious programs of investment that cater to optimistic market expectations about the firm's prospects. Furthermore, overvalued firms should be eager to raise inexpensive capital, including equity.

A further reason why variations in misvaluation should have a stronger effect on issuance and investment among overvalued firms derives from project-scale economies. If some investment projects have a minimum efficient scale, then overvalued firms will tend to find it more attractive than undervalued firms to raise capital for purposes of investment. If undervalued firms relatively often reject the relevant project, on average a marginal increase in valuation will have relatively little effect. In contrast, among firms whose high overvaluation encourages them to adopt the relevant project, an increase in overvaluation encourages a greater scale of issuance and investment.

We test here whether and why overvaluation causes firms to raise more net capital, especially equity. To evaluate hypotheses for why overvaluation affects financing decision, we test how the sensitivity of issuance to misvaluation varies across valuation, size, turnover, book-to-market, R&D, and insider trading subsamples.

Our approach to testing for misvaluation effects upon net issuance is to apply a single overall measure of misvaluation. By definition, mispricing affects market price; the challenge is to identify a good fundamental benchmark for comparison, so that the deviation between price and fundamental is a relatively pure measure of misvaluation. For this purpose we use a *forward-looking* benchmark measure of fundamental value. Doing so filters the contaminating effects of prospects for future investment opportunities from market price. This is crucial, as superior investment opportunities is a distinct cause of new financing. In this respect our misvaluation measure greatly reduces the confounding of growth prospects and misvaluation effects that is present in past studies that relate either past returns or current market valuations to new issues.

Specifically, we apply the residual income model of Ohlson (1995) to obtain a measure of fundamental value, sometimes called "intrinsic value" (V); we measure misvaluation by V/P, the deviation of market price from this value. V/P is a strong predictor of future abnormal returns (Frankel and Lee 1998; Lee, Myers, and Swaminathan 1999), and has been applied to study the determinants of repurchases (D'Mello and Shroff 2000), and takeover-related behaviors (Dong et al. 2006). Intrinsic value reflects not only current book value, but also a discounted value of analyst forecasts of future earnings. We discuss the justification for V/P as a misvaluation proxy in Section 3.

In contrast, possible misvaluation measures such as Tobin's q or equity market-to-book rely on a backward-looking value measure, book value, for their fundamental benchmarks. Such valuation ratios therefore reflect information about the ability of the firm to generate high returns on its book assets. Indeed, many studies have viewed Tobin's q or related variables as proxies for firm characteristics other than misvaluation, such as earnings growth prospects, investment opportunities, or managerial effectiveness. So, using q or market-to-book, it is not possible to distinguish misvaluation from other rational effects.[1] Furthermore, Tobin's q is a measure of total firm valuation; to measure the firm's access to cheap equity capital, we need a measure of *equity* misvaluation.

To test for misvaluation effects, we perform both quintile sorting by V/P or B/P ratios, and regressions that include further controls for other possible determinants of security issuance, including growth opportunities (proxied by q or equity book-to-market),[2] cash flow, return on assets, leverage, and firm age. We find that greater (more positive) mispricing is associated with greater net equity issuance and total (debt plus equity) issuance. This evidence is consistent with the hypothesis that overvaluation induces firms to raise cheap capital, especially equity.

To test whether overvalued equity intensifies misvaluation effects, as predicted by the aforementioned catering and misvaluation/scale economies arguments, we sort firms based upon V/P ratios, and examine the sensitivity of net issuance to valuation within different misvaluation quintiles. Consistent with the hypothesis, we find that it is only among overvalued stocks that equity misvaluation positively affects new issues.

If insider stock selling intensifies when insiders know their firm's equity is overvalued (Jenter 2005), we expect insider net selling to be associated with equity overvaluation. It follows from the arguments above that the sensitivity of equity issuance to V/P should be greater when insider net selling is high. The requirement of nonmissing insider trading data severely reduces sample size, but even in this subsample we find that the marginal effect of V/P on equity issuance is significantly greater among firms with high net insider selling.

To probe further into *why* misvaluation affects financing decisions, we test how other conditioning variables affect the sensitivity of net issuance to misvaluation. The hypotheses are developed in more depth in Section 2. In addition to sorting by the mispricing proxies themselves (V/P and insider

[1] To the extent that our filter is imperfect, variation in our purified measure is not fully purged of firm growth prospects. If this problem were severe, we would expect V/P to have a high absolute correlation with q. In our sample, the correlation with q is not especially strong (–0.27). Nevertheless, as a precaution, we additionally control for growth prospects as proxied by book-to-market in our tests.

[2] Tobin's q and equity book-to-market should be correlated with misvaluation as well as growth. Controlling for these variables therefore provides conservative tests for misvaluation effects.

selling, as just discussed), we sort firms into subsamples according to firm size, share turnover, B/P, and R&D.

For a manager to cater to investor overvaluation of growth opportunities, the firm plausibly must seem to have such opportunities. Furthermore, scale economies in new projects will only matter for firms that have potentially attractive new projects. So, both arguments imply a greater sensitivity of issuance to misvaluation among firms that derive greater potential value from growth opportunities. We test this by comparing the sensitivity of issuance to V/P across subsamples selected by R&D, firm size, and book-to-market. Consistent with these hypotheses, we find that firms that are in lower quintiles of size and book-to-market, and higher quintiles of R&D, have higher sensitivities of equity issuance and total financing to misvaluation.[3]

Even a manager who is focused on long-term value will issue more equity when it is overvalued, as doing so generates a profit for the firm (Stein 1996). However, to the extent that the manager values a higher stock price per se, there is a further incentive to issue if this enables investments that cater to optimistic investor perceptions. Because a short-term horizon makes equity financing of overvalued projects more attractive, the sensitivity of new issues to misvaluation should be higher when managers are more heavily focused on short-run stock prices. Following Polk and Sapienza (2009), who test for catering in investment choices, we use turnover as a proxy for short-term focus on the part of shareholders. We find that the sensitivity of new issues to misvaluation is higher among high-turnover firms. This is consistent with the hypothesis that managerial catering to investor overvaluation is one of the reasons for the misvaluation/issuance relationship.

Owing to opposing forces of misvaluation on debt issuance, on theoretical grounds debt issuance could either increase or decrease with misvaluation. On the one hand, overvaluation encourages the issuance of risky debt, owing to the benefit of selling an overvalued security, and for the sake of undertaking projects that cater to investor optimism. On the other hand, for a given amount of financing, greater overvaluation causes substitution from debt to equity issuance. We find an overall insignificant relation between debt issuance and overvaluation, though debt issuance decreases with overvaluation before 1990.

Several kinds of evidence from previous research are potentially consistent with the predictions of the inefficient markets approach to financing decisions. Evidence that new issue firms have high market-to-book ratios and earn low post-event returns has sometimes been interpreted as a consequence of

3 A subtle caveat, discussed in Subsection 5.2, is that there is greater scope for the market to misvalue, either positively or negatively, growth opportunities than tangible assets in place. But within subsamples that are more prone to misvaluation, we expect V/P to be a better proxy for misvaluation, strengthening the sensitivity of issuance to V/P. This possibility is most likely to be important for the firm size categorization, owing to lower transparency and ease of arbitrage in small firms. To the extent that this caveat applies, evidence of high issuance sensitivity among small firms provides further corroboration of the basic hypothesis that misvaluation affects issuance, rather than further evidence about why this relationship exists.

market timing by firms to exploit mispricing. However, valuation ratios such as market-to-book are heavily influenced by firm risk and growth rates, not just misvaluation, and hence do not isolate the effects of market inefficiency. Furthermore, extensive controversy remains about whether apparent long-run post-issue abnormal return performance is a consequence of mispricing or of rational risk premia.

More broadly, existing evidence suggestive of misvaluation effects on financing is indirect, subject to severe measurement error, and/or subject to multiple interpretations. In Section 1, we discuss more fully why existing evidence does not conclusively resolve whether market inefficiency affects financing decisions, and why our approach provides clearer evidence that this is the case. In addition, our tests provide new insights about the mechanism by which market inefficiency affects financing decisions.

1. Existing Empirical Approaches to Misvaluation and Financing

We explain here why evidence from existing studies is not conclusive about whether inefficient misvaluation affects new financing, and how our approach provides distinct and in some ways more direct insight about how and why overvalued equity affects financing decisions.

The fact that new issues occur after stock price runups (Eckbo and Masulis 1995) is potentially consistent with an effect of misvaluation on financing behavior. However, Korajczyk, Lucas, and McDonald (1991) and Bayless and Chaplinsky (1996) show that a rational setting with asymmetric information also generates such a pattern, and provide evidence consistent with information asymmetry effects. Furthermore, under the rational q theory of investment (Brainard and Tobin 1968; Tobin 1969), a stock price runup or a high stock price relative to book value indicates an improvement in growth opportunities, which encourages the firm to invest more, and perhaps to raise more capital as financing.

The second type of evidence is the new issues puzzle—the return underperformance after new securities issues, with more severe underperformance after equity issuances than after debt issuances (equity, Ritter 1991; Loughran and Ritter 1995; debt, Spiess and Affleck-Graves 1995); and its counterpart, overperformance after repurchases (Lakonishok and Vermaelen 1990; Ikenberry, Lakonishok, and Vermaelen 1995; Peyer and Vermaelen 2009). This evidence has stimulated debate about the methodology of long-run abnormal return tests and the choice of risk factor benchmarks (e.g., Fama 1998; Loughran and Ritter 2000; Lyandres, Sun, and Zhang 2008). In contrast, evidence that the firm-level debt versus equity composition of net financing does not predict future returns has been interpreted as opposing the hypothesis that issuance choices are designed to exploit mispricing (Butler et al. 2011).

A reason why the benchmark and methodological issues are so salient is that long-run returns contain large amounts of noise associated with ex post fundamental news that arrives about stocks over time. Our ex ante measures of misvaluation, though imperfect, avoid this very large source of noise.

Furthermore, for the purposes of testing the causal effect of misvaluation on new issues, conditioning on new issues themselves has the drawback that firms take actions at the time of new issue to *induce* misvaluation. For example, firms engage in upward earnings management at the time of new issues, and greater earnings management at the time of issue is associated with more negative postissue returns (e.g., Teoh, Welch, and Wong 1998a, 1998b; Teoh, Wong, and Rao 1998). By examining preexisting misvaluation prior to the immediate new issue period, our tests focus more sharply on how misvaluation affects financing decisions ("market timing"), rather than the reverse causality from planned financing choice to the firm's decision to incite overvaluation.

The third kind of evidence is that proxies for overvaluation are associated with greater capital expenditures and R&D (Gilchrist, Himmelberg, and Huberman 2005; Polk and Sapienza 2009; see also Titman, Wei, and Xie 2004), and that the effects of stock market valuations (efficient or otherwise) on investment are greater for more financially constrained ("equity-dependent") firms (Baker, Stein, and Wurgler 2003). However, this evidence is only indirectly related to the hypothesis that greater overvaluation increases equity issuance.

The fourth kind of evidence is that firms with higher measured overvaluation tend to use equity rather than debt as a means of payment in takeovers (e.g., Dong et al. 2006). Although suggestive, this does not show whether equity issuance is related to misvaluation in a general sample of firms. In fact, our findings here of misvaluation effects on issuance are strongest among small firms, even though small firms are takeover bidders much less frequently than large firms.

The fifth kind of evidence is that the aggregate equity share in new issues is a negative predictor of subsequent market returns (Baker and Wurgler 2000; Henderson, Jegadeesh, and Weisbach 2006). This is consistent with the idea that when the stock market as a whole is overvalued, the constituent overvalued firms substitute from debt to equity issuance. However, this evidence does not speak to whether greater misvaluation is a predictor of greater equity issuance in the cross-section of firms, and whether misvaluation is associated with greater total (debt plus equity) issuance.

The sixth kind of evidence is that, in responses to survey questions, CFOs report that stock market valuations are an important consideration in their firms' decision to issue common stock (Graham and Harvey 2001). However, this is evidence about managerial perceptions, not actual misvaluation and issuance. If managers are overoptimistic about their firms, they may wrongly perceive their firm to be undervalued. Furthermore, practitioners seldom distinguish carefully between the "misvaluation" that arises under efficient markets under asymmetric information (Myers and Majluf 1984), and misvaluation that arises from market inefficiency in processing public information. In either scenario, market valuations affect financing decisions, but our purpose here is specifically to test how *market inefficiency* affects financing decisions.

Finally, a seventh type of evidence is based upon the association of valuation ratios with equity issuance or repurchase. Previous studies find that the market-to-book ratio is positively associated with the probability that a firm conducts a seasoned equity offering (Baker and Wurgler 2002; DeAngelo, DeAngelo, and Stulz 2010; Dong et al. 2012). However, market-to-book reflects growth opportunities (among other things) as well as misvaluation, so this does not establish whether market inefficiency affects equity issuance.[4]

2. Hypotheses

The inefficient markets approach to corporate finance predicts that firms will design financing strategies to exploit investor and market errors (e.g., Stein 1996; Ljungqvist, Nanda, and Singh 2006; the survey of Baker, Ruback, and Wurgler 2007). Theoretical arguments imply that firms will issue more when their equity is more overvalued to exploit incoming investors, and perhaps also to maintain overly optimistic investor perceptions about investment opportunities (Polk and Sapienza 2009; Jensen 2005).[5] This leads to the first basic hypothesis:

Hypothesis 1. Equity issuance and total issuance increase with the degree of overvaluation.

As the price of equity is more sensitive than the price of debt to firm misvaluation, we predict the effect of misvaluation to be stronger for equity than for debt.

Hypothesis 2. The sensitivity of equity issuance to misvaluation is greater (more positive) than the sensitivity of debt issuance to misvaluation.

According to Jensen (2004, 2005), pressures to raise capital and to overinvest are especially strong among overvalued firms. This conclusion is reinforced by an argument based upon scale economies in investment. When a firm is undervalued, a project with minimum efficient scale may not be funded at all,

4 DeAngelo, DeAngelo, and Stulz (2010) and Dong et al. (2012) also use ex post market-adjusted returns as an alternative proxy for misvaluation; such tests were discussed earlier. D'Mello and Shroff (2000) find that firms that are undervalued based upon a version of the V/P measure tend to engage in repurchase tender offers. A crucial difference, however, is that their measure uses ex post information, ex post realized earnings. So, their paper is more akin to studies that document ex post abnormal returns after financing decisions than to our study, which is based upon an ex ante measure of misvaluation.

5 A disadvantage of equity issuance for a manager who cares about the short-run stock price is the more negative market reaction to new equity issues than to new debt issues. However, this disadvantage is present regardless of whether or not the firm is overvalued.

so that a decrease in undervaluation has little effect on issuance and investment. In contrast, for an overvalued firm that is funding such a project, greater overvaluation can encourage an increase in project scale, thereby encouraging issuance. Thus, to evaluate these theories about why overvaluation affects issuance, we test whether the sensitivity of equity issuance to overvaluation is higher among overvalued firms.

Hypothesis 3. The sensitivities of equity issuance and total issuance to misvaluation are stronger among overvalued firms than among undervalued firms.

We further hypothesize that the effect of misvaluation on issuance will be stronger among firms with high intangibles or growth opportunities. For agency reasons, overvalued growth firms may be especially prone to raising equity capital to finance investments that investors are overoptimistic about (Jensen 2005). Furthermore, project-scale economies should be more relevant to firms with strong potential growth opportunities (firms with low book-to-market, high R&D, or small size). We therefore have:

Hypothesis 4. The sensitivities of total issuance and equity issuance to misvaluation are stronger among growth firms (with low book-to-market ratios).

Hypothesis 5. The sensitivities of total issuance and equity issuance to misvaluation are stronger among firms with a higher intensity of intangible assets.

Hypothesis 6. The sensitivity of equity issuance and total issuance to misvaluation is greater among small than among large firms.

To test Hypotheses 4–6 about the effects of intangibility and growth on issuance, we examine how the sensitivity of issuance to misvaluation varies between sets of firms that have different prior book-to-market ratios, R&D intensity, or size as measured by book asset value. (Polk and Sapienza 2009 also use R&D as a proxy for intangibility, and use R&D as a conditioning variable in testing the relation of misvaluation to capital expenditures.)

Catering to inefficient overpricing should be stronger when a firm is pressured to have a more short-term focus (Jensen 2005; Polk and Sapienza 2009). Therefore, we predict that the sensitivity of equity issuance and total issuance to misvaluation increases with turnover, a proxy for short-term investor pressure. Polk and Sapienza (2009) find that the sensitivity of capital expenditures to discretionary accruals (a proxy for misvaluation) is positively related to turnover. This suggests, but does not directly establish, that short-term pressure increases the sensitivity of issuance to misvaluation. We therefore have our final hypothesis.

Hypothesis 7. The sensitivity of equity issuance and total issuance to misvaluation is greater among firms in which shareholders have short time horizons.

Theory is inconclusive about how overvaluation affects debt issuance. On the one hand, overvaluation encourages the issuance of risky debt as an overvalued security, to expropriate new buyers, and for the sake of undertaking investment that caters to investor optimism. On the other hand, because the equity price is more sensitive than the price of debt to firm overvaluation, greater overvaluation should cause substitution away from debt toward equity issuance.[6] So, predictions for debt corresponding to the later hypotheses about the effects of conditioning variables are inconclusive as well.

3. Data and Methodology

Our sample includes U.S. firms listed on NYSE, AMEX, or NASDAQ that are covered by CRSP and Compustat and are subject to the following restrictions. We require firms to have the earnings forecast data from I/B/E/S, in addition to possessing the necessary accounting items, for the calculation of the residual income model value to price (V/P) ratio. Consequently, our sample starts from 1976, when I/B/E/S reporting begins. We further require each valid firm-year observation to have nonmissing equity and debt issuance data from Compustat. Finally, we exclude financial firms (firms with one-digit SIC of 6) and utility firms (two-digit SIC of 49). Our final sample has a total of 58,178 firm-year observations between 1976 and 2009.

We examine the relation between firm security issuance levels (equity, debt, and total issuance) and the (mis)valuation level of firm's stock (measured by B/P and V/P, described below). We measure firms' issuances during each fiscal year, and we measure firms' valuation levels at the beginning of each fiscal year, using the previous month's valuation ratio. For example, for a firm with a December fiscal year-end, we relate the valuation measure calculated at the end of December 2003 to the issuances during the fiscal year ending in December 2004.

To align firms with different fiscal year-ends in calendar time, we use June as the cutoff and allow for a four-month gap from the fiscal year-end for the

[6] The substitution effect need not always dominate. For example, if a firm is underleveraged owing to financing frictions, an increase in overvaluation increases the relative benefit of issuing equity, but the absolute increase in the benefit to issuing risky debt may still trigger debt rather than equity issuance.

accounting data to be publicly available. So, for calendar year t, we include firms with fiscal year-ends that occur from March of year $t-1$ through February of year t. In portfolio sorting tests, we sort firms into valuation quintiles each year, calculate security issuances across quintiles, and aggregate over time. In the regression tests, we include several control variables described below.

3.1 Issuance and other control variables

We measure firms' net equity and debt issuances using accounting data from the Compustat annual files. Following Baker and Wurgler (2002), equity issuance (*EI*) is measured as the change in book equity minus the change in retained earnings [Δ book equity (Compustat item CEQ) + Δ deferred taxes (item TXDB) − Δ retained earnings (item RE)] scaled by lagged assets, and debt issuance (*DI*) is the change in assets minus the change in book equity [Δ total assets (item AT) − Δ book equity (item CEQ) − Δ deferred taxes (item TXDB)] scaled by lagged assets.[7] The payment of a dividend out of retained earnings does not affect these measures, because the reduction in book equity is offset by the reduction in retained earnings. Total equity and debt issuance *TI* is defined as $EI+DI$. All variables, include the ones described below, are winsorized at the 1st and 99th percentiles to mitigate the influence of outliers. We require that the issuance variables *EI* and *DI* and valuation measures B/P and V/P to be nonmissing, but do not delete a firm-year observation simply because a certain control variable is missing. Table 1, Panel A, reports summary statistics of the issuance variables.

In the multivariate tests, we control for other issuance determinants, including cash flow [item IB + item DP + RD] scaled by lagged assets [missing RD (item XRD) is set to zero], and Tobin's q, defined as the market value of equity plus assets minus the book value of equity [item CEQ + item TXDB] all over assets (see, e.g., Kaplan and Zingales 1997). In addition, we include leverage (LEV) defined as (item DLTT + item DLC)/(item DLTT + item DLC + item SEQ) and (to control for profitability and perhaps firm risk) return on assets (ROA), defined as earnings before depreciation (item OIBDP) plus R&D expenses (missing RD is set to zero) scaled by total assets. Because mature firms are less likely to issue new equity (DeAngelo, DeAngelo, and Stulz 2010), we control for firm age (AGE), defined as the number of years between the beginning of fiscal year and the delisting date, truncated at 50 (results are not sensitive to this truncation). Finally, to further control for firm risk, we include the loadings of the Fama-French three factors, estimated using monthly returns over the previous five years or at least two years due to missing observations. Except for cash flow, which is measured over the fiscal year, all control variables are measured at the start of the fiscal year. Table 1, Panel B, presents summary statistics for these control variables.

7 Our primary results do not change if equity issuance is not net of repurchase and is restricted to be positive, where repurchase is the amount of funds used to repurchase common and preferred equity (item PRSTKC).

Table 1
Summary statistics of security issuances, valuation, and control variables

	N	Mean	SD	Median	Min.	Max.
Panel A: Issuance variables						
EI (%)	58,178	7.41	30.15	0.99	−14.23	128.35
DI (%)	58,178	7.80	22.98	2.96	−27.01	111.52
TI (%)	58,178	15.20	41.80	4.90	−23.95	195.75
Panel B: Control Variables for issuance regressions						
q	58,178	2.43	2.84	1.56	0.58	16.93
CF (%)	58,041	12.64	14.93	12.54	−35.03	52.67
LEV	58,178	0.27	0.23	0.25	0.00	0.84
ROA (%)	58,038	16.00	12.90	15.39	−24.26	50.84
AGE	58,178	14.70	13.58	10.17	0.42	50.00
Panel C: Valuation variables						
B/P	58,178	0.62	0.61	0.45	0.03	3.34
V/P (CAPM)	58,178	0.65	0.60	0.57	−1.05	3.00
V/P (FF 3-factor)	52,005	0.60	0.60	0.47	−1.00	2.91
Panel D: Conditioning variables affecting the issuance-valuation sensitivity						
Total assets ($M)	58,178	3,027.3	16,198.4	412.1	16.4	44,140.3
Turnover (%)	56,885	12.58	14.15	7.38	0.51	69.15
RD (%)	36,474	8.67	13.12	4.13	0.00	65.80

The sample includes U.S. nonfinancial, nonutility firms listed on NYSE, AMEX, and NASDAQ with CRSP/Compustat and I/B/E/S coverage during 1976–2009. *EI* is equity issuance (Δbook equity + Δdeferred taxes – Δretained earnings), and *DI* is debt issuance (Δtotal assets – Δbook equity – Δdeferred taxes) during the fiscal year, scaled by lagged assets. Total issuance (*TI*) is sum of *EI* and *DI*. q is Tobin's q ratio measured as market value of equity plus total assets minus book value of equity over total assets. *CF* is cash flow (income before extraordinary items + depreciation + *RD*) over the fiscal year scaled by lagged assets (missing *RD* is set to zero in the *CF* calculation). Leverage (*LEV*) is defined as (long-term debt + current liabilities)/(long-term debt + current liabilities + shareholders' equity). *ROA* is operating income before depreciation and R&D expenses scaled by total assets for the prior fiscal year. *AGE* is the number of years between the beginning of the fiscal year and the listing date of the firm in CRSP, truncated at 50. B/P is the book equity to price ratio. V/P is the residual-income-value to price ratio. We use CAPM to estimate the discount rate for the intrinsic value (V) for the main results, but our results are robust to using the Fama-French (FF) 3-factor model for the discount rate. *Turnover* is monthly trading volume scaled by the number of shares outstanding. *RD* is R&D expenditures scaled by lagged assets. Except for the issuance variables in Panel A, and cash flow (*CF*) in Panel B, which are measured over each fiscal year, all other control variables, valuation variables, and valuation sensitivity variables are measured in the month preceding the beginning of each fiscal year. We choose the most recent fiscal year accounting data available at the end of June each year so that each sample firm appears once for a particular year. Total assets figures are in 2010 dollars. All variables are winsorized at the 1st and 99th percentiles.

3.2 Motivation for and calculation of valuation ratios

Our use of V/P as a misvaluation proxy V/P does not require that residual income value V be a better proxy than market price for rational fundamental value. V can be noisy and biased (e.g., analyst forecast biases); the key is that it does not fully share the misvaluation contained in market price so that the ratio tends to filter fundamentals from the price.

Past literature finds that B/P is a strong predictor of the cross-section of one-month returns. Behavioral models imply that B/P is correlated with misvaluation, and therefore is a predictor of abnormal returns (e.g., Barberis and Huang 2001; Daniel, Hirshleifer, and Subrahmanyam 2001). The use of book value in the numerator of B/P can help filter out irrelevant scale differences to provide a more accurate proxy for mispricing (Daniel, Hirshleifer, and Subrahmanyam 2001).

However, B/P is also potentially correlated with firm characteristics other than misvaluation, such as risk, growth opportunities, managerial discipline (often proxied by q measures that are highly correlated with B/P), or the degree of information asymmetry. Furthermore, a source of noise in B/P as a misvaluation proxy is that book value is influenced by firm and industry differences in accounting methods.

By using a better proxy for fundamental value in the numerator, V/P goes further than B/P in filtering out sources of variation other than misvaluation. For example, managerial skill and high-quality corporate governance should reduce B/P by raising the denominator relative to the numerator, whereas to a first approximation these should not affect V/P.

We calculate B/P as a ratio of equity rather than total asset values, as it is equity rather than total misvaluation that should matter for corporate investment decisions; a similar point applies for V/P. This would be the case, for example, for a firm that issues overvalued stock rather than bonds to finance an investment project. Also, as in Dong et al. (2006), our focus is on market inefficiency, so we measure market misvaluation relative to publicly available information. We therefore calculate our misvaluation proxies solely using ex ante information (current price, book value, and analyst forecasts).

Several findings suggest that V/P is a proxy for mispricing. Lee, Myers, and Swaminathan (1999) find that aggregate residual income values predict one-month-ahead returns on the Dow 30 stocks better than does aggregate B/P. Frankel and Lee (1998) find that V is a better predictor than book value of the cross-section of contemporaneous stock prices, and that V/P is a predictor of the one-year-ahead cross-section of returns. Ali, Hwang, and Trombley (2003) report that the abnormal returns associated with high V/P are partially concentrated around subsequent earnings announcements, and that V/P predicts future returns significantly even after controlling for characteristics such as beta, size, book-to-market, and residual risk. In our sample, in Fama-MacBeth regressions of returns on V/P, B/P, size, and one-year past return, V/P is a stronger predictor than B/P of future returns.

Residual income value has at least two important advantages over book value as a fundamental measure. First, it is invariant to accounting treatments (to the extent that the "clean surplus" accounting identity obtains; see Ohlson 1995). Second, it supplements the backward-looking information contained in book value with the forward-looking information contained in analyst earnings forecasts.

In our sample, the correlation of B/P with V/P is fairly low, 0.16, so V/P potentially offers useful independent information about misvaluation. This is to be expected, as much of the variation in book/market arises from other sources such as differences in growth prospects or in managerial discipline.

Turning to procedure, to B/P, each month for each stock, book equity (item CEQ) is measured at the end of the prior fiscal year.[8] This is divided by market value of equity measured at the end of the month.

Our estimation procedure for V/P is similar to that of Lee, Myers, and Swaminathan (1999). For each stock in month t, we estimate the residual income model (RIM) price, denoted by $V(t)$. Under "clean surplus" accounting, the change in book value of equity equals earnings minus dividends, and the intrinsic value of firm stock is equal to book value plus the discounted value of an infinite sum of expected residual incomes (Ohlson 1995),

$$V(t)=B(t)+\sum_{i=1}^{\infty}\frac{E_t[\{ROE(t+i)-r_e(t)\}\,B(t+i-1)]}{[1+r_e(t)]^i}, \tag{1}$$

where E_t is the expectations operator, $B(t)$ is the book value of equity at time t (negative $B(t)$ observations are deleted), $ROE(t+i)$ is the return on equity for period $t+i$, and $r_e(t)$ is the firm's annualized cost of equity capital.

For estimation, the above infinite sum is replaced by a finite series of $T-1$ periods, plus an estimate of the terminal value beyond period T. This terminal value is estimated by viewing the period T residual income as a perpetuity. Lee, Myers, and Swaminathan (1999) report that the quality of their $V(t)$ estimates was not sensitive to the choice of the forecast horizon beyond three years. Of course, the residual income valuation $V(t)$ cannot perfectly capture growth. However, because V reflects forward-looking earnings forecasts, a large portion of the growth effects contained in B/P should be purged from V/P.

We use a three-period forecast horizon:

$$\begin{aligned}V(t) \;=\; & B(t)+\frac{\left[f^{ROE}(t+1)-r_e(t)\right]B(t)}{1+r_e(t)}+\frac{\left[f^{ROE}(t+2)-r_e(t)\right]B(t+1)}{[1+r_e(t)]^2}\\ & +\frac{\left[f^{ROE}(t+3)-r_e(t)\right]B(t+2)}{[1+r_e(t)]^2\,r_e(t)},\end{aligned} \tag{2}$$

where $f^{ROE}(t+i)$ is the forecasted return on equity for period $t+i$, the length of a period is one year, and the last term discounts the period $t+3$ residual income as a perpetuity.[9]

Forecasted ROE's are computed as

$$f^{ROE}(t+i)=\frac{f^{EPS}(t+i)}{\bar{B}(t+i-1)}, \tag{3}$$

[8] Using the definition as in Baker and Wurgler (2002) for book equity value does not change the results materially, but reduces the sample size.

[9] Following Lee, Myers, and Swaminathan (1999) and D'Mello and Shroff (2000), in calculating the terminal value component of V, we assume that expected residual earnings remain constant after year 3 so that the discount rate for the perpetuity is the firm's cost of equity capital.

where

$$\bar{B}(t+i-1) \equiv \frac{B(t+i-1)+B(t+i-2)}{2}, \tag{4}$$

and where $f^{EPS}(t+i)$ is the forecasted EPS for period $t+i$.[10] We require that each of these f^{ROE}s be less than one.

Future book values of equity are computed as $B(t+i)=B(t+i-1)+(1-k)f^{EPS}(t+i)$, where k is the dividend payout ratio determined by $k=D(t)/EPS(t)$, and $D(t)$ and $EPS(t)$ are, respectively, the dividend and EPS for period t. Following Lee, Myers, and Swaminathan (1999), if $k<0$ (owing to negative EPS), we divide dividends by (0.06 $\times$ total assets) to derive an estimate of the payout ratio, that is, we assume that earnings are on average 6% of total assets. Observations in which the computed k is greater than 1 are deleted.

We consider the CAPM and the Fama-French three-factor model as alternative models for the annualized cost of equity, $r_e(t)$. There is no clear consensus in the literature about whether the three-factor model primarily captures risk or mispricing (Daniel and Titman 1997), so we report findings based upon the CAPM.

Specifically, the annualized cost of equity, $r_e(t)$, is determined for each firm using the CAPM, where the time-t beta is estimated using the trailing five years (or at least two years if there is not enough data) of monthly return data. The market risk premium assumed in the CAPM is the average annual premium over the risk-free rate for the CRSP value-weighted index over the preceding 30 years. Any estimate of the CAPM cost of capital that is outside the range of 5%–25% (about 12% of our estimates) is winsorized to the relevant boundary of this range. Previous studies have reported that the predictive ability of V/P was robust to the cost of capital model used (Lee, Myers, and Swaminathan 1999) and to whether the discount rate was allowed to vary across firms (D'Mello and Shroff 2000). The results using expected returns based on the Fama-French three-factor model, and (following D'Mello and Shroff 2000) by using the alternative constant discount rate of 12.5% are similar to those reported here.

Residual income model valuations have been found to be too low on average, so the benchmark for fair valuation is not equal to one for V/P. The downward bias is even stronger for B/P, as book value does not reflect current growth expectations. Our tests focus on relative comparisons of valuation proxies across firms and time, with higher (lower) values of V/P (or B/P) indicating relative undervaluation (overvaluation).

Panel C of Table 1 reports summary statistics for the two valuation ratios. We retain negative V values caused by low earnings forecasts, as such cases

[10] If the EPS forecast for any horizon is not available, it is substituted by the EPS forecast for the previous horizon and compounded at the long-term growth rate (as provided by I/B/E/S). If the long-term growth rate is not available from I/B/E/S, the EPS forecast for the first preceding available horizon is used as a surrogate for $f^{EPS}(t+i)$.

should also be informative about overvaluation. We use V/P as a measure of undervaluation (rather than P/V as a measure of overvaluation), because negative values of P/V should indicate over- rather than undervaluation. For consistency we similarly use B/P rather than P/B. Removing negative V/P observations (about 6% of the sample) tends to reduce statistical significance without materially altering the main results.

In addition to examining the relation between security issuance and stock market misvaluation in the full sample, we perform tests conditioned upon potential determinants of the sensitivity of equity issues to misvaluation, as motivated by the hypotheses in Section 2. In addition to conditioning on V/P and B/P themselves, we condition on the firm's R&D intensity, measured by the firm's previous-fiscal-year R&D expenditures scaled by lagged assets; firm size (total assets); share turnover (monthly trading volume as a fraction of number of shares outstanding); and net insider selling, which is available to a small subset of the sample.

Panel D of Table 1 reports summary statistics for these conditioning variables. Total assets is not highly correlated with either turnover or R&D (lower than 0.07 correlation), but turnover and R&D have a correlation of 0.22.

3.3 Time patterns in issuances and valuations

Table 2 reports yearly descriptive statistics for the sample during 1976–2009. Prior to 1990, debt issuance exceeds equity issuance in every year but 1983. Equity issuances overtake debt issuances in the 1990s, and during most of the years 2000–2009, equity issuances exceed debt issuances.

Before 1986, total issuance (combined net issuance of equity and debt, *TI*) is less than internally generated funds (CF). Afterward, external financing tends to be a larger portion of firms' total financing. Each year after 1992, except for 2009, external financing exceeds internal cash flows, with a peak in the late 1990s and early 2000s.

Residual earnings adds value to stocks on average, as reflected in the V/P mean (median) of 0.65 (0.57) exceeding the B/P mean (median) of 0.62 (0.45). There is a strong time trend in valuation; mean and median V/P are lower than mean and median B/P in each year before 1985. However, after 1991, both the mean and median V/P are higher than B/P each year, except for 2001–2002, on the heels of the collapse of the NASDAQ boom, and the last three years of the sample period, which are affected by the global financial crisis.

It is intriguing that stock valuation was low in the early part of the sample period, when equity issuance is low compared to debt issuance. In the latter half of the sample (excepting the years following the collapse of the technology and real estate booms), valuations are high and equity issuance generally exceeds debt issuance. Although not the focus of this paper, these patterns are potentially consistent with aggregate market timing, wherein firms favor equity issuance when they are overvalued.

Table 2
Security issuances and valuations by year

Year	*N*	*EI* (%)	*DI* (%)	*TI* (%)	*CF* (%)	*ROA* (%)	B/P	B/P(Med.)	V/P	V/P(Med.)
1976	413	1.49	5.61	7.10	15.68	19.45	1.01	0.83	0.77	0.67
1977	590	1.35	7.18	8.53	16.38	18.76	0.79	0.67	0.73	0.66
1978	666	1.99	10.57	12.56	17.04	19.33	0.84	0.73	0.72	0.68
1979	973	1.90	11.08	12.98	16.39	18.18	0.95	0.80	0.63	0.60
1980	1,049	3.13	6.69	9.82	15.20	18.33	0.90	0.75	0.53	0.50
1981	1,044	3.44	6.40	9.84	14.89	18.81	0.87	0.72	0.46	0.44
1982	1,073	1.82	3.77	5.59	12.97	18.09	0.88	0.73	0.57	0.52
1983	1,151	6.16	4.42	10.57	13.66	18.81	0.86	0.69	0.58	0.56
1984	1,280	2.45	8.29	10.74	14.60	16.86	0.58	0.46	0.39	0.36
1985	1,449	3.66	7.50	11.16	13.20	16.22	0.70	0.58	0.65	0.61
1986	1,436	5.05	9.19	14.24	12.50	17.21	0.66	0.54	0.58	0.56
1987	1,469	3.10	9.16	12.26	13.29	15.91	0.61	0.50	0.60	0.57
1988	1,522	2.18	10.26	12.44	14.44	15.54	0.65	0.52	0.78	0.70
1989	1,529	3.21	8.63	11.84	14.75	16.15	0.63	0.52	0.70	0.67
1990	1,598	2.96	6.46	9.42	13.66	17.09	0.62	0.50	0.61	0.57
1991	1,566	6.43	3.70	10.13	13.21	17.82	0.82	0.59	0.77	0.70
1992	1,665	6.12	5.52	11.64	13.94	18.22	0.64	0.46	0.75	0.70
1993	1,812	7.06	7.35	14.41	13.66	17.28	0.55	0.41	0.79	0.73
1994	1,974	6.39	9.73	16.12	14.60	16.60	0.49	0.37	0.79	0.74
1995	2,190	9.85	10.92	20.77	14.62	16.00	0.52	0.41	0.77	0.74
1996	2,381	13.28	10.24	23.52	14.35	16.60	0.50	0.36	0.70	0.61
1997	2,560	9.70	13.16	22.86	13.54	17.78	0.44	0.33	0.59	0.49
1998	2,663	9.24	14.06	23.30	12.56	16.10	0.44	0.33	0.56	0.49
1999	2,502	12.34	11.04	23.38	13.02	16.30	0.56	0.40	0.65	0.54
2000	2,313	21.17	11.12	32.29	12.83	16.46	0.59	0.39	0.62	0.49
2001	2,271	10.13	3.21	13.34	7.35	17.35	0.71	0.40	0.57	0.43
2002	2,187	6.55	2.75	9.30	7.58	13.49	0.68	0.44	0.64	0.54
2003	2,074	8.53	4.55	13.08	10.75	12.12	0.81	0.57	0.94	0.92
2004	2,091	9.09	7.00	16.09	12.88	12.48	0.50	0.38	0.75	0.65
2005	2,147	7.40	7.07	14.47	12.70	13.32	0.41	0.33	0.56	0.43
2006	2,147	9.67	8.08	17.75	12.70	13.99	0.44	0.35	0.45	0.37
2007	2,119	7.78	9.18	16.96	11.54	14.45	0.43	0.34	0.38	0.33
2008	2,161	3.71	4.70	8.40	8.02	13.90	0.50	0.37	0.45	0.38
2009	2,113	6.56	−0.31	6.25	7.65	13.76	1.05	0.68	0.99	0.97
All	58,178	7.41	7.80	15.20	12.64	16.00	0.62	0.45	0.65	0.57

This table reports the mean values of new issues variables during each fiscal year: equity issuance (*EI*), debt issuance (*DI*), total issuance (*TI*) (sum of the two), cash flow (*CF*), all scaled by lagged total assets for each fiscal year. *ROA* is operating income before depreciation and R&D expenses scaled by total assets for the prior fiscal year. Also reported are the mean and median of beginning-of-fiscal-year B/P, the book equity to price ratio, and V/P, the residual-income-value to price ratio. Each sample firm appears once for a particular year. *N* is the number of observations each year. All variable entries are mean values unless specified as median (Med.).

4. How Misvaluation Affects Issuances: Cross-Sectional Tests

We next test whether misvaluation affects debt and equity issuance based on univariate and two-way sorts of firms according to valuation measures; multivariate regression tests are provided in Section 5.

4.1 Univariate sorts

We first describe univariate tests. Each year, firms are grouped into quintile portfolios according to either B/P or V/P of the month preceding each fiscal year start. The valuation portfolios are formed annually to ensure that any effects we identify are cross-sectional, and therefore not driven by common time-series swings in market valuation and external financing. Each year, mean

Table 3
Security issuances of firms sorted by B/P or V/P

Valuation portfolio	N	Valuation ratio	EI(%)	DI (%)	TI (%)
		Sorting by B/P			
1 (Growth)	341.8	0.17	15.48	13.18	28.65
2	342.4	0.34	7.03	9.35	16.38
3	342.5	0.52	4.34	7.38	11.72
4	342.4	0.77	2.95	5.66	8.61
5 (Value)	342.0	1.54	1.81	2.43	4.24
Difference 1 – 5		−1.38	13.66	10.75	24.41
(t-statistic)			(5.04)	(12.24)	(7.24)
$\beta_{BP} = \Delta$ *Issuance* / $\Delta(B/P)$			10.74	8.54	19.28
(t-statistic)			(5.04)	(9.25)	(6.66)
		Sorting by V/P			
1 (Overvalued)	341.8	0.03	16.02	9.80	25.83
2	342.4	0.38	6.76	7.96	14.72
3	342.5	0.59	3.70	7.26	10.96
4	342.4	0.83	2.50	6.39	8.89
5 (Undervalued)	342.0	1.41	2.63	6.57	9.21
Difference 1 – 5		−1.38	13.39	3.23	16.62
(t-statistic)			(4.15)	(3.78)	(4.54)
$\beta_{VP} = \Delta$ *Issuance* / $\Delta(V/P)$			9.25	2.73	11.98
(t-statistic)			(5.50)	(3.41)	(6.22)

The sample includes U.S. nonfinancial, nonutility firms listed on NYSE, AMEX, and NASDAQ with CRSP/Compustat and I/B/E/S coverage during 1976–2009. At the end of June each year, firms are sorted into quintile portfolios according to the beginning-of-previous-fiscal-year book to price ratio (B/P), or residual-income-model-value to price ratio (V/P). The valuation portfolios consist of firms with no restriction on fiscal year-end month. Each year, mean security issuance is computed for each valuation quintile. Finally, time-series mean of security issuance for each quintile is computed. This table reports the time-series mean of equity issuance (*EI*), debt issuance (*DI*), and total issuance (*TI*) (sum of the two), all scaled by lagged total assets, for each valuation portfolio. Difference in issuances between the most over- and undervalued portfolios, and the associated t-statistic of the difference, are also reported. N is the time-series average number of firms in each portfolio. The bottom two rows in each panel report the time-series mean and t-statistic of the issuance-valuation sensitivity ratio, defined as the ratio of interquintile spread in issuance to the spread in valuation (measured by either B/P or V/P) for each issuance category. The t-statistics are corrected for autocorrelations up to three lags according to Newey and West (1987).

issuance levels are computed for each quintile. Finally, the time-series mean of the issuances for each quintile is computed.

Table 3 reports how under- or overvaluation is related to equity and debt net issuances. Mean values of B/P or V/P, and the issuance variables *EI*, *DI*, the sum of the two issuances (*TI*), and their differences between top and bottom valuation firms, are reported. Also reported are the mean and t-statistic [corrected for autocorrelations up to three lags per Newey and West (1987)] of the issuance-valuation sensitivities β_{BP} and β_{VP}, defined as the ratios of interquintile spread in issuance to the spread in B/P or V/P for each issuance category.

Measuring valuation by B/P, it is evident that high-valuation firms issue more of both equity and debt. Both equity and debt issuances (*EI* and *DI*) increase monotonically with valuation; the most overvalued quintile measured by B/P issues 13.66% (10.75%) more in equity (debt) than does the most undervalued quintile. All these quintile differences are highly statistically significant, with t-statistics of 5.04 or greater.

The B/P evidence could reflect the effects of either misvaluation or profit growth prospects. Therefore, to test for misvaluation effects, we rely more on the purified misvaluation measure, V/P.

Consistent with Hypothesis 1, using the V/P measure, overvalued firms issue more equity than do undervalued firms; the interquintile difference in *EI* is 13.39% ($t = 4.15$). Furthermore, consistent with Hypothesis 3, the effect is strongest in high overvaluation quintiles. For example, a move from the most overvalued V/P quintile (quintile 1) to quintile 2 is associated with a drastic drop in the level of *EI*, from 16.02% to 6.76%; this compares with a much narrower gap in *EI* between the bottom two valuation quintiles (–0.13%, the negative difference indicating a slight nonmonotonicity).

Overvalued firms also issue more debt as well; the interquintile difference in *DI*, although much weaker than when B/P is used as valuation measure, is still significant ($3.23\%, t = 3.78$). Consistent with Hypothesis 2, the sensitivity of equity issuance to misvaluation is much greater than the sensitivity of debt issuance ($13.39\% > 3.23\%$).

It follows that overvalued firms have much greater total issuance than do undervalued firms. *TI* for the most overvalued quintile firms is 25.83%, much higher than that of the most undervalued firms (9.21%), consistent with Hypothesis 1.

The conclusions based on issuance-valuation sensitivity ratios are similar. For example, measuring valuation by V/P, the issuance-valuation sensitivity ratio (β_{VP}) is 9.25 for *EI*, and 2.73 for *DI*, both statistically significant.

Overall, the evidence from the one-way sorts is consistent with the hypothesis that firms respond to higher inefficient valuation by issuing more equity and raising more funds in total. Furthermore, the evidence that this effect is concentrated among overvalued firms is consistent with the explanation suggested by Jensen (2004, 2005) that overvalued firms cater to the market's overvaluation of the firm's investment opportunities, and to the alternative hypothesis that overvaluation allows firms to exploit scale economies in investment.

4.2 Two-way sorts

In V/P, intrinsic value V purges expectations about earnings growth from market price imperfectly, because analyst forecasts are noisy proxies for market expectations, and because we possess forecasts only for a few years forward. Because book value is not forward-looking, as compared with V/P, B/P is relatively heavily weighted toward information about growth prospects as compared with misvaluation [see, e.g., the model of Daniel, Hirshleifer, and Subrahmanyam (2001)]. Therefore, as a more stringent test for misvaluation effects, we test the relation between V/P and issuance after controlling for B/P. This test is stringent in the sense that B/P also contains information about misvaluation.

Table 4
Security issuance of two-way sorted portfolios

	BP1 (Growth)	BP2	BP3	BP4	BP5 (Value)	BP1 – BP5	t (BP1–BP5)	β_{BP}	t (β_{BP})
Panel A: Equity issuance (*EI*)									
VP1 (Overvalued)	24.42	16.92	12.66	8.39	4.32	20.09	(4.76)	13.37	(4.57)
VP2	12.11	6.74	4.08	3.52	1.49	10.62	(5.61)	9.33	(5.41)
VP3	7.33	4.29	3.25	2.20	1.16	6.17	(7.41)	5.63	(5.75)
VP4	6.47	3.50	2.54	1.72	1.02	5.45	(4.07)	4.86	(3.58)
VP5 (Undervalued)	8.63	5.21	3.18	2.16	1.24	7.39	(4.61)	5.91	(4.77)
VP1 – VP5	15.78	11.71	9.49	6.22	3.08				
t(VP1–VP5)	(3.90)	(3.09)	(3.38)	(3.37)	(3.38)				
β_{VP}	11.57	8.62	7.03	4.08	1.57				
t (β_{VP})	(4.73)	(3.94)	(3.75)	(3.72)	(3.45)				
Panel B: Debt issuance (*DI*)									
VP1 (Overvalued)	15.58	10.15	6.78	5.58	0.41	15.17	(11.27)	10.11	(8.33)
VP2	11.37	9.02	7.13	4.79	2.20	9.16	(7.73)	7.87	(6.82)
VP3	11.58	9.30	7.14	5.44	2.10	9.48	(8.25)	8.64	(6.68)
VP4	10.66	8.23	7.34	5.47	2.51	8.16	(7.53)	7.69	(6.45)
VP5 (Undervalued)	13.61	10.35	8.49	6.57	3.66	9.95	(3.95)	6.99	(5.29)
VP1 – VP5	1.97	−0.20	−1.70	−0.99	−3.24				
t(VP1–VP5)	(0.66)	(−0.19)	(−2.01)	(−1.25)	(−4.69)				
β_{VP}	1.42	−0.69	−1.48	−0.52	−2.13				
t (β_{VP})	(0.51)	(−0.81)	(−1.81)	(−0.59)	(−3.39)				
Panel C: Total issuance (*TI*)									
VP1 (Overvalued)	40.00	27.07	19.44	13.96	4.74	35.26	(7.10)	23.48	(6.07)
VP2	23.48	15.75	11.21	8.32	3.69	19.78	(7.11)	17.20	(6.45)
VP3	18.91	13.59	10.39	7.64	3.26	15.65	(8.74)	14.26	(6.68)
VP4	17.14	11.73	9.88	7.19	3.53	13.61	(6.97)	12.56	(5.60)
VP5 (Undervalued)	22.24	15.56	11.66	8.73	4.90	17.34	(5.86)	12.89	(6.64)
VP1 – VP5	17.75	11.51	7.78	5.23	−0.16				
t(VP1–VP5)	(2.98)	(2.45)	(2.63)	(2.85)	(−0.13)				
β_{VP}	12.99	7.93	5.55	3.56	−0.56				
t (β_{VP})	(2.96)	(2.76)	(2.59)	(2.71)	(−0.65)				

At the end of June each year during 1976–2009, firms are sorted into quintile portfolios according to the beginning-of-previous-fiscal-year book to price ratio (B/P), and independently, on residual-income-model-value to price ratio (V/P). The intersection of the BP- and VP-quintiles creates 25 BP-VP portfolios. Each year, mean security issuance is computed for each portfolio. Finally, time-series mean of security issuance for each quintile is computed. This table reports the time-series mean of equity issuance (Panel A), debt issuance (Panel B), and total issuance (Panel C), all scaled by lagged total assets, for each portfolio. Also reported are the interquintile issuance difference along BP and VP and the issuance-valuation sensitivity ratios, and the associated t-statistics. The mean and t-statistic of the issuance-valuation sensitivity ratios, $\beta_{BP} = \Delta\, Issuance / \Delta(B/P)$, and $\beta_{VP} = \Delta\, Issuance / \Delta(V/P)$, are calculated based on the time series of the yearly ratio of interquintile spread in issuance to the spread in B/P or V/P. The t-statistics are corrected for autocorrelations up to three lags according to Newey and West (1987).

For our two-way sorts, each year, firms are sorted into quintile portfolios according to the beginning-of-fiscal-year B/P, and independently, on V/P. The intersection of these quintiles creates 25 BP-VP portfolios. Mean security issuance is computed each year for each portfolio, and then the time-series mean for each quintile is computed.

Table 4 reports the time-series means of equity, debt, and total issuance for each portfolio. We also report the interquintile issuance difference along BP and VP and the mean issuance-valuation sensitivity ratios β_{BP} and β_{VP} as defined in the univariate tests, and the associated t-statistics.

Panel A confirms the findings for equity issuance of the one-way sorts. For given B/P, greater overvaluation is associated with greater equity issuance, and misvaluation affects issuance mainly among firms with overvalued equity as measured by V/P. Furthermore, consistent with Hypothesis 4, the effect of misvaluation on equity issuance is strongest among growth firms.

In contrast, Panel B shows that controlling for B/P affects the results for debt issuance. In the two-way sorts, overvalued firms tend to issue *less* debt, especially among value firms (high B/P), in contrast to the univariate result. Specifically, among value firms, it is undervalued firms that tend to issue more debt. Because the two-way sorts are more controlled, we place greater faith in the findings here.

Among growth firms in columns BP1 and BP2, the relation between *DI* and V/P is U-shaped—among growth firms, both the most under- and overvalued firms tend to issue more debt than the medium-valued firms. This may reflect the opposing effects described in the hypothesis section—a greater absolute benefit to issuing risky debt when the firm is more overvalued but a lower benefit relative to issuing equity.[11]

Finally, Panel C shows that the results for total issuance are consistent with the univariate results. For example, *TI* is strongly increasing with overvaluation among growth firms (BP1 and BP2). This reflects the fact that the effect of misvaluation on *EI* in the two-way sorts is much stronger than the (more complex) pattern for *DI*.

5. Regression Tests

Both to test the robustness of the basic finding that misvaluation affects issuance, and to test hypotheses for why this is the case, we perform multivariate analysis with additional controls. To control more fully for growth, risk, and other possible interfering effects, in addition to B/P, we control for Tobin's q, cash flow scaled by lagged assets, ROA, leverage, firm age, the Fama-French three-factor loadings, and two-digit SIC major industry indicators as defined by Moskowitz and Grinblatt (1999).

Table 5 reports the results of panel regressions with *EI*, *DI*, and *TI* as dependent variables, where t-statistics are based on standard errors clustered by both year and firm per Petersen (2009), as in DeAngelo, DeAngelo, and Stulz (2010). For each dependent variable, we report the results of three specifications for the independent variables: (1) B/P and controls, (2) V/P and controls, and (3) B/P, V/P, and controls (dropping q because q and B/P capture similar information). This lets us evaluate whether V/P has incremental explanatory power as a misvaluation measure after controlling for B/P. This provides a fairly stringent test for misvaluation, as distinct from the earnings growth fundamentals that are correlated with book/market, because B/P can

[11] Intuitively, for firms with poor growth prospects, the incentive for issuing risky debt is not strong, so we observe *DI* decreases with the valuation level. For high-growth firms, the incentive for issuing risky debt is strong enough—perhaps owing to catering incentives of managers to maintain irrational equity prices—to induce a U-shaped relation between *DI* and overvaluation.

Table 5
Regressions of security issuances on valuation measures

	(1) *EI*	(2) *EI*	(3) *EI*	(1) *DI*	(2) *DI*	(3) *DI*	(1) *TI*	(2) *TI*	(3) *TI*
V/P		−1.11	−2.58		−0.09	0.05		−1.19	−2.53
		(−3.26)	(−4.78)		(−0.21)	(0.11)		(−1.95)	(−3.42)
B/P	−1.43		−4.79	−4.17		−5.08	−5.59		−9.87
	(−3.74)		(−7.66)	(−11.15)		(−9.74)	(−9.50)		(−9.92)
q	2.96	3.04		0.71	1.09		3.67	4.12	
	(8.85)	(9.52)		(4.87)	(6.31)		(8.70)	(10.05)	
CF	−0.08	−0.07	−0.04	0.07	0.10	0.08	−0.01	0.04	0.03
	(−2.39)	(−2.01)	(−1.22)	(3.83)	(5.30)	(4.46)	(−0.20)	(0.92)	(0.76)
ROA	−0.27	−0.26	−0.19	−0.09	−0.08	−0.07	−0.35	−0.33	−0.26
	(−7.52)	(−7.14)	(−3.88)	(−5.36)	(−4.56)	(−4.79)	(−9.54)	(−8.64)	(−5.14)
LEV	−1.15	−0.77	−4.95	−1.50	−1.29	−2.64	−2.65	−2.06	−7.59
	(−1.53)	(−1.05)	(−5.61)	(−2.20)	(−1.83)	(−4.16)	(−2.21)	(−1.74)	(−6.27)
Log(AGE)	−2.04	−2.03	−3.04	−1.59	−1.48	−1.82	−3.63	−3.51	−4.86
	(−8.98)	(−8.93)	(−8.71)	(−7.46)	(−6.63)	(−7.36)	(−10.00)	(−9.59)	(−9.70)
MKT	1.41	1.08	1.20	−0.42	−0.50	−0.28	0.99	0.58	0.92
	(6.40)	(3.87)	(4.00)	(−2.36)	(−1.82)	(−1.20)	(3.17)	(1.27)	(2.22)
SMB	1.64	1.55	1.76	0.12	0.06	0.20	1.76	1.61	1.96
	(4.31)	(4.15)	(4.38)	(0.90)	(0.45)	(1.44)	(4.28)	(4.05)	(4.43)
HML	−1.05	−0.94	−1.28	0.20	0.10	0.06	−0.85	−0.84	−1.22
	(−3.06)	(−2.90)	(−2.87)	(1.40)	(0.62)	(0.35)	(−2.05)	(−2.12)	(−2.27)
Intercept	7.08	6.75	19.39	13.55	9.36	15.98	20.64	16.11	35.37
	(5.29)	(5.92)	(12.32)	(11.57)	(8.38)	(10.49)	(11.37)	(9.25)	(13.87)
N	51,866	51,866	51,866	51,866	51,866	51,866	51,866	51,866	51,866
R^2	0.1218	0.1214	0.0751	0.0373	0.0266	0.0331	0.1092	0.1031	0.0727

This table reports results of panel regressions of security issuance on misvaluation proxies (V/P and B/P) and control variables. The dependent variable is one of the following security issuances: equity issuance (*EI*), debt issuance (*DI*), and total issuance (*TI*) (sum of the two), all scaled by lagged total assets. The independent variables include beginning-of-year V/P (the residual-income-model-value to price ratio) and B/P (book to price ratio). q is the beginning-of-year Tobin's q ratio measured as market value of equity plus total assets minus book value of equity over total assets. *CF* is cash flow (income before extraordinary items + depreciation + *RD*) scaled by lagged assets (where *RD* is R&D expenses; missing *RD* is set to zero in the *CF* calculation). *LEV* is beginning-of-year leverage defined as (long-term debt + current liabilities)/(long-term debt + current liabilities + shareholders' equity). *ROA* is operating income before depreciation and R&D expenses scaled by total assets, for the prior fiscal year. *Log*(*AGE*) is the natural logarithm of firm age, where age is the number of years between the beginning of the fiscal year and the listing date of the firm in CRSP, truncated at 50. *MKT*, *SMB*, and *HML* are the loadings of the Fama-French 3 factors estimated using monthly returns in the five (or at least two) years prior to the beginning of the fiscal year. All regressions include 2-digit SIC major industry indicators. The sample includes U.S. nonfinancial, nonutility firms listed on NYSE, AMEX, and NASDAQ with CRSP/Compustat and I/B/E/S coverage during 1976–2009. Numbers in parentheses are t-statistics based on standard errors clustered by both year and firm, per Petersen (2009).

potentially extract part of the misvaluation effect from V/P. We draw our main inference from specification (3), the more stringent test of the misvaluation hypothesis.

5.1 Full sample tests

In the full sample, Hypothesis 1 predicts that equity and total net issuances increase as overvaluation increases. Hypothesis 2 predicts that the sensitivity of equity issuance to misvaluation is higher than that of debt issuance.

In Table 5, consistent with Hypothesis 1, overvalued firms issue more equity; the coefficient of −2.58 (t=−4.78) on V/P in specification (3) indicates that V/P is a significant negative predictor of *EI*. This is consistent with the conclusion of the one-way and two-way portfolio tests. Furthermore, the inclusion of both B/P and V/P tends to increase the significance of both variables. The coefficient on V/P in specification (3) is stronger than in specifications (1) or (2), indicating that growth effects do not explain the ability of misvaluation as measured by V/P to predict equity issuance.

In the *DI* regressions, the coefficient on V/P is insignificant and close to zero, indicating that overvaluation has no clear effect on the propensity to issue debt. This is consistent with Hypothesis 2, which predicts that debt issuance is not as positively sensitive to overvaluation as equity issuance. The lack of a relation between *DI* and overvaluation suggests a relatively strong substitution from debt issuance to equity issuance as overvaluation increases or undervaluation decreases.

Although not crucial for the main hypotheses of this paper, it is interesting to contrast the finding that greater overvaluation is not associated with greater debt issuance with the evidence of Spiess and Affleck-Graves (1999) about post-debt-issuance returns. Based on the finding that debt issuers earn lower stock returns in the years subsequent to issuance, they conclude that debt issuers are overvalued. Also, although we do not perform equity share tests, our findings are in the spirit of aggregate-level evidence that a high equity share in new issues (a variable that is motivated by the substitution by overvalued firms from debt to equity) is followed by low aggregate stock returns (Baker and Wurgler 2000; Henderson, Jegadeesh, and Weisbach 2006) more than firm-level tests that do not find such effects (Butler et al. 2011). Of course, a large body of literature debates the validity of alternative benchmarks and return calculation methods for long-run return studies (e.g., Fama 1998; Loughran and Ritter 2000). More importantly, our tests answer a different causal question than ex post return tests.[12]

Also consistent with Hypothesis 1, *TI* (the sum of *EI* and *DI*) is significantly positively related to overvaluation as measured by V/P. The V/P coefficient in the *TI* specification (3) is -2.53 ($t = -3.42$).

To gauge the economic importance of the issuance-valuation relation, we examine the effect of a one-standard-deviation shift in V/P on equity and debt issuances, and we compare these to the effects of a comparable shift in B/P (which measures the effect of growth prospects). The standard deviations of V/P and B/P from Table 1 are 0.60 and 0.61, respectively. According to the *EI* regression specification (3), a one-standard-deviation shift in V/P therefore implies a 1.55% (2.58×0.60) change in *EI*, which is about 21% of the average *EI*. This compares with a 2.92% (4.79×0.61) change in *EI* by a one-standard-deviation shift in B/P, implying that the effect of misvaluation

[12] As discussed in Section 2, conditioning on preexisting misvaluation rather than on the issuance event focuses on the causal effects of misvaluation rather than the possible reverse causality wherein firms that are planning to issue take actions to increase misvaluation. Our evidence that this distinction affects inferences about whether misvaluation causes debt issuance highlights that this distinction must be kept in mind for equity issuance as well.

on equity issuances is about 53% of the effect of growth opportunities. A similar calculation shows that the effect of misvaluation on *EI* is 2.6 times the effect of cash flow on *EI*.

A comparison between the *EI* and *DI* regressions of Table 5 suggests that B/P has a greater effect on debt than on equity issuance, as evident in Model 1, which does not include V/P. The misvaluation theory does not make a prediction about which effect will be stronger, because even the basic prediction about the effect of misvaluation on debt issuance is ambiguous. Traditional financing theories also have different predictions about the relative strength of these effects. For example, the pecking order theory predicts that firms in need of capital should prefer debt to equity financing, so if low B/P firms need financing for their high growth opportunities, this should mainly come from debt issuance. The debt overhang theory predicts that low B/P growth firms should refrain from issuing debt to avoid bypassing valuable future investment opportunities. The finding that higher B/P has a more negative effect on debt than on equity financing tends to be most supportive of the pecking order theory.

5.2 Why does misvaluation affect issuance? Characteristics-based subsample tests

We now examine misvaluation sensitivities of financing within subsamples sorted by firm characteristics to test different possible reasons why misvaluation affects equity and debt issuances. The conditioning variables we hypothesize to affect the sensitivity of issuance to misvaluation are the level of misvaluation itself, B/P, R&D, size, share turnover, and net insider selling.

We report the subsample results in Tables 6–8. For each subsample, we report the V/P coefficient in Model 3 of Table 5, which provides the effect of V/P on issuances after controlling for the effects of growth and other potential effects of cash flow, leverage, and firm-specific risk.

5.2.1 Valuation-subsample regressions. Panel A of Table 6 describes how the sensitivity of financing activity to misvaluation as measured by V/P varies across misvaluation quintiles. Within each quintile, we regress *EI* (or *DI* or *TI*) on V/P, B/P, and the other controls.

Consistent with Hypothesis 3, the effect of overvaluation on *EI* is limited to the top two misvaluation quintiles. In fact, among the two bottom valuation quintiles V/P has a significantly positive, rather than negative, effect on *EI*, though the magnitude is much smaller.[13] The interquintile difference in V/P coefficients between the top and bottom valuation quintiles is large and statistically significant (21.20, $t=7.63$). This is consistent with the prediction

[13] Subperiod analysis (unreported) shows that this effect is primarily present in the 2000s. One possible interpretation of this result is that some distressed firms are forced to raise new equity financing even when their stock is undervalued.

Table 6
Issuance sensitivity to valuation by quintiles sorted by V/P, growth, and R&D

	V/P statistics		*EI*		*DI*		*TI*	
	Mean	SD	*b*	*t*	*b*	*t*	*b*	*t*
Panel A: V/P quintile								
1 (Overvalued)	−0.02	0.36	−18.58	(−6.82)	0.69	(0.51)	−17.89	(−5.12)
2	0.36	0.14	−10.80	(−2.15)	−0.86	(−0.20)	−11.66	(−1.67)
3	0.58	0.17	−0.01	(−0.00)	−3.05	(−1.02)	−3.06	(−1.02)
4	0.84	0.23	2.18	(3.61)	−2.51	(−1.31)	−0.33	(−0.16)
5 (Undervalued)	1.47	0.59	2.62	(4.86)	−0.26	(−0.38)	2.36	(2.41)
Difference 5 – 1			21.20	(7.63)	−0.95	(−0.62)	20.25	(5.58)
Panel B: B/P quintile								
1 (Growth)	0.39	0.43	−8.49	(−4.85)	−3.14	(−2.91)	−11.63	(−4.66)
2	0.57	0.45	−2.59	(−1.46)	−0.70	(−0.74)	−3.29	(−1.51)
3	0.69	0.50	−2.09	(−2.88)	0.57	(0.84)	−1.52	(−1.79)
4	0.78	0.60	−0.28	(−0.62)	1.37	(2.93)	1.09	(1.75)
5 (Value)	0.80	0.84	−0.25	(−0.97)	1.40	(3.87)	1.15	(2.50)
Difference 5 – 1			8.24	(4.65)	4.54	(3.99)	12.78	(5.03)
Panel C: R&D quintile								
1 (Low)	0.77	0.61	−0.31	(−0.80)	−0.25	(−0.48)	−0.56	(−0.77)
2	0.80	0.57	−0.01	(−0.02)	0.29	(0.48)	0.29	(0.37)
3	0.63	0.53	−1.02	(−1.40)	0.25	(0.27)	−0.77	(−0.60)
4	0.46	0.51	−2.62	(−2.11)	0.09	(0.14)	−2.53	(−1.75)
5 (High)	0.24	0.56	−3.53	(−2.38)	0.41	(0.35)	−3.12	(−1.38)
Difference 5 – 1			−3.22	(−2.10)	0.66	(0.51)	−2.56	(−1.08)

The issuance regressions as specified in model (3) of Table 5 are performed separately by quintiles sorted by V/P in Panel A, Growth in Panel B, and R&D (scaled by lagged assets) in Panel C. The yearly sorting variables are based on beginning-of-fiscal-year values. For each quintile, for each of the equity issuance (*EI*), debt issuance (*DI*), and sum of the issuances (*TI*) regressions, this table reports the coefficient (b) and the t-statistic (t) of V/P using standard errors clustered by both year and firm. The bottom row reports the difference in the V/P coefficient between quintiles 1 and 5, based on the coefficients and standard errors of V/P for the two quintiles. Also reported are the mean and standard deviation of V/P for each quintile. The sample includes U.S. nonfinancial, nonutility firms listed on NYSE, AMEX, and NASDAQ with CRSP/Compustat and I/B/E/S coverage during 1976–2009.

that the sensitivity of equity issuance to overvaluation is strongest among overvalued firms.

As discussed in Section 2, overvalued firms have the incentive to issue equity for investment to cater to investor optimism, and project-scale economies provide an additional possible reason why investment should be more responsive to misvaluation among overvalued firms than among undervalued firms. A full analysis of how misvaluation affects investment is beyond the scope of this study, but in unreported tests we confirm that investment (the sum of capital and R&D expenditures) increases with overvaluation as measured inversely by V/P (after controlling for B/P and factors such as cash flow, firm age, and leverage), and that the sensitivity of investment to misvaluation is greater among overvalued firms.

To assess economic importance, we follow a procedure similar to that of Section 5.1. Among firms in the most overvalued quintile firms, a one-standard-deviation shift in misvaluation increases *EI* by 6.69%, compared with an effect of a one-standard-deviation shift in B/P of 8.98%. Thus, the estimated effect of misvaluation on equity issuance is substantial, and is greater than that of cash flow.

For *DI*, there is no significant effect of misvaluation within each valuation quintile, even for the most undervalued quintile. There is also no clear trend in the V/P effect across the valuation quintiles. Finally, consistent with Hypothesis 3, the V/P coefficient indicates that the effect of misvaluation on total issuance is strongest among the top overvaluation quintiles (statistically significant, $t = -5.12$, only for the top quintile).

5.2.2 B/P-quintile regressions. Panel B of Table 6 reports the effect of misvaluation on issuance for the B/P quintiles. Consistent with Hypothesis 4, growth firms with low B/P show a much stronger misvaluation effect on *EI* (-8.49; $t = -4.85$) than do value firms (insignificant V/P effect).

The V/P effect on *DI* is also negative for growth firms (-3.14; $t = -2.91$). However, it is positive for value firms (high B/P ratios), with a coefficient of 1.40, $t = 3.87$. As discussed in Section 2, the effect of misvaluation on debt issuance is potentially ambiguous because greater firm overvaluation directly encourages the issuance of overvalued risky debt, but also encourages a substitution away from debt toward equity issuance. This raises the question of why the first effect would dominate among growth firms, resulting in a negative coefficient on V/P, and the second effect would dominate among value firms, resulting in a positive coefficient on V/P.

A possible catering explanation is that among overvalued growth firms, the incentive to maintain overvalued equity prices causes the issuance of risky debt as a supplement to equity issuance. Jensen (2004, 2005) argues that the pressure on managers to take actions such as raising capital to finance investment projects is stronger among overvalued firms, especially among growth firms for which investor optimism is high. Overvalued growth firms may be exploiting both means (debt and equity) of financing ambitious projects to cater investor optimism.

It follows from the *EI* and *DI* results above that overvaluation positively affects the *TI* among growth firms and negatively among value firms. This results in a significantly negative coefficient on V/P among growth firms ($t = -4.66$) and a significantly positive coefficient among value firms ($t = 2.50$). The positive coefficient among value firms indicates that among value firms a reduction in undervaluation is associated with lower total issuance. This opposes the spirit of Hypothesis 1, but the economic magnitude of the coefficient (1.15) is modest.

The interquintile difference in the V/P effect on *TI* is substantial and highly significant (12.78; $t = 5.03$). The more negative relation between undervaluation as proxied by V/P and total issuance (i.e., the more positive relation between overvaluation and issuance) among growth firms is consistent with Hypothesis 4.

A subtle caveat to Hypotheses 4–6 is that a different line of reasoning based upon the quality of the V/P proxy for misvaluation leads to the same conclusion. Firms with high intangibles or growth opportunities are harder to value, and therefore are more subject to misvaluation effects. Small firms share these features, and in addition have low transparency and high costs of arbitrage, owing to their illiquidity.

Because V/P is a noisy measure of misvaluation, within subsamples that contain greater variation in true misvaluation, a greater fraction of the variation in V/P should be the result of variation in actual misvaluation rather than measurement error. For example, in a subsample in which true misvaluation is close to zero for all firms, almost all of the variation in V/P would be noise. So, any conditioning variable that induces greater conditional dispersion in *true* misvaluation should strengthen the sensitivity of issuance to measured misvaluation.

This possibility is most important for firm size conditioning firms (Hypothesis 6), owing to the high costs of arbitraging mispricing of small firms. To the extent that this caveat applies, evidence of higher issuance sensitivity among the small firm subsample provides further corroboration of the basic hypothesis that misvaluation affects issuance, rather than further evidence about why this relationship exists.

5.2.3 R&D-quintile regressions. According to Hypothesis 5, firms whose assets are less tangible and therefore harder for the market to value will have greater sensitivity of issuance to misvaluation. Section 5.2.2 provides one kind of evidence consistent with this hypothesis, that the sensitivity of equity issuance and total issuance to V/P is greater among growth firms (firms with low B/P). However, B/P has multiple interpretations, so it is useful to test this hypothesis using a different measure of intangibility. We therefore examine how the sensitivity of issuance to misvaluation varies across sets of firms with different levels of R&D.

Panel C of Table 6 reports the sensitivity of issuances to misvaluation for each R&D quintile. Consistent with Hypothesis 4, high-R&D firms have a much higher sensitivity of *EI* to V/P than do low-R&D firms. The V/P effect on *EI* is concentrated in the top three R&D quintiles, and is statistically significant only in the top two. The difference in coefficients between the top and bottom quintiles is statistically significant ($t = -2.10$).

5.2.4 Size-quintile regressions. According to Hypothesis 6, the sensitivity of equity issuance and total financing to misvaluation will be greater among small firms, again because such firms tend to derive greater potential value from growth. Panel A of Table 7 reports the effect of V/P on issuance within quintiles sorted by total assets. Consistent with Hypothesis 6, the V/P effect on *EI* is much stronger among small firms than among large firms. The V/P effect on *EI* is -3.67 ($t = -4.05$) among the smallest-firm quintile is

Table 7
Issuance sensitivity to valuation by quintiles sorted by size and turnover

	V/P statistics		*EI*		*DI*		*TI*	
	Mean	SD	*b*	*t*	*b*	*t*	*b*	*t*
Panel A: Size quintile								
1 (Small)	0.50	0.71	−3.67	(−4.05)	0.33	(0.58)	−3.34	(−2.87)
2	0.61	0.62	−2.66	(−3.70)	0.31	(0.57)	−2.35	(−2.55)
3	0.68	0.57	−2.39	(−4.02)	−0.01	(−0.01)	−2.39	(−2.61)
4	0.70	0.56	−1.28	(−3.21)	−0.10	(−0.15)	−1.38	(−1.93)
5 (Large)	0.74	0.51	−0.55	(−1.22)	−0.28	(−0.40)	−0.83	(−1.04)
Difference 5 – 1			3.12	(3.08)	−0.61	(−0.67)	2.51	(1.78)
Panel B: Turnover								
1 (Small)	0.78	0.70	−1.23	(−2.85)	0.63	(1.15)	−0.60	(−0.81)
2	0.70	0.60	−1.30	(−2.35)	−0.39	(−0.66)	−1.69	(−2.08)
3	0.66	0.58	−1.91	(−2.85)	0.47	(0.63)	−1.45	(−1.34)
4	0.60	0.57	−3.59	(−4.78)	0.02	(0.02)	−3.57	(−3.39)
5 (Large)	0.49	0.53	−5.79	(−3.32)	−0.01	(−0.01)	−5.80	(−2.53)
Difference 5 – 1			−4.56	(−2.54)	−0.64	(−0.57)	−5.20	(−2.15)

The issuance regressions as specified in model (3) of Table 5 are performed separately for each size (total assets, or *TA*) quintile in Panel A and for each turnover (monthly trading volume scaled by the number of shares outstanding) quintile in Panel B. The quintiles are sorted yearly by the beginning-of-fiscal-year values. For each quintile, for each of the equity issuance (*EI*), debt issuance (*DI*), and sum of the issuances (*TI*) regressions, this table reports the coefficient (*b*) and the t-statistic (t) of V/P using standard errors clustered by both year and firm. The bottom row reports the difference in the V/P coefficient between quintiles 1 and 5, based on the coefficients and standard errors of V/P for the two quintiles. Also reported are the mean and standard deviation of V/P for each quintile. The sample includes U.S. nonfinancial, nonutility firms listed on NYSE, AMEX, and NASDAQ with CRSP/Compustat and I/B/E/S coverage during 1976–2009.

monotonically increasing toward zero moving toward larger size across the quintiles, has significant coefficient only for the four smallest size quintiles, and has a coefficient of only −0.55 ($t=-1.22$) among the largest-firm quintile.

In contrast, there is no significant V/P effect on *DI* within any of the size quintiles. Finally, as a consequence of the V/P effect on *EI*, small firms show a stronger V/P effect on *TI* than do large firms. The difference in coefficients between the largest and smallest quintiles is significant at the 10% level ($t=1.78$).

5.2.5 Turnover-quintile regressions. According to Hypothesis 7, the sensitivity of equity issuance to misvaluation is greater when investors have a shorter time horizon, because this increases the catering incentive to issue shares for the purpose of financing the ambitious and expensive projects that the market is optimistic about. Following Polk and Sapienza (2009), we use turnover as a proxy for investor time horizon. Panel B of Table 7 reports the misvaluation effects on issuances by turnover quintile. As expected, we see that high-turnover firms have higher sensitivity than low-turnover firms of *EI* to V/P. The V/P effect on *EI* increases monotonically with turnover. The sensitivity moves from −1.23 ($t=-2.85$) among the lowest-turnover quintile to −5.79 ($t=-3.32$) among the highest-turnover quintile, which is more than four times as large. The interquintile difference in the V/P effect between the high-and low-turnover firms is also significant ($t=-2.54$). This finding suggests that equity issuance is complementary with the investment catering identified by Polk and Sapienza (2009).

There is no indication of a trend across turnover quintiles in the ability of V/P to predict debt issuance. A trend in the V/P effect on *TI* is present across turnover quintiles, paralleling the effect of turnover on the sensitivity of *EI* to misvaluation. The effects for *TI* are similar to those for *EI* in magnitude and significance.

5.2.6 Insider selling subsample regressions. Previous literature (e.g., Jenter 2005) finds that insiders are more likely to sell (buy) their firm's shares when they perceive their stock as overvalued (undervalued). If net insider selling is an indicator of equity overvaluation, by Hypothesis 3, the sensitivity of equity and total issuances to V/P will be greater when insider net selling is high. So, as a further test of Hypothesis 3, we condition on net insider selling. In contrast with the tests that condition on V/P itself, this tests whether the sensitivity of issuance to misvaluation is greater among firms that are *recognized* by managers to be overvalued.

Our measure of net insider selling, $NSELL$, is the number of insider selling transactions deflated by the total number of insider buying and selling transactions in the fiscal year preceding the issuance measurement. Insider trading data are obtained from Wharton Research Data Service (WRDS) for 1986–2009, and for the years 1976–1985 from the National Archives and Records Administration.[14] We define insiders as the top four executives (CEO, CFO, Chairman of Board, and President). Only 6.4% of our sample observations have nonmissing insider trading data, so we form $NSELL$ terciles rather than quintiles.

Table 8 reports the relation of V/P to issuance by $NSELL$ tercile. Even in this severely reduced subsample, we still observe that high net insider selling firms have a higher sensitivity of equity issuance to V/P, with an intertercile difference in the V/P coefficient between the high and low $NSELL$ terciles of 4.23 ($t = -1.94$). Likewise, high $NSELL$ firms also appear to have a higher sensitivity of total issuance than low $NSELL$ firms, with an intertercile difference in the V/P effect of -5.22. This effect is also economically substantial, but the difference is statistically insignificant owing to the small sample size. However, we will see in Section 5.4 that the intertercile difference in the V/P effect on *TI* is statistically significant in an integrated regression specification. These findings give further support for Hypothesis 3.

5.3 Time-variation in misvaluation effects

In Section 3.3, we saw that stock valuation was low in the early part of the sample period, a time in which equity issuances were low compared to debt

[14] These are records of insider trades on Forms 3 and 4 filed with the U.S. Securities and Exchange Commission. We exclude the following from the insider trading data: low-quality insider trading data marked by WRDS, insider transactions of less than 100 shares, employee benefit plan transactions, and derivative transactions.

Table 8
Issuance sensitivity to valuation for net insider selling high-med.-low portfolios

NSELL tercile	V/P statistics		*EI*		*DI*		*TI*	
	Mean	SD	*b*	*t*	*b*	*t*	*b*	*t*
1 (Low)	0.67	0.50	−0.33	(−0.37)	2.01	(1.39)	1.68	(0.83)
2	0.60	0.42	−2.79	(−1.76)	−2.80	(−2.10)	−5.59	(−2.37)
3 (High)	0.48	0.40	−4.56	(−2.30)	1.02	(0.56)	−3.54	(−1.19)
Difference 5 – 1			−4.23	(−1.94)	−0.99	(−0.42)	−5.22	(−1.45)

Our measure of net insider selling is *NSELL*, the number of insider selling transactions deflated by the total number of insider buying and selling transactions, based on transactions in the fiscal year preceding the issuance measurement. Insiders are defined as the top four executives (CEO, CFO, Chairman of Board, and President). The sample firms with nonmissing *NSELL* observations are sorted into three portfolios by the beginning-of-previous-fiscal-year *NSELL*. The issuance regressions as specified in model (3) of Table 5 are performed separately for each *NSELL* tercile. For each portfolio, for each of the equity issuance (*EI*), debt issuance (*DI*), and sum of the issuances (*TI*) regressions, this table reports only the V/P coefficient (b) and the t-statistic (t) using standard errors clustered by both year and firm. The bottom row reports the difference in coefficients between portfolios 1 and 3, based on the coefficients and standard errors of V/P for the two quintiles. The sample includes U.S. nonfinancial, nonutility firms listed on NYSE, AMEX, and NASDAQ with CRSP/Compustat and I/B/E/S coverage during 1976–2009, with nonmissing insider trading data.

issuances. Valuations are high and equity issuances often exceed debt issuances in the later half of the sample. This suggests that it may be interesting to explore whether the effect of overvalued equity on financing differs across subperiods. We therefore divide the sample into three periods: a pre-1990 subperiod (1976–1989), a 1990s subperiod (1990–1999), and a 2000s subperiod (2000–2009).

Owing to reduction in sample size, we do not expect to see statistical significance to be completely consistent in subperiod tests, especially in tests that further subdivide the sample by firm characteristics. The conclusions from the full sample are fairly robust across subperiods, but there are some interesting variations in effects. For brevity, we focus primarily on equity issuance, the dependent variable for which misvaluation effects should be strongest.

In unreported tests, we find that the V/P effect on *EI* is statistically significant in all three subperiods, and is much stronger during the 1990s than in the earlier period. The coefficient of V/P as in regression specification (3) in Table 5 almost triples when moving from the pre-1990 to the 1990s subperiod. The effect during the 2000s is intermediate in magnitude but closer to the weaker pre-1990 effect. The strong misvaluation effect during the 1990s may be a consequence of the high-tech boom of the late 1990s; Dong et al. (2006) also report stronger effects of misvaluation in the post-1990s period in their study of misvaluation and takeovers.

The negative relation of V/P to total issuance is strong and highly significant during the 1990s period. It is not present during the pre-1990s period, and is marginally insignificant at the 10% level (or significant at the 10% level in a one-sided test) during the 2000s. On the other hand, despite the overall insignificant effect of misvaluation on debt issuance, during the pre-1990 period but not the two other periods, undervalued firms issue more debt.

The differences in the sensitivity of issuance to misvaluation across subsamples with different firm characteristics are reasonably robust to subperiod. The conclusion that the sensitivity of *EI* to misvaluation is greatest among overvalued firms is robust and highly significant in all three subperiods. It is especially pronounced in the 1990s period—the V/P effect among the top valuation quintile during the 1990s period is almost double that of the pre-1990 or the 2000s subperiods. The finding that small firms have greater sensitivity of *EI* to misvaluation is present in the 2000s period and is especially intense in the 1990s period, but is not significant in the pre-1990 period.

The greater sensitivity of *EI* to overvaluation among growth firms exists in the 1990s and 2000s periods, but not the pre-1990 period. It is much more pronounced in the 1990s period—the growth-value interquintile difference in V/P effect on *EI* during the 1990s is almost triple that of the 2000s. The finding that the sensitivity of *EI* to misvaluation is greatest among high R&D firms is strong in the pre-1990 period and the 1990s but is not present in the 2000s.

Finally, the full-sample finding that high turnover firms have higher sensitivity of *EI* to V/P applies strongly during the 1990s, with 10% significance in the 2000s, and does not apply during the 1980s. This suggests that catering effects grew stronger in the 1990s.

5.4 Regression interaction tests

To test the predictions in Hypotheses 3–7 more fully, we use an integrated regression approach rather than running separate subsample regressions as in Tables 6–8. We define an indicator variable $I(X)$ for each conditioning variable X, where X is one of the conditioning variables examined in Tables 6–8 (V/P, B/P, RD, TA, $Turnover$, or $NSELL$). $I(X)$ is equal to 0.5 if X is in X-quintile 5 and is equal to -0.5 if X is in quintile 1. We augment the baseline regression model (i.e., Model 3 of Table 5) with interaction variables of $I(X)$ with each of the baseline independent variables along with the intercept.[15] Therefore, the coefficient on the interaction of any variable with $I(X)$ reflects the difference in the effect of this variable between X-quintiles 5 and 1.[16]

Table 9 reports only the interaction coefficient on $V/P{*}I(X)$ and the associated t-statistic. These statistics reflect the difference in the effect of V/P on issuance between X-quintiles 5 and 1. The integrated regressions as summarized in Table 9 largely confirm the subsample regression results found in Tables 6–8. All the $V/P{*}I(X)$ coefficients in the *EI* and *TI* regressions have the same signs as the coefficient differentials in the subsample regressions, and all are statistically significant at the 5% level or lower. These conclusions obtain even when the conditioning variables are R&D, size, and $NSELL$, for

[15] Tables 6–8 only report V/P coefficients across the X-quintiles, but in these regressions the effects of other independent variables such as B/P also differ across the quintiles. We therefore include the interaction between $I(X)$ and each of the baseline independent variables in the regression.

[16] Again, the sample is split into $NSELL$ terciles rather than quintiles because of the severely reduced sample size when the sample is limited to observations with nonmissing $NSELL$. Therefore, $V/P{*}I(NSELL)$ reflects the difference in the effect of V/P on *EI* between $NSELL$ terciles 3 and 1.

Table 9
Factors affecting the sensitivity of issuance to valuation: Regression interaction tests

	EI		*DI*		*TI*	
Conditioning variable (X)	$V/P*I(X)$	t	$V/P*I(X)$	t	$V/P*I(X)$	t
V/P	14.15	(6.91)	1.39	(1.62)	15.54	(6.24)
B/P	6.80	(5.40)	3.04	(4.43)	9.84	(5.84)
R&D	−7.97	(−4.75)	0.71	(0.63)	−7.26	(−2.92)
TA	4.63	(4.91)	−0.47	(−0.56)	4.16	(3.55)
Turnover	−4.91	(−2.39)	−0.87	(−0.78)	−5.78	(−2.23)
NSELL	−3.53	(−2.05)	−2.44	(−1.29)	−5.97	(−2.10)

This table reports summary results of panel regressions of security issuance on misvaluation proxies (V/P and B/P) and control variables, with conditioning indicator variables ($I(X)$s, described below) included to assess how the sensitivity of the misvaluation effect on new issues depends on these conditioning variables. The dependent variable is either equity issuance (*EI*), debt issuance (*DI*), or total issuance (*TI*) (sum of the two). The baseline independent variables include beginning-of-year V/P (the residual-income-model-value to price ratio) and B/P (book to price ratio). The other control variables (*CF, ROA, LEV, AGE, MKT, SMB*, and *HML*) are as defined in Table 5. These baseline independent variables, along with the intercept, are interacted with an indicator variable for $X(I(X))$, where X is one of the following conditioning variables: *V/P, B/P, RD, TA, Turnover,* and *NSELL*, as defined in Tables 6–8. $I(X)$ is equal to 0.5 if X is in X-quintile 5, and is equal to −0.5 if X is in X-quintile 1. For example, the following panel regression is run when *EI* is the dependent variable and *RD* is the conditioning variable:

$$EI_{it} = \beta_0 + \beta_1 V/P_{it} + \beta_2 B/P_{it} + \beta_3 CF_{it} + \beta_4 ROA_{it} + \beta_5 LEV_{it} + \beta_6 Log(AGE)_{it} + \beta_7 MKT_{it} + \beta_8 SMB_{it} + \beta_9 HML_{it}$$
$$+ \beta_{10} I(RD)_{it} + \beta_{11} V/P_{it} {*} I(RD)_{it} + \beta_{12} B/P_{it} {*} I(RD)_{it} + \beta_{13} CF_{it} {*} I(RD)_{it} + \beta_{14} ROA_{it} {*} I(RD)_{it}$$
$$+ \beta_{15} LEV_{it} {*} I(RD)_{it} + \beta_{16} Log(AGE)_{it} {*} I(RD)_{it} + \beta_{17} MKT_{it} {*} I(RD)_{it} + \beta_{18} SMB_{it} {*} I(RD)_{it}$$
$$+ \beta_{19} HML_{it} {*} I(RD)_{it} + \varepsilon_{it}.$$

Therefore, in the regression, the interaction of any variable with $I(X)$ reflects the difference in the effect of this variable between X-quintiles 5 and 1. For example, in the *EI* regression, *V/P*I(RD)* reflects the difference in the effect of V/P on *EI* between *RD*-quintiles 5 and 1. (The sample is split into *NSELL* terciles rather than quintiles because of reduced sample size with nonmissing *NSELL* observations. Therefore, *V/P*I(NSELL)* reflects the difference in the effect of V/P on *EI* between *NSELL*-terciles 3 and 1.) All regression models include 2-digit SIC indicators.
For each conditioning variable regression, for each of the equity issuance (*EI*), debt issuance (*DI*), and total issuance (*TI*) regressions, this table reports only the coefficient ($V/P*I(X)$) and the t-statistic (t) of the interaction variable between V/P and $I(X)$, using standard errors clustered by both year and firm per Petersen (2009). The sample includes U.S. nonfinancial, nonutility firms listed on NYSE, AMEX, and NASDAQ with CRSP/Compustat and I/B/E/S coverage during 1976–2009.

which the subsample regressions indicate a weaker *TI* sensitivity to V/P. These results provide further support for Hypotheses 3–7.[17]

6. Robustness

We now consider several alternative hypotheses that potentially might explain the relation of V/P to new financing.

[17] In unreported tests, we include in one single regression the entire set of interactions between the baseline independent variables and all the conditioning indicator variables (excluding $I(NSELL)$ for the sake of sample size). The results are qualitatively similar to those reported in Table 9, with somewhat reduced significance because of the greater number of regressors, the multicollinearity associated with the high correlation of size with turnover, and the fact that some of the variables are proxies for the same economic forces (e.g., B/P, R&D, and size all get at growth and at intangible intensity).

6.1 Earnings forecast management in advance of issuance

Previous research documents that firms manage earnings upward in advance of equity issues (Teoh, Welch, and Wong 1998a, 1998b) and that such earnings management is associated with higher analyst forecasts (Teoh and Wong 2002). This raises the possibility that such higher forecasts increase V/P via the numerator.

It is not obvious whether this biases our tests, because the higher analyst forecasts that raise V may also be associated with higher market valuations P. Indeed, the abovementioned studies provide postevent return evidence suggesting that earnings management does increase market valuations prior to new issues. Furthermore, Teoh and Wong (2002) find that this effect is facilitated by the upward earnings management on analyst forecasts.

If this bias is present, it would operate against the effects we find. If earnings management causes an increase in V/P prior to new issues, and if this effect is strong for larger issues, that would induce a positive association between the two variables, which would oppose the misvaluation hypothesis that overvalued firms issue more equity. Our finding is a negative relation between the two variables. So, to the extent that this bias is important, the true effect is even stronger than what we have estimated.

6.2 Time-varying adverse selection, disagreement, and analyst forecast biases

We first consider several possible channels through which V/P might be proxying for something other than misvaluation, with a focus on how analysts make forecasts. Lucas and McDonald (1990) extend the theory of Myers and Majluf (1984) to a dynamic setting to derive implications about how adverse selection effects vary over time. Choe, Masulis, and Nanda (1993) consider how time-varying adverse selection affects aggregate equity issues. The time-varying adverse selection hypothesis is also tested in Dittmar and Thakor (2007). Variation in information asymmetry may affect the accuracy or bias of the analyst forecasts used in the calculation of V/P, which in some fashion might induce correlations between V/P and issuance.

Furthermore, Dittmar and Thakor (2007) present and test a model that predicts that firms are more likely to issue equity when prices are high, so that investors are in agreement with managers' investment decisions and are likely to respond positively to additional investment. If prices are low, indicating more disagreement between investors and managers, then managers are more inclined to issue debt. This raises the possibility that disagreement (regardless of whether it derives from information asymmetry) might induce correlations between V/P and issuance.

Our earlier tests already address any tendency for time-varying adverse selection or disagreement to affect the time series of V/P and issuance, as we find strong cross-firm misvaluation effects on issuance (Tables 3 and 4). To address cross-sectional effects of adverse selection or disagreement, we include proxies for information asymmetry and disagreement in the issuance regression. In unreported tests, we consider three proxies for information asymmetry or disagreement and possible forecast bias: number of analysts following the firm, analyst forecast error (mean forecasted earnings minus actual earnings) scaled by actual earnings, and dispersion in analyst one-year unadjusted earnings forecast deflated by book value per share. When we include these additional variables, the results are similar to those of our baseline regression (Model 3 of Table 5).

Finally, Richardson, Teoh, and Wysocki (2004) show that analyst forecasts, which are upward biased at long time horizons, switch to being downward biased close to the earnings announcement, and that this "walk-down" to beatable forecasts is stronger for high market-to-book and larger firms. If the walk-down drives our findings about the relation of issuance to V/P, then the sensitivity of issuance to V/P should be especially strong among growth firms and large firms, for which the walk-down is strongest. We do find that the sensitivity of equity issuance to V/P is stronger among growth firms. However, we also find that the effect of firm size is in the opposite direction of that implied by the proposed bias: The sensitivity of equity issuance to V/P is strongest among *small* firms. So, it is unlikely that analyst walk-down explains our findings.

6.3 Macroeconomic influences on financing decisions

As shown in Table 2, issuances and valuation ratios vary substantially over time. Choe, Masulis, and Nanda (1993) document the relation of business cycles to issuing decisions. These effects may be driven by shifts in growth opportunities, but our empirical approach was designed to filter out and control for growth effects. However, as discussed in Choe, Masulis, and Nanda (1993), there are other possible reasons for the time variation in issuance and valuation ratios.

One possibility is that as macroeconomic conditions fluctuate, they affect the level of new issues, and that these shifts are correlated over time with the misvaluation proxy V/P. This possibility would not, however, explain the results of our purely cross-sectional tests (Tables 3 and 4).

A different possibility is that macroeconomic conditions differentially affect issuance of different firms in the cross-section, and also affect the cross-section of measurement error in the misvaluation proxy V/P. To address this, we add macrovariables as controls in the issuance regressions. Our proxies for macroeconomic conditions are the value-weighted market index return over the prior one-year period ($RET1Y$), and the real GDP growth rate over the prior year (*GDPG*).

Table 10 reports the augmented regressions with one of the macroeconomic variables and its interaction with V/P included as independent variables (we include Model 1, the baseline regression, for ease of comparison). None of the baseline regression coefficients are affected much by the inclusion of these macrovariables. There is an indication that firms tend to issue more debt

Table 10
Controlling for the effects of macroeconomic variables: Market index return and GDP growth

	(1) *EI*	(2) *EI*	(3) *EI*	(1) *DI*	(2) *DI*	(3) *DI*	(1) *TI*	(2) *TI*	(3) *TI*
V/P	−2.58	−2.54	−2.35	0.05	0.38	0.03	−2.53	−2.15	−2.32
	(−4.78)	(−4.61)	(−3.62)	(0.11)	(1.32)	(0.09)	(−3.42)	(−3.08)	(−3.51)
B/P	−4.79	−4.80	−4.88	−5.08	−4.84	−4.78	−9.87	−9.64	−9.66
	(−7.66)	(−8.14)	(−8.62)	(−9.74)	(−8.64)	(−8.23)	(−9.92)	(−9.49)	(−9.40)
CF	−0.04	−0.04	−0.04	0.08	0.07	0.07	0.03	0.03	0.03
	(−1.22)	(−1.23)	(−1.15)	(4.46)	(4.27)	(4.21)	(0.76)	(0.63)	(0.64)
ROA	−0.19	−0.19	−0.19	−0.07	−0.07	−0.07	−0.26	−0.26	−0.25
	(−3.88)	(−3.88)	(−3.88)	(−4.79)	(−4.71)	(−4.64)	(−5.14)	(−5.18)	(−5.11)
LEV	−4.95	−4.89	−4.86	−2.64	−3.08	−2.91	−7.59	−7.97	−7.77
	(−5.61)	(−5.54)	(−5.41)	(−4.16)	(−4.51)	(−4.20)	(−6.27)	(−6.79)	(−6.33)
Log(AGE)	−3.04	−3.06	−3.08	−1.82	−1.79	−1.71	−4.86	−4.84	−4.79
	(−8.71)	(−8.67)	(−9.04)	(−7.36)	(−8.17)	(−7.64)	(−9.70)	(−10.01)	(−10.08)
MKT	1.20	1.07	1.10	−0.28	−0.07	−0.08	0.92	1.00	1.02
	(4.00)	(3.25)	(3.54)	(−1.20)	(−0.33)	(−0.37)	(2.22)	(2.28)	(2.38)
SMB	1.76	1.77	1.77	0.20	0.15	0.18	1.96	1.92	1.95
	(4.38)	(4.43)	(4.41)	(1.44)	(1.08)	(1.34)	(4.43)	(4.37)	(4.45)
HML	−1.28	−1.25	−1.24	0.06	0.03	−0.01	−1.22	−1.22	−1.25
	(−2.87)	(−2.86)	(−2.88)	(0.35)	(0.19)	(−0.03)	(−2.27)	(−2.27)	(−2.35)
RET1Y		0.01			0.07			0.08	
		(0.21)			(3.00)			(1.83)	
*V/P*RET1Y*		−0.03			0.01			−0.03	
		(−1.52)			(0.73)			(−0.82)	
GDPG			−0.14			0.61			0.47
			(−0.41)			(3.28)			(1.04)
*V/P*GDPG*			−0.15			0.13			−0.02
			(−0.63)			(1.15)			(−0.07)
Intercept	19.39	19.64	20.13	15.98	14.69	13.48	35.37	34.34	33.61
	(12.32)	(12.43)	(12.69)	(10.49)	(10.91)	(9.36)	(13.87)	(14.22)	(13.69)
N	51,866	51,866	51,866	51,866	51,866	51,866	51,866	51,866	51,866
R^2	0.0751	0.0756	0.0757	0.0331	0.0371	0.0383	0.0727	0.0735	0.0734

This table assesses the impact of macroeconomic conditions on the effect of the misvaluation on equity issuance (*EI*), debt issuance (*DI*), and the sum of the issuances (*TI*). The regression as specified in model (3) of Table 5 is augmented with a macroeconomic variable (*RET1Y*, value-weighted CRSP market index return over the prior one-year period, or *GDPG*, the real growth rate of GDP over the prior year) and its interaction with the misvaluation proxy V/P. The other regression variables are defined in Table 5. All regressions include 2-digit SIC major industry indicators. The sample includes U.S. nonfinancial, nonutility firms listed on NYSE, AMEX, and NASDAQ with CRSP/Compustat and I/B/E/S coverage during 1976–2009.

when the aggregate economy is experiencing high growth, as reflected by the significant and positive coefficient of $RET1Y$ or *GDPG* in the *DI* regression. However, none of the interactions between V/P and these macrovariables is significant in any of the *EI*, *DI*, or *TI* regressions. So, there is no indication that the effects we document are driven by shifts in macroeconomic conditions.

6.4 Difference of opinion among investors

Hypothesis 7 describes the relation of turnover, as a proxy for investor short-termism, to the sensitivity of issuances on misvaluation. However, turnover and variables such as dispersion of analyst forecasts are also used as proxies for difference of opinion in the literature (e.g., Chen, Hong, and Stein 2002; Diether, Malloy, and Scherbina 2002). These papers apply predictions from Miller (1977) to test whether difference of opinion among investors increases market valuations. This raises the question of whether our tests of Hypothesis 7 may actually be picking up the effects of investor disagreement on valuation, as reflected in V/P.

To distinguish these interpretations, in unreported tests, we regress turnover on V/P to construct a residual turnover measure that is orthogonal to V/P. We then use residual turnover as the conditioning variable in lieu of turnover in the subsample regression test of Table 7, Panel B, as well as in the integrated regression approach as in Table 9. We find that sensitivities of equity issuance and total issuance to overvaluation as proxied by V/P is much higher in firms with high residual turnover. This is consistent with the interpretation that turnover is capturing the effects of investor short-termism rather than investor-disagreement-induced overvaluation.

6.5 Risk

Despite the design of V to purify P in V/P, and our inclusion of controls for growth opportunities and risk, V/P could be capturing risk effects. Ceteris paribus, when the risk of a firm declines, its price increases, which reduces V/P. Furthermore, ceteris paribus, we expect the firm to invest more, which could be associated with equity issuance.

Some findings in past literature cast doubts upon this risk pathway of causality. Suppose that the conventional risk controls we use in this study fail to adequately capture risk. The study of Autore, Bray, and Peterson (2009) examines post-issue returns conditioning on firms' stated plans for use of issue proceeds and finds that "…issuers stating recapitalization or general corporate purposes experience abnormally poor performance in the subsequent three years, but issuers stating investment display little or no subsequent underperformance." In contrast, under the risk pathway, the firms that are investing the proceeds should have low risk and hence low subsequent return performance relative to conventional benchmarks.

Furthermore, in the risk account, issuers that have high market-to-book have low risk and hence should invest more of their issue proceeds. But, Kim and Weisbach (2008) find that high market-to-book firms have a greater tendency to raise capital and *not* invest it. Furthermore, the insiders of such firms are more prone to sell, which Kim and Weisbach argue is consistent with their exploiting overvaluation.

Of course, it is impossible for us to completely rule out the possibility that variations in V/P reflect variations in risk and that it is risk that is causing equity issuance. However, in unreported tests, we find that when firms are sorted into quintile subsamples based on previous change in investment (the sum of capital expenditures and R&D), or when firms are double-sorted based on the signs of previous equity issuance and previous change in investment, V/P continues to be a strong and highly significant positive predictor of returns within each of the subsamples. So, controlling for either investment change or use of funds from issuance (which, in the risk account, are proxies for the shift in risk) does not seem to hamper the ability of V/P to predict future returns.

7. Concluding Remarks

An implication of the inefficient markets approach to financing decisions is that firms raise more capital, and especially issue more equity, when their shares are overvalued. We test whether equity misvaluation as measured by the ratio of residual income valuation to price (V/P) affects the net amount of equity and debt issuances. We measure misvaluation by the value/price ratio V/P, instead of book/price (B/P), to focus more sharply on the effects of mispricing as opposed to growth opportunities or management quality.

Using the purified measure, V/P, we find strong evidence that greater overvaluation predicts greater total and equity issuance. Furthermore, consistent with the incentive for overvalued firms to substitute from debt to equity issuance, the sensitivity of equity issuance to overvaluation is greater (more positive) than that of debt issuance.

There are different possible reasons why misvaluation affects financing. Jensen (2004, 2005) provides a catering argument, that the pressure on managers to take actions such as raising capital to finance ambitious projects is especially strong among overvalued firms. Also, owing to project-scale economies, the effect of misvaluation on issuance is likely to be strongest among overvalued firms. Consistent with these explanations, we find that the sensitivity of total issuance and equity issuance to misvaluation is much stronger among firms in the lowest V/P quintiles. Similarly, using insider selling as a proxy for equity overvaluation, we confirm in the subsample with nonmissing insider trading data that the marginal effect of V/P on equity issuance is greater among firms with high net insider selling. The nonlinear effect of V/P is especially strong in the 1990s period that Jensen and others have identified as having strong valuation effects on investment. For example, Shleifer (2000) attributed the boom in high-tech IPOs during this period to irrational overvaluation.

To explore inefficient markets theories of financing decisions in more depth, we examine how the effects of misvaluation on security issuances differ in subsamples of firms sorted by different conditioning variables. Consistent with the catering and project-scale economy theories, we find that the sensitivity of issuance to misvaluation is stronger among firms with high growth opportunities, as measured either by low book-to-market ratios or by high levels of R&D expenditures; and that small firms have a much higher sensitivity of total issuance and equity issuance to misvaluation than do large firms, especially during the 1990s. Consistent with greater catering by firms in their investment/financing decisions when investors have short time horizons (Polk and Sapienza 2009), we also find that the sensitivity of equity issuance and total issuance to misvaluation is greatest among firms with high stock turnover.

The relationship between equity overvaluation and new issues could potentially be influenced by several other forces considered in previous literature, such as time-varying adverse selection, management-investor disagreement, divergence of investor opinion, and macroeconomic conditions. Robustness checks provide evidence that the effect of misvaluation on issuance obtains even after controlling for these other possible effects. Overall, the evidence presented here supports the proposition that overvalued equity is important for firms' financing decisions, and is consistent with explanations based upon catering, project-scale economies, and investor short-termism.

References

Ali, A., L.-S. Hwang, and M. A. Trombley. 2003. Residual-income-based valuation predicts future stock returns: Evidence on mispricing versus risk explanations. *Accounting Review* 78:377–96.

Autore, D., D. Bray, and D. Peterson. 2009. Intended use of proceeds and the long-run performance of seasoned equity issuers. *Journal of Corporate Finance* 15:358–67.

Baker, M., R. S. Ruback, and J. Wurgler. 2007. Behavioral corporate finance: A survey. In *Handbook of corporate finance: Empirical corporate finance*, Volume 1, Chap. 4, pp. 145–183. Ed. E. Eckbo. Amsterdam: North Holland.

Baker, M., and J. Wurgler. 2000. The equity share in new issues and aggregate stock returns. *Journal of Finance* 55:2219–57.

———. 2002. Market timing and capital structure. *Journal of Finance* 57:1–32.

Baker, M., J. Stein, and J. Wurgler. 2003. When does the market matter? Stock prices and the investment of equity-dependent firms. *Quarterly Journal of Economics* 118:969–1005.

Barberis, N., and M. Huang. 2001. Mental accounting, loss aversion, and individual stock returns. *Journal of Finance* 56:1247–92.

Bayless, M., and S. Chaplinsky. 1996. Is there a window of opportunity for seasoned equity issuance? *Journal of Finance* 51:253–78.

Brainard, W., and J. Tobin. 1968. Pitfalls in financial model building. *American Economic Review: Papers and Proceedings* 58:99–122.

Butler, A. W., J. Cornaggia, G. Grullon, and J. P. Weston. 2011. Corporate financing decisions, managerial market timing, and real investment. *Journal of Financial Economics* 101:666–83.

Chen, J., H. Hong, and J. C. Stein. 2002. Breadth of ownership and stock returns. *Journal of Financial Economics* 66:171–205.

Choe, H., R. W. Masulis, and V. Nanda. 1993. Common stock offerings across the business cycle: Theory and evidence. *Journal of Empirical Finance* 1:3–31.

Daniel, K. D., D. Hirshleifer, and A. Subrahmanyam. 2001. Overconfidence, arbitrage, and equilibrium asset pricing. *Journal of Finance* 56:921–65.

Daniel, K. D., and S. Titman. 1997. Evidence on the characteristics of cross-sectional variation in common stock returns. *Journal of Finance* 52:1–33.

DeAngelo, H., L. DeAngelo, and R. M. Stulz. 2010. Seasoned equity offerings, market timing, and the corporate lifecycle. *Journal of Financial Economics* 95:275–95.

Diether, K. B., C. J. Malloy, and A. Scherbina. 2002. Differences of opinion and the cross-section of stock returns. *Journal of Finance* 57:2113–41.

Dittmar, A. K., and A. Thakor. 2007. Why do firms issue equity? *Journal of Finance* 62:1–54.

D'Mello, R., and P. K. Shroff. 2000. Equity undervaluation and decisions related to repurchase tender offers: An empirical investigation. *Journal of Finance* 55:2399–424.

Dong, M., D. Hirshleifer, S. Richardson, and S. H. Teoh. 2006. Does investor misvaluation drive the takeover market? *Journal of Finance* 61:725–62.

Dong, M., I. Loncarski, J. ter Horst, and C. Veld. 2012. What drives security issuance decisions: Market timing, pecking order, or both? *Financial Management* 41:637–63.

Eckbo, B. E., and R. W. Masulis. 1995. Seasoned equity offerings: A survey. In *Handbooks in operations research and management science and management science*, Volume 9, Chapter 31, pp. 1017–72. Eds. R. A. Jarrow, V. Maksimovic, and W. T. Ziemba. Amsterdam: North Holland.

Fama, E. F. 1998. Market efficiency, long-term returns, and behavioral finance. *Journal of Financial Economics* 49:283–306.

Frankel, R., and C. Lee. 1998. Accounting valuation, market expectation, and the book-to-market effect. *Journal of Accounting and Economics* 25:283–321.

Gilchrist, S., C. Himmelberg, and G. Huberman. 2005. Do stock price bubbles influence corporate investment? *Journal of Monetary Economics* 52:805–27.

Graham, J. R., and C. R. Harvey. 2001. The theory and practice of corporate finance: Evidence from the field. *Journal of Financial Economics* 60:187–243.

Henderson, B. J., N. Jegadeesh, and M. S. Weisbach. 2006. World markets for raising new capital. *Journal of Financial Economics* 82:63–101.

Ikenberry, D., J. Lakonishok, and T. Vermaelen. 1995. Market underreaction to open market share repurchases. *Journal of Financial Economics* 39:181–208.

Jensen, M. C. 2004. Agency costs of overvalued equity. Working Paper, Harvard Business School.

———. 2005. Agency costs of overvalued equity. *Financial Management* 34:5–19.

Jenter, D. 2005. Market timing and managerial portfolio decision. *Journal of Finance* 60:1903–49.

Kaplan, S. N., and L. Zingales. 1997. Do investment–cash-flow sensitivities provide useful measures of financing constraints? *Quarterly Journal of Economics* 113:169–215.

Kim, W., and M. S. Weisbach. 2008. Motivations for public equity offers: An international perspective. *Journal of Financial Economics* 87:281–307.

Korajczyk, R. A., D. J. Lucas, and R. L. McDonald. 1991. The effect of information releases on the pricing and timing of equity issues. *Review of Financial Studies* 4:685–708.

Lakonishok, J., and T. Vermaelen. 1990. Anomalous price behavior around repurchase tender offers. *Journal of Finance* 45:455–77.

Lee, C. M., J. Myers, and B. Swaminathan. 1999. What is the intrinsic value of the Dow? *Journal of Finance* 54:1693–741.

Ljungqvist, A., V. Nanda, and R. Singh. 2006. Hot markets, investor sentiment, and IPO pricing. *Journal of Business* 79:1667–702.

Loughran, T., and J. Ritter. 1995. The new issues puzzle. *Journal of Finance* 50:23–52.

———. 2000. Uniformly least powerful tests of market efficiency. *Journal of Financial Economics* 55:361–89.

Lucas, D. J., and R. L. McDonald. 1990. Equity issues and stock price dynamics. *Journal of Finance* 45:1019–43.

Lyandres, E., L. Sun, and L. Zhang. 2008. The new issues puzzle: Testing the investment-based explanation. *Review of Financial Studies* 21:2825–55.

Miller, E. M. 1977. Risk, uncertainty, and divergence of opinion. *Journal of Finance* 32:1151–68.

Moskowitz, T. J., and M. Grinblatt. 1999. Do industries explain momentum? *Journal of Finance* 54:1249–90.

Myers, S. C., and N. S. Majluf. 1984. Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics* 13:187–221.

Newey, W. K., and K. D. West. 1987. A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. *Econometrica* 55:703–8.

Ohlson, J. 1995. Earnings, book values, and dividends in equity valuation. *Contemporary Accounting Research* 11:661–87.

Petersen, M. A. 2009. Estimating standard errors in finance panel data sets: Comparing approaches. *Review of Financial Studies* 22:435–80.

Peyer, U., and T. Vermaelen. 2009. The nature and persistence of buyback anomalies. *Review of Financial Studies* 22:1693–745.

Polk, C., and P. Sapienza. 2009. The stock market and corporate investment: A test of catering theory. *Review of Financial Studies* 22:187–217.

Richardson, S., S. H. Teoh, and P. D. Wysocki. 2004. The walk-down to beatable analyst forecasts: The role of equity issuance and insider trading incentives. *Contemporary Accounting Research* 21:885–924.

Ritter, J. R. 1991. The long-run performance of initial public offerings. *Journal of Finance* 46:3–27.

Shleifer, A. 2000. Are markets efficient? No, arbitrage is inherently risky. *Wall Street Journal* 236:A10.

Spiess, D. K., and J. Affleck-Graves. 1995. Underperformance in long-run stock returns following seasoned equity offerings. *Journal of Financial Economics* 38:243–68.

———. 1999. The long-run performance of stock returns following debt offers. *Journal of Financial Economics* 54:45–73.

Stein, J. 1996. Rational capital budgeting in an irrational world. *Journal of Business* 69:429–55.

Teoh, S. H., I. Welch, and T. J. Wong. 1998a. Earnings management and the long-term market performance of initial public offerings. *Journal of Finance* 53:1935–74.

———. 1998b. Earnings management and the underperformance of seasoned equity offerings. *Journal of Financial Economics* 50:63–99.

Teoh, S. H., and T. Wong. 2002. Why do new issues and high accrual firms underperform? The role of analysts' credulity. *Review of Financial Studies* 15:869–900.

Teoh, S. H., T. J. Wong, and G. Rao. 1998. Are accruals during an initial public offering opportunistic? *Review of Accounting Studies* 3:175–208.

Titman, S., J. K. Wei, and F. Xie. 2004. Capital investment and stock returns. *Journal of Financial and Quantitative Analysis* 39:677–701.

Tobin, J. 1969. A general equilibrium approach to monetary theory. *Journal of Money, Credit, and Banking* 1:15–29.