Investment Concentration and the Importance of Cash Flow

Gustavo Grullon, John Hund, and James Weston*

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Abstract

Capital expenditures by the top 100 firms make up more than 60% of aggregate investment by publicly traded firms and account for most of the variation in aggregate net fixed private non-residential investment. Surprisingly, these firms have the highest investment-cash flow sensitivity in the economy, despite being the least financially constrained. Further, contrary to the trend among smaller firms, the investment-cash flow sensitivity of the top capital spenders has not disappeared over time. For these firms, we find that cash flows provide better information about future investment opportunities than proxies for Tobin's q. Our results suggest that inferences based on the average or median public firm may not extend to the firms that drive most of the fluctuations in aggregate investment.

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*Gustavo Grullon (grullon@rice.edu), John Hund (jhund@rice.edu), and James Weston (westonj@rice.edu) are at the Jones Graduate School of Business at Rice University. We appreciate comments from seminar participants at the BI Norwegian Business School, the Interdisciplinary Center Herzliya, Rice University, Tel Aviv University, University of California-San Diego, and the University of Melbourne.

Aggregate investment by publicly traded firms is highly concentrated among a small number of very large firms. In 1970, capital expenditures by the largest 100 spenders made up about 65% of total spending. In 2010, the largest 100 spenders still accounted for more than 60%, while the largest 500 spenders contributed almost 90% of total aggregate capital expenditures. This high concentration at the top of the distribution of capital spenders presents a challenge to the existing literature on corporate investment. If top spenders are significantly different from other firms, then both structural investment models using parameters from a representative firm (e.g., average firm) and cross-sectional tests giving equal weights to all observations could miss the dynamics of aggregate corporate investment and financing decisions.

We show that firms driving most of the aggregate fluctuations in investment in the U.S. behave differently from the typical, or average, firm. Specifically, we find that the top capital spenders in the U.S. have the highest investment-cash flow sensitivity among all publicly traded firms.[1] This is a surprising and puzzling result because the top capital spenders are not financially constrained in any way. Using different measures of financial constraints, we find that the top 10% capital spenders are the least financially constrained firms in our sample. These are large, old, highly profitable firms that have easy access to the debt market, and distribute a large fraction of their earnings through dividends and share repurchases.

Perhaps even more surprising, we show that the investment-cash flow sensitivity of the top capital spending firms has been relatively stable over time. This result contrasts with Chen and Chen (2012) who find that the investment-cash flow sensitivity of the *average* firm in the U.S. has declined over the past four decades. Overall, our results suggest that at least for the

[1] This result has been hinted at before, at least going back to Gilchrist and Himmelberg (1995) and Erikson and Whited (2000) who find that larger firms have higher investment-cash flow sensitivity. However, both studies focus on other issues and do not explore the economic reasons for the high investment-cash flow sensitivities in the upper tail of the distribution.

firms that drive most of the aggregate investment in the U.S., cash flows remain an important determinant of corporate investment policy.

The fact that the largest real investors show the highest sensitivity to cash flows is puzzling. Q-theory predicts that marginal q is a sufficient statistic for investment, so cash flows should not play any role in explaining corporate investment (Hayashi (1982)). However, there is a considerable literature arguing that cash flows can have a positive effect on investment in the presence of financial frictions. Fazzari, Hubbard and Petersen (1988), Gomes (2001), Moyen (2004), and Hennessy and Whited (2007), among others, examine models in which financial constraints, such as the inability to raise funds in the capital markets, force firms to depend almost exclusively on their internally generated funds to finance their investment projects. As a consequence of these market frictions, firms' capital expenditures become sensitive to variations in the firms' internal cash flows. Although this is a reasonable and intuitive explanation for the positive correlation between capital expenditures and cash flow shocks, it cannot explain our main finding. In fact, our results indicate the opposite effect – the least financially constrained firms in the economy appear to be the most sensitive to cash flow shocks.

We show that the high investment-cash flow sensitivity among the top capital spenders has a simple explanation: cash flow is a better predictor of future investment for these firms. If current cash flows provide information about future growth options not reflected in noisy estimates of Tobin's q, then current cash flows should predict future capital expenditures. In fact, we show that realized 10-year horizon future investment rates are more correlated with current cash flows than with proxies for Tobin's q. Consistent with the argument in Erickson and Whited (2000), our results indicate that cash flow sensitivities appear to capture measurement errors in Tobin's q rather than levels of financial constraints.

We also test whether the largest investing firms finance their investment spending differently from other firms. Indeed, we find that they do. Following the methodology of Frank and Goyal (2003), we find that the largest investors first use internal cash flows, then debt, and then equity if needed. This pattern in the data decays rapidly as the sample size increases to include firms with less investment spending. Our evidence suggests that these firms are not equity dependent since their issuance behavior suggests that debt issues track the financing deficit more closely than do net equity issues. Even though debt issues track the financing deficit for less than 10% of public firms, these firms account for more than 70% of total investment.

Our paper also contributes to the debate on whether investment-cash flow sensitivities reflect financial constraints. It is well known that these measures are flawed (e.g. Kaplan and Zingales, 2000, Erikson and Whited 2000, Whited and Wu, 2006, Hadlock and Pierce, 2010). However, our findings seem to contradict the predictions of recent theoretical models. For example, Alti (2003) argues that because young firms learn a great deal of information about their long-run profitability by observing their own cash flows, these firms' investment decisions should be more sensitive to cash flow shocks. Although we find evidence that current cash flows provide information about future investment opportunities, this information appears more relevant for mature firms than for young firms. One potential explanation for this result is that the cash flows of mature firms are more autocorrelated, and consequently, they provide better information about future profitability.

Our results are also related to Baker, Stein, and Wurgler (2003), who link investment to stock prices (proxy for Tobin's q) through the equity financing channel. Using the Kaplan and Zingales' (1997) KZ-index to measure financial constraints, these authors argue that mispriced equity dependent firms have more sensitivity to Tobin's q. We reevaluate these results using better measures of financial constraints and find somewhat different results. Consistent with the basic idea in Baker, Stein, and Wurgler (2003), we also find that many equity dependent firms have a higher sensitivity to stock prices. However, when properly sorted, these firms constitute very little (less than 1%) of actual real investment spending. Our results are consistent with those in Bakke and Whited (2010) who find no support for the equity dependence and mispricing channels for large firms. While the stock market may drive investment for a large number of relatively small firms, it remains a sideshow for both aggregate investment and the top capital spenders that dominate aggregate investment.

Our paper also sheds light on the empirical performance of the q-theory of investment. Although this model shows some promise in cross-sectional tests, its empirical performance at the aggregate level has been decidedly poor.[2] There are a number of good reasons for why the q-theory seems to fail empirically.[3] For example, we usually measure the average q, not the marginal q and even then – only with substantial error. Erickson and Whited (2000) suggest that much of the standard cross-sectional regression results are plagued with measurement error problems. In fact, some studies suggest that cash flows themselves may proxy for investment opportunities better than (average) q itself.[4] Our argument is distinct from these studies in that we focus on the heterogeneity in investment *levels* to show that the significant concentration of investment spending among U.S. firms can confound simple analysis of the average firm in the cross section.

[2] See, for example, Clark (1979), Von Furstenberg (1977), Abel and Blanchard (1989), Morck, Shleifer, and Vishny (1990), and Blanchard, Rhee, and Summers (1993).
[3] Erickson and Whited (2012) provide an overview of some of the problems with the empirical implementation of the q-theory.
[4] In an interesting parallel, this argument hearkens back to early accelerator models of investment theory, where real investment was assumed to be driven by shocks to output or in later versions, by sales. See for instance, the early accelerator models of Fisher (1933), Samuelson (1939), and Clark (1970). Caballero and Leahy (1996) also link investment opportunities to cash flows via fixed adjustment costs. Gomes (2001) and Gala and Gomes (2012) also argue that cash flows may be less noisy proxies for investment opportunities.

Finally, our findings seem to provide an explanation to the results in DeAngelo, DeAngelo and Skinner (2004), and Fama and French (2001), who document substantial concentration in earnings and dividends among U.S. firms. Because both earnings and dividends are generated from the previous investments made by firms, it is not surprising that these cash flows are naturally distributed to the "winners" of prior concentrated investment spending.

The recurring theme in our tests is that the largest investing firms behave much differently from the median public firm. The big spenders are not constrained, but are especially sensitive to cash flow. These firms' investment spending is less sensitive to their stock prices. They have little time series variation in their cash flow sensitivity and their debt issues closely track their financing deficit. This collection of results is opposite what a researcher would conclude by studying the behavior of the average, median, or representative public firm.

These stark differences are not simply the result of computing equal vs. value weighted averages. The marginal sensitivities of corporate decisions appear to change across the size distribution. This suggests either large differences in market frictions, incentives, factor prices, or rates of technical substitution. Models of corporate investment and financing decisions based on the behavior of a representative firm may fail to explain variations in macroeconomic outcomes if those models do not predict decisions for the largest firms that matter the most.

In fact, we show that fluctuations in the capital expenditures of just the top 100 spenders explain nearly two thirds of the variation in aggregate net fixed private non-residential investment. Most of this explanatory power comes from just the top 50 spenders, whose investment explains 58% of the fluctuations in aggregate investment. Our results complement past studies like Gabaix (2010) and Doms and Dunne (1998) who also focus on the skewed aggregate impact of large firms. Instead of focusing on the average COMPUSTAT firm to make inferences about aggregate investment behavior, theoretical models may need to focus on the behavior of the top capital spenders to get a better understanding of how economies create productive capital.

Our analysis proceeds as follows. Section 2 describes the sample selection procedure and defines the variables. Section 3 documents the concentration and persistence of investment spending among U.S. firms. Section 4 contains the results of our analysis of the top capital spenders, showing that these firms have substantial cash flow sensitivities. In Sections 5 and 6 we test several explanations for the high cash flow sensitivities of the largest investment spenders, including financial constraints and investment opportunities. In Section 7, we test whether the largest spenders fill their financing gap with debt or equity. Section 8 tests the robustness of our results to measurement errors. Section 9 concludes.

2. Sample Selection and Variable Definitions

We use a comprehensive sample of Compustat firms from 1950 through 2011, although for some of our analysis we restrict the sample to the period from 1964 onward and use those firms for which we have data on both CRSP and Compustat. We exclude financial firms (SIC codes 6000 through 6999) and utilities (SIC codes 4900 through 4999), firms with assets under $10 million, and firms with negative book or market value or capital expenditures. Generally, our discussion of investment concentration uses the most comprehensive set of firms available (all Compustat firms from 1950 onwards subject only to the above screens). Following the methodology in Almeida, Campello, and Galvao (2010), we exclude from our regression analysis firms that do not have sufficient lagged values to generate the instrumental variable correction for the measurement bias in Tobin's q. We also obtain data on GDP and aggregate investment from the Bureau of Economic Analysis, and age data from Jovanovic and Rousseau (2001) that is supplemented with data from Fink, Fink, Grullon, and Weston (2011).

Our main investment and cashflow variables are constructed as in Baker, Stein, and Wurgler (2003). Specifically, we define investment as capital expenditures (Compustat item CAPX) at time t scaled by the book value of total assets (item AT) at time t-1, and cashflow as income before extraordinary items (item IB) plus depreciation (item DP) at time t scaled by the book value of total assets at time t-1. Tobin's q is defined as the book value of total assets plus the market value of equity (MV) minus the book value of equity (item CEQ) minus deferred taxes (item TXDB) scaled by the book value of total assets. The market value of equity (MV) is defined as the total number of common shares outstanding (item CSHO) times the closing stock price at the end of the fiscal year (item PRCC_F). Sales is defined as the total sales of the firm (item SALE).

For our primary measure of financial constraints, we construct the Hadlock and Pierce (2010) index as:

$$\text{HP index} = -0.737\times\text{size} + 0.043\times\text{size}^2 - 0.04\times\text{age},$$

where size is the log of the book value of total assets and age is the difference between the sample year and the year of the firm's incorporation or founding. When constructing the HP index, we winsorize each component every year at the 2.5% level.

For consistency with past studies, we also use the four-variable version of the Kaplan and Zingales' (1997) financial constraints index as constructed in Baker, Stein, and Wurgler (2003):

$$\text{KZ index} = -1.002\times\text{cashflow} - 39.38\times\text{dividend rate} - 1.315\times\text{cash rate} + 3.139\times\text{leverage},$$

where cashflow is defined above, the dividend rate is the total amount of dividends declared on common shares (item DVC) plus the total amount of dividends declared on preferred stocks (item DVP) scaled by the book value of total assets at time t-1, cash rate is cash plus short-term investments (item CHE) scaled by the book value of total assets at time t-1, and leverage is the sum of total liabilities (item LT) and total current liabilities (item DLC) scaled by total liabilities plus total current liabilities plus total stockholders'equity (item SEQ).

3. Concentration of Investment Spending

In this section we examine the concentration of investment spending in the U.S. to determine whether the investment of large firms plays an important role at the aggregate level. We begin our analysis by examining the total percentage of all capital expenditures in the Compustat database accounted for by the top N investing firms, where N varies from 10 to 200. Figure 1 shows the results from this analysis. It is clear from this figure that real investment is highly concentrated in a small number of companies; the top 200 capital spenders accounted for almost 70% of all real investment by all public companies in nearly all years since 1973, though there was a modest decrease to about 63% over the period 1991-1998. This number understates the true concentration of investment by public companies because even within the top investors, real investment is concentrated in a very small number of firms. For example, the amount of total capital investment accounted for by the largest 10 investors has stayed relatively constant at around 20%.

The concentration in real investment is also surprising because most firms invest each year (at the very least to cover capital depreciation) whereas other corporate finance variables (such as dividends) are more discretionary in nature. While DeAngelo, DeAngelo, and Skinner (2004) document a dramatic and increasing concentration in cash dividend payouts, we show a similar but very persistent concentration in investment. Table 1 shows cumulative and cohort percentages and dollar values (inflation adjusted) of capital expenditures for investment-ranked groups of 100 firms in 1973, 1990, and 2010. In all 3 years, the bulk of investment is concentrated in the top 200 firms which do well over 70% of all capital investment. In actual dollar terms, the top 200 firms in 2010 invested over 3 times as much ($941 billion) as the other

3,400 firms ($301 billion).[5] There appears to be a dip in investment concentration in 1990 (see also Figure 1) but even in that year the top 200 capital spenders generated over 2.5 times the total investment of all other firms combined.

Our analysis not only reveals that real investment is highly concentrated among a small number of firms, but also that these firms are generally the same year after year. Figure 2 shows the persistence of membership in the top ventile of aggregate investment intensity and the total % of capital expenditures accounted for by those firms. Over half of all firms in the top ventile persist in the top ventile for at least 5 years, and even among the top capital spenders in this set they are the largest, since the associated percentage of total investment accounted for by the very persistent firms exceeds 50%.[6]

Firms that do the bulk of the investment in the US also account for the majority of earnings and dividends paid. DeAngelo, DeAngelo, and Skinner (2004) note that the top 100 dividend paying firms account for 81.8% of total dividends paid in 2000. In Table 2 we show that not only there is substantial concentration in dividends and investment, in many cases the firms that are driving this concentration are the same firms. In every year since 1974 there have been at least 100 firms that are jointly in the top 5% of real investment, dividends paid, and operating cashflow. Together, these large firms generally supply about half of all investment, pay about 50% of all dividends, and earn 50% of all operating cashflows.[7] To summarize, this section show that the total investment in Compustat is persistently dominated by a very small

[5] Values for all of bottom firms do not sum exactly to the values for the 2000 firms shown in Table 1, due to 5.5 billion dollars of aggregate investment by the smallest 1,600 firms.

[6] Five firms have been in the top 5% every year since 1953: Chevron, DuPont, ExxonMobil, General Electric, and International Business Machines. General Motors would have made this screen, except for the years 2006, 2007, and 2008.

[7] From 1998 to 2003 there is a noticeable drop from the 50% level to about 42%, but then the joint concentration rapidly returns to the 50% level.

number of large firms who not only invest the most, but earn more than half of all earnings and pay over half of all dividends.

4. Investment-Cashflow Sensitivity of Top Capital Spenders

Since investment spending is so highly concentrated, it is hard to extrapolate results from standard cross-sectional regressions to aggregate investment because they put equal weight on each firm. In this section, we test whether standard approaches used in the literature to examine the cross section of investment spending apply to the largest investment spenders. Our tests are designed to focus on whether the largest spenders are fundamentally different or similar to the vast majority of firms that have small levels of investment.

Traditional tests of the q-theory focus on whether Tobin's q is a sufficient statistic to describe the variation in investment spending, or whether other real variables, like cash flows, are also significant drivers. The standard approach in the empirical literature, at least historically, is to regress investment spending on Tobin's q and measures of cash flows as in:

$$\frac{I_{it}}{A_{it-1}} = \alpha + \beta_1 Q_{it} + \beta_2 \frac{CF_{it}}{A_{it-1}} + \varepsilon_{it} \qquad (1)$$

In this set up, Tobin's Q should explain any nonrandom variation in investment spending while a significant coefficient on cash flows represents a deviation from the q-theory of investment.

Interpreting the coefficient on cash flow from such regressions is controversial. For example, while early studies by Fazzari, Hubbard, and Peterson (1988, 2000) argue that investment-cash flow sensitivities capture financial constraints, other studies question this interpretation (see, for example, Kaplan and Zingales (1997, 2000), Erickson and Whited (2000), Alti (2003), and Moyen (2004)). More recently, Gala and Gomes (2012) criticize these regressions on the basis that cash flows can capture shocks to productivity and demand which would naturally mitigate their importance in measuring financial constraints.

In our first set of tests, we estimate regression (1) separately for 20 ventiles of total investment spending. Our goal is to test whether the very top investors look different from the rest of the sample. Table 3 presents the results of our estimates of β_1 and β_2 from the cross-sectional regressions of equation (1). We split the sample into 20 sub-samples based on the level of investment spending each year. The sample includes all observations between 1964 and 2010 as described in Section 2.

All regressions are estimated correcting for measurement error in Tobin's q using the differenced instrumental variables approach in Almeida et. al (2010) and clustering standard errors by firm. This specification includes both firm and year fixed effects. In unreported tests, we have also included time-varying controls for industry level variation and time series trends, but these factors do not have any qualitative effect on our results. In Section 7, we also estimate coefficients and standard errors following the measurement error consistent methodology of Erickson and Whited (2000) and find similar results.

The sensitivity of investment to both market prices and cash flows show two clear patterns across investment levels. First, firms that do very little investment show little sensitivity to Tobin's q. For investors above the median there is a positive but generally flat correlation between market prices and investment. The second feature of the data is that cash flow sensitivities exhibit a strong nearly monotonic positive relationship with the level of investment. In fact, the largest two ventiles of investment spending show the strongest sensitivity to cash flows with levels nearly twice that of the median spender. For example, consider the standardized coefficient on the 20^{th} Capx ventile which suggests that a one standard deviation increase in cash flows drives a 0.26 standard deviation increase in investment. The standardized coefficients on the largest two ventiles are actually larger in magnitude than the standardized coefficients on Q. This feature of the data is directly opposite from the predictions of standard q-theory.

Further, these top two ventiles make up more than 77% of investment, 71% of dividends and 73% of total earnings. Variation in the investment spending of firms making the lion's share of aggregate U.S. investment is mainly driven by variation in cash flows, and this relationship is unlikely to be driven by financial constraints, as we show in the next section.

We also reexamine in this section the recent evidence in Chen and Chen (2012), who find that the investment-cash flow sensitivity of firms in the U.S. has significantly declined over the past four decades and completely disappeared in recent years. They even find that investment was insensitive to cash flow shocks during the recent financial crisis of 2007-2009. Here we investigate whether the investment-cash flow sensitivity of the top capital spenders exhibit a similar pattern over time. We present the results from this analysis in Figure 3. Consistent with the evidence in Chen and Chen (2012), the results in Panel A indicate that the cashflow coefficients of the smallest capital spenders have been declining over time. Contrary to their evidence, however, we do not find this pattern for the top capital spenders. Although the investment-cash flow sensitivity of the top capital spenders experienced a modest decline from the period 1977-1986 to the period 1987-1996, it has not disappeared over time. In fact, this sensitivity has been trending up since the mid 1990s from 0.15 to 0.20. In Panel B of Figure 3 we examine the time-series behavior of the coefficients of Tobin's q and find that it is similar to the one of cash flows. In general, our results suggest that cash flow shocks still drive the investment decisions of the firms that contribute the lion's share of aggregate investment.

5. The Role of Financial Constraints

Our findings indicate that the largest capital spenders have the highest investment-cash flow sensitivity. Because this sensitivity has been interpreted as a measure of financial constraints, it is important to establish whether this is true for the top capital spenders. In this section we examine a number of proxies for financial constraints and test whether the largest, most cash flow sensitive firms in our sample appear to be financially constrained.

In Table 4 we report the characteristics of firms in each investment-level quintile. The evidence clearly indicates that the top capital spenders are unlikely to be financially constrained. Compared to the firms in the other quintiles, the top capital spenders are large, old, highly profitable firms that pay substantial dividends. For example, while the average size (age) of the firms in the highest quintile is $15.4 billion (65 years), it is only $95 million (29 years) for the firms in the lowest quintile. Given this large difference in size and age, it is not surprising that according to the HP index, the top capital spenders are the least financially constrained firms in our sample. The evidence in Table 4 also indicates that these firms have easy access to the debt market and rely less on equity issues to finance their operations.

To further investigate the role of financial constraints among the top capital spenders, we replicate the analysis in Table 4 by quintiles based on capital expenditures, the Kaplan-Zingales index, and the Hadlock-Pierce index. We report the results from this analysis in Table 5. Consistent with the findings in Table 4, Panel A of Table 5 shows that the firms with the most investment spending have the greatest sensitivity to cash flows. In Panel B, we replicate the analysis of Baker, Stein, and Wurgler (2003) and corroborate their results. When firms are sorted based on the KZ index, the constrained firms appear to have greater sensitivity to stock market prices, but show no similar relation for cash flow sensitivities. However, when we re-sort the data based on the HP measure of financial constraints, the story reverses and we find that stock price investment sensitivity actually decreases with financial constraints whereas cash flow sensitivity shows no clear pattern. Given that Hadlock and Pierce (2010) show that the KZ index does not capture financial constraints, our results indicate that one needs to be careful interpreting findings based on this measure.

If financial constraints prevent firms from raising capital to finance investment, then they may store up cash reserves to fund investment internally, strategically waiting until cash flows are sufficient to justify the investment. In Table 6 we dig deeper into the cross section of investment cash flow sensitivity. We first sort on the level of capital expenditures and then sort inter-quintile on the KZ index. This test reveals a number of interesting features in the data. First, the coefficients on both q and cash flows increase with the level of investment. However, within investment quintiles, there are no clear patterns based on inter-quintile sorts on the KZ index. For firms in the highest quintile of investment, firms appear to do an equal amount of investment and show roughly equal investment-cash flow sensitivities across KZ quintiles. Consistent with recent studies, it does not appear that the KZ index is able to sort firms on their financial constraints.

Given recent results that financial constraints are better measured with simple metrics like size and firm age, we form portfolios based on the HP measure of financial constraints. As in Table 6, we perform a double sort on the data by first partitioning the sample into quintiles based on the level of capital expenditures and then partitioning each investment quintile into five sub-groups based on the HP index. We report these results in Table 7. This analysis uncovers two patterns in the data. First, financial constraints do not appear to drive the investment cash flow sensitivity. While there is some evidence that sensitivities increase with the HP index, this inter-quartile variation is swamped by the difference in magnitudes across investment quintiles. That is, most of the variation in sensitivities is driven by the level of investment, and not by the variation in financial constraints.

These results speak directly to the theoretical model of Alti (2003) that predicts that investment should be more sensitive to cash flows for young, small firms, with high growth opportunities. However, our results show the opposite relation---large mature stable firms are the most sensitivity to cash flow shocks. In general, our findings are more consistent with Gala and Gomes (2012) who argue that cash flow may be more closely linked to investment because cash flows are a better predictor of future demand.

6. Forecasting Long-Run Investment

In this section we test whether and to what extent cash flows and market prices predict future long-horizon realized investment. If Tobin's q is a better measure of investment opportunities than cash flows, then this pattern should appear in the data, at least at long horizons.

Since investment is often lumpy and noisy at the firm level, we focus on 10-year horizons. For three ten year time periods, 1980-1989, 1990-1999, and 2000-2009, we sort firms into terciles based on both cash flow and Tobin's q in year *t-1* (1979, 1989, 1999). We then compute the average investment rate (Capx/Assets) over the next 10 years. These sorts are independent. In this simple design, we test whether investment rates over the next 10 years are associated with cash flows and q at the beginning of the period.

Table 8 presents the results of this analysis. Cash flow levels in year *t* explain far more of the variation in future *(t+1,…,t+10)* investment than Tobin's q. In all three time periods, investment rates rise monotonically with the level of cash flow. On the other hand, future investment rates appear to have no consistent relationship with q. For example, investment rates appear to rise with q in the 1980s but show mixed results for the 1990s. Further, investment rates appear to decline with q in the 2000s. Overall, the level of cash flow appears to predict the future investment behavior of firms far better than Tobin's q. Again, this finding is consistent with the hypothesis that cash flows are a better predictor of future demand.

In Table 9 we repeat the analysis in Table 8 but split the sample based on the level of capital expenditures to test whether the effect of cash flows on future investment rates is correlated with the level of investment. The results in Table 9 indicate that the predictive power of cash flows is stronger for the largest investors than for the smallest investors. Note that, on average, the investment rates of the top capital spenders increase faster with cash flows than the ones of small capital spenders. In addition to the simple portfolio sorts, we also estimate the following regression:

$$
\begin{aligned}
&I_{it}^{+10} = \alpha_i + \tau_t + \beta_1 CF_{it} + \beta_2 Q_{it} + \varepsilon_{it} \\
&t = 1979, 1989, 1999
\end{aligned}
$$

where I_{it}^{+10} is average amount of investment (or the average rate) over the following 10 years. We estimate this regression as a panel with firm and year fixed-effects. Our results (not reported) are consistent with the basic portfolio sorts. Cash flows are a much better predictor of future investment than Tobin's q.

7. Financing Decisions of Large Capital Spenders

In the previous sections we argue that the largest investing firms have high cash flow-investment sensitivities, but that these firms are not constrained in any way. Further, cash flows appear to be the best predictor of future investment behavior. If these large, cash-rich firms drive the majority of aggregate US investment, and appear to be financially unconstrained, then how do they finance their projects? In this section, we test whether there are significant differences in capital structure decisions across investment size classes.

Our analysis begins with simple tests of the pecking order/dynamic trade-off theory. According to Myers (1984), adverse selection problems drive firms to prefer internal finance over external finance and to prefer debt to equity. In their simplest form, both theories predict that firms facing a financing deficit should fill the gap with debt. This means that a simple regression of net debt issues on the financing deficit should produce a slope coefficient of one.

Shyam-Sunders and Myers (1999) test this prediction and find strong support in a balanced panel of large firms, while Frank and Goyal (2003) find little support in a larger sample of US firms, though they do find stronger support for large firms. On the contrary, Fama and French (2005) argue that large firms violate pecking order more frequently. Lemmon and Zender (2004) modify the pecking order to include financial distress costs and find more support. Simply put, empirical support for these theories is mixed. Leary and Roberts (2010) provide a comprehensive overview of empirical tests of the pecking order and tradeoff theories.

In its simplest form, we might expect the lowest capital spenders to conform more to the pecking order theory since they are more likely to exhibit adverse selection problems. However, these predictions are at least mitigated by other theories that suggest that small firms may be credit rationed (Halov and Heider (2011)), have less risk averse managers (Hennessey, Livdan and Miranda (2006)), or face more incentive conflicts (Leary and Roberts (2010)). These conflicting predictions likely drive the mixed empirical support. Since the top capital spenders firms are generally large, profitable, unconstrained firms, our theoretical prediction is mixed but prior empirical studies suggest that the largest investing firms may show more support for pecking order.

To see whether the top capital spenders are different from other firms, we first reconstruct Figure 1 from Frank and Goyal (2003). We estimate the time series of the average financing deficit, net debt issued (scaled by net assets), and net equity issued (scaled by net assets). However, rather than plot the time series across all firms as in Frank and Goyal (2003), we plot the results for the smallest and largest investment spending ventiles separately. Figure 4 presents our results. The difference stands in sharp contrast. The smallest investment spending ventile (Panel A) shows that equity issues track almost perfectly the financing deficit. For these firms, debt issues are relatively small and have only an 18% correlation with financing deficits. This is similar to the conclusion of Frank and Goyal for the average firm in their sample. However, the results for the largest investment spending ventile are significantly different. Panel B shows that debt issues line up closely with the financing deficit (89% correlation) while equity issues are significantly lower and less correlated. Thus, it appears there is much stronger evidence supporting the predictions that debt should be used to fill the financing gap for the firms that drive most of the aggregate investment in the U.S.

We also test the relationship more formally in a panel setting. Our regression tests follow the methodology in Shyam-Sunder and Myers (1999) and Frank and Goyal (2003). The basic approach is to test whether changes in the financing deficit match with changes in new debt issues. We estimate the following regression equation:

$$\Delta D_{it} = \alpha_i + \tau_t + \beta DEF_{it} + \varepsilon_{it}$$

where ΔD is the amount of net debt issued and *DEF* is the financing deficit. The financing deficit is defined as the sum of dividends and investment plus any increases in working capital, cash, and short term debt less net cash flow after interest and taxes. Both variables are scaled by net assets. The regression is estimated with firm-year fixed effects and firm-level clustered standard errors.

Table 10 presents our estimates of β separately for ventiles of investment and assets. The coefficient clearly increases with the level of investment or firm size. The largest coefficients are measured for the firms with the largest investment. For these firms, each dollar of financing deficit is matched by nearly 82 cents in debt issues. Further, for these firms roughly 89% of the variation in new debt issues is explained by the financing deficit. These results are broadly consistent with the predictions of both pecking order and dynamic tradeoff theory for the largest investment spending firms. It is also interesting to note that the coefficient on the financing deficit falls sharply with less investment spending. While the strongest evidence may hold only for the largest 10-20% percent of the firms, these firms make up 75-90% of total investment. Weighted by level of investment, firms finance their operations with internal cash flows and then fill their financing gap mostly with debt.

8. Measurement error effects

Estimates of Tobin's q are noisy and this noise introduces a potentially severe bias in estimates of investment equations. As a result, a large literature examines how to properly estimate investment equation parameters of the type we study in this paper. While our lagged instrumental variables estimation may mitigate this problem, there is some controversy over whether this method is sufficient to remove the bias from measurement error in q. In fact, Erickson and Whited (2012) argue that such an instrumental variables approach may itself be biased if the measurement error in Tobin's q exhibits strong serial correlation. In this section, we re-estimate our main results using the higher moment estimators for panel data outlined in Erickson and Whited (2012). In particular, we implement the GMM5 (fifth moment) estimator on both ventiles and quintiles of the investment levels distribution.

Our research design focuses on the change in coefficients across various subsamples of the investment level distribution, and by implication, a narrow sub-set of large listed firms. The EW estimator is estimated separately for each cross-section, and as a result, we face a difficult choice in implementing the EW estimator. Separate estimates of each ventile in each cross-section are not feasible, since higher moments are not easily identified due to a paucity of data points, especially in the earliest years of our sample. Accordingly, we only examine the quintiles of the investment level distribution and examine each year's estimation to ensure that the estimates are properly identified.

Specifically, we estimate the standard investment-cash flow regression for each year in the sample using the EW higher moment estimator, but include dummy variables for each quintile of the investment level distribution.[8] We also include all interactions of the dummy variables with q and cash flow. The coefficients on the dummy variables thus reflect the shift in the intercept across the distribution and the interaction coefficients the respective shifts in slope. This approach yields stable estimates in the sense that we observe what might appear to be outlier estimates in less than 3% of the approximately 200 estimations we perform. Regardless of how we aggregate the cross-sectional estimates across the years, we find a pattern consistent with our earlier findings.[9] The coefficients on the dummy variables themselves are insignificant and flat, and no pattern is discernible on interactions with the q variable. However, the interactions with the cash flow variable are monotonically increasing, and reach their largest value for the quintile that includes the largest investment spenders. We conclude that regardless of how we estimate the parameters of the investment regressions, the largest capital spenders have the highest coefficients on cash flow, and exhibit a greater economic significance to cash flow than to q.[10]

9. Implications for aggregate investment

The concentration of real investment has important consequences for the links between empirical results on determinants of investment at cross-sectional and aggregate levels. In particular, a number of studies have shown that q-theory is a significant determinant of

[8] In our implementation we choose the smallest quintile as the base level.
[9] We use the average (Fama-Macbeth), the median, and various trimmed means (1%, 2%, 5%) to aggregate the estimates.
[10] We also estimate the main regressions in the paper using standard OLS and traditional fixed effect regressions and obtain similar results.

investment for individual firms using cross-sectional analyses; conversely, an equally voluminous body of literature describes the inadequacy of q-theory to describe aggregate investment dynamics. Many explanations for this paradox have been advanced, including measurement error in the aggregate and lack of power in the time series tests. Here we offer a much simpler explanation: while q-theory may be a fairly good descriptor of investment for the average firm, it is not a particularly powerful descriptor for the small number of firms that do the bulk of investment. The focus of our paper is on these "high-investment" firms and thus on the firm dynamics that actually drive aggregate investment.

The sample of Compustat firms that we study represents a wide cross-section of firms in the U. S., but it is possible that this set of firms may not be representative of total aggregate investment. For instance, Compustat does not report investment data for private firms which are tracked in the official statistics of the United States Government. To address this issue, we plot in Figure 5 the total nonresidential private investment from the NIPA accounts of the US versus two samples of firms derived from Compustat data: all firms in the database (Panel A) and all domestically incorporated firms (Panel B).[11]

Panel A of Figure 5 shows that simply summing up all investment expenditures (CapX) of all firms in Compustat results in a series that almost exactly tracks (and occasionally exceeds, especially in the later years) the BEA official GDP estimates of private nonresidential investment. Much more importantly than matching the levels of the GDP series, the Compustat sample tracks the fluctuations in the GDP series almost exactly, confirming that the investment made by the Computstat firms is representative of the patterns of aggregate investment revealed

[11] It is important to note that the official GDP statistics on private investment compiled by the Bureau of Economic Analysis seek to tabulate all domestic investment that occurs physically in the US, regardless of where the firm making the investment is incorporated. Thus the private nonresidential investment series would include (for example) an auto plant in South Carolina built by a German company and exclude investment in Mexico by a US fast food company.

by the US GDP statistics. Panel B shows that this representative pattern holds even when we restrict attention to domestically incorporated public firms, although now the levels of investment are lower as would be expected for an economy which is the largest net recipient of foreign direct investment.[12]

Figure 5 also depicts the total investment for both the top 5% and the top 100 firms of either the all Compustat or domestically incorporated Compustat subsample. The immediate conclusion is that the pattern of aggregate investment in the US is well captured by firms in Compustat, and that real investment in both Compustat and the BEA official statistics is dominated by a small number of firms. In almost all years, the top 100 firms in Compustat contribute over half the total nonresidential private investment in the US, as measured by the official GDP statistics.[13]

To formally test the contribution of the largest top capital spenders on aggregate investment, we regress the change in the log of aggregate net fixed private non-residential investment on the change in the log of the total investment made by the top capital spenders in the U.S. We report the results from this analysis in Table 11. Consistent with our earlier results, this table shows that the variation in the investment of the top capital spenders explain most of the variation in aggregate investment. Most of the explanatory power comes from the top 50 capital spenders. Column 1 in Table 11 shows that the variation in the investment of these firms accounts for more than 58% of the variation in aggregate investment. Including more firms in our portfolios of top capital spenders marginally increases the explanatory power of our regressions. The fluctuations in investment of the top 100, the top 250, and the top 500 capital

[12] In 2011, the US had a net inflow of foreign direct investment of $257 billion dollars which is the largest net inflow position in the world, according to official statistics compiled by the World Bank.

[13] This is not to suggest that there is a one-to-one correspondence between the capital expenditure numbers reported in Compustat and the methodology used by the Bureau of Economic Analysis. Rather, we note that the level and similar dynamics is remarkable given the vastly different sources of the data, and the issues noted above with respect to private firm investment and foreign direct net investment.

spenders explain 63.6%, 66%, and 66.4% of the fluctuations in aggregate investment, respectively. Columns 2, 4, 6 and 8 of Table 11 also show that including the total investment of the capital spenders ranked below 500 (which includes that majority of Compustat firms) does not add much additional explanatory power to our regressions. These findings highlight the impact of the top capital spenders on aggregate economic activity. Given that the behavior of these firms is significantly different from the average or median Compustat firm, it is unlikely that statistical inference based on equally-weighted cross sectional regressions can be extended to draw implications for aggregate investment.

10. Conclusion

In this paper we argue that the investment behavior of the very largest corporations is distinct and important. Because investment spending is so concentrated, a small number of firms at the top of the size distribution drive most of the time series variation in aggregate investment. These firms are cash cows. They earn most of the money, pay the lion's share of aggregate dividends and show no signs of being financially constrained. Surprisingly, however, these firms also show the greatest investment sensitivity to cash flows.

Using updated measures of financial constraints, we find no evidence that the investment behavior of equity dependent firms is any more or less sensitive to stock market prices. While there is some evidence that small financially constrained firms with low levels of investment are more sensitive to stock prices, these firms make up less than 1% of aggregate investment. Even if stock market prices are driven by irrational behavioral biases that push prices far away from fundamentals for sustained periods of time, it just would not matter much for aggregate investment.

The large investment-cash-flow sensitivity of the biggest investing firms appears to be related to future investment opportunities. Cash flows are a strong predictor of future investment over the next 10 years. As a result, current cash flow is a better measure of investment opportunities than poorly measured proxies for average (not marginal) q, which can account for the empirical failure of q.

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Figure 1
The Concentration of Investment Spending in the U.S.

This figure shows the percentage of total capital expenditures accounted for in each year by the largest N spenders, with N = 10, 25, 50, 100, and 200. The sample is the entire set of firms from the Compustat annual file.

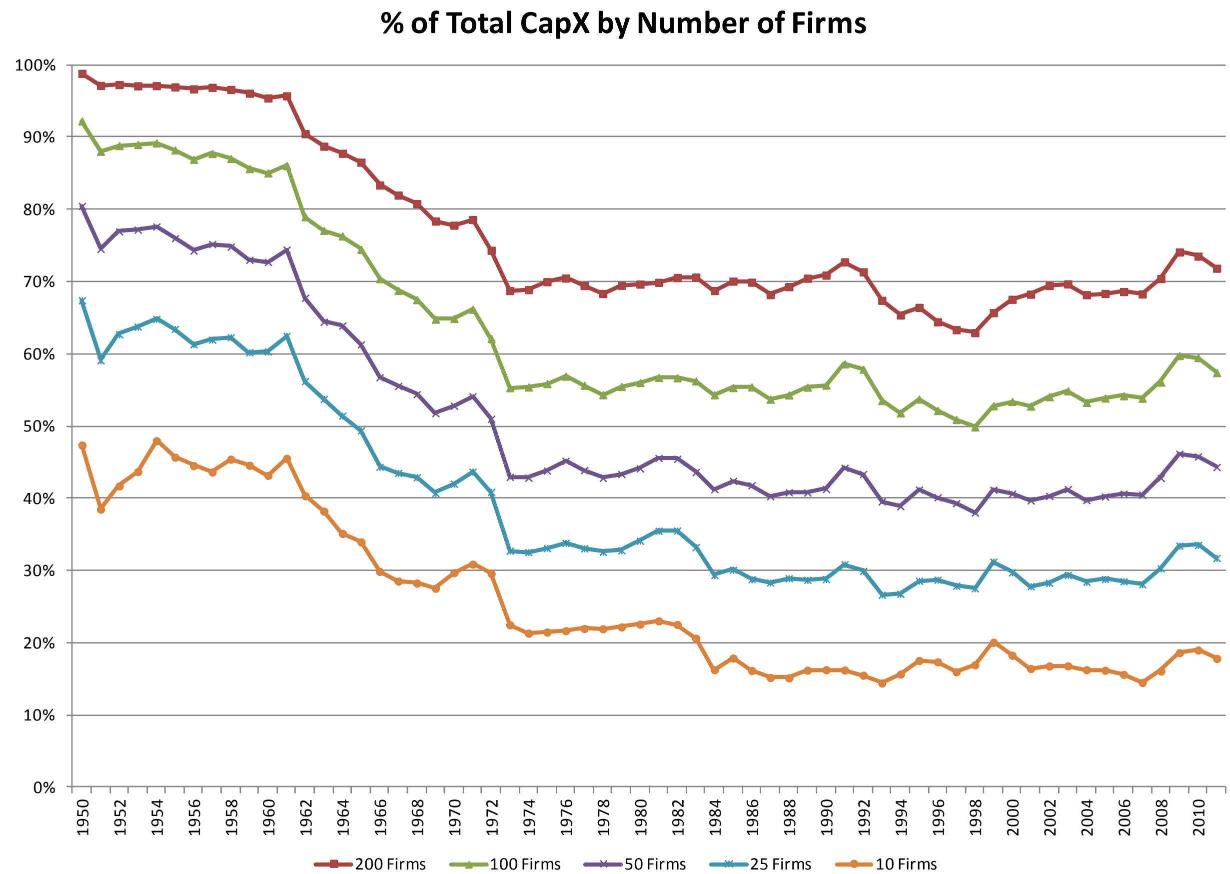


Figure 2
The Persistence over Time of the Top Capital Spenders

This figure shows the persistence of membership in the top ventile of aggregate investment intensity, and the total % of capital expenditures accounted for by those firms. The bars depict the % of aggregate capital expenditure by the firms who are in the top ventile in the current year and those who have been in the top ventile for the past 5 years, respectively. The lines depict the numbers of firms in those two cohorts. The sample includes all firms in Compustat that have data on capital expenditures.

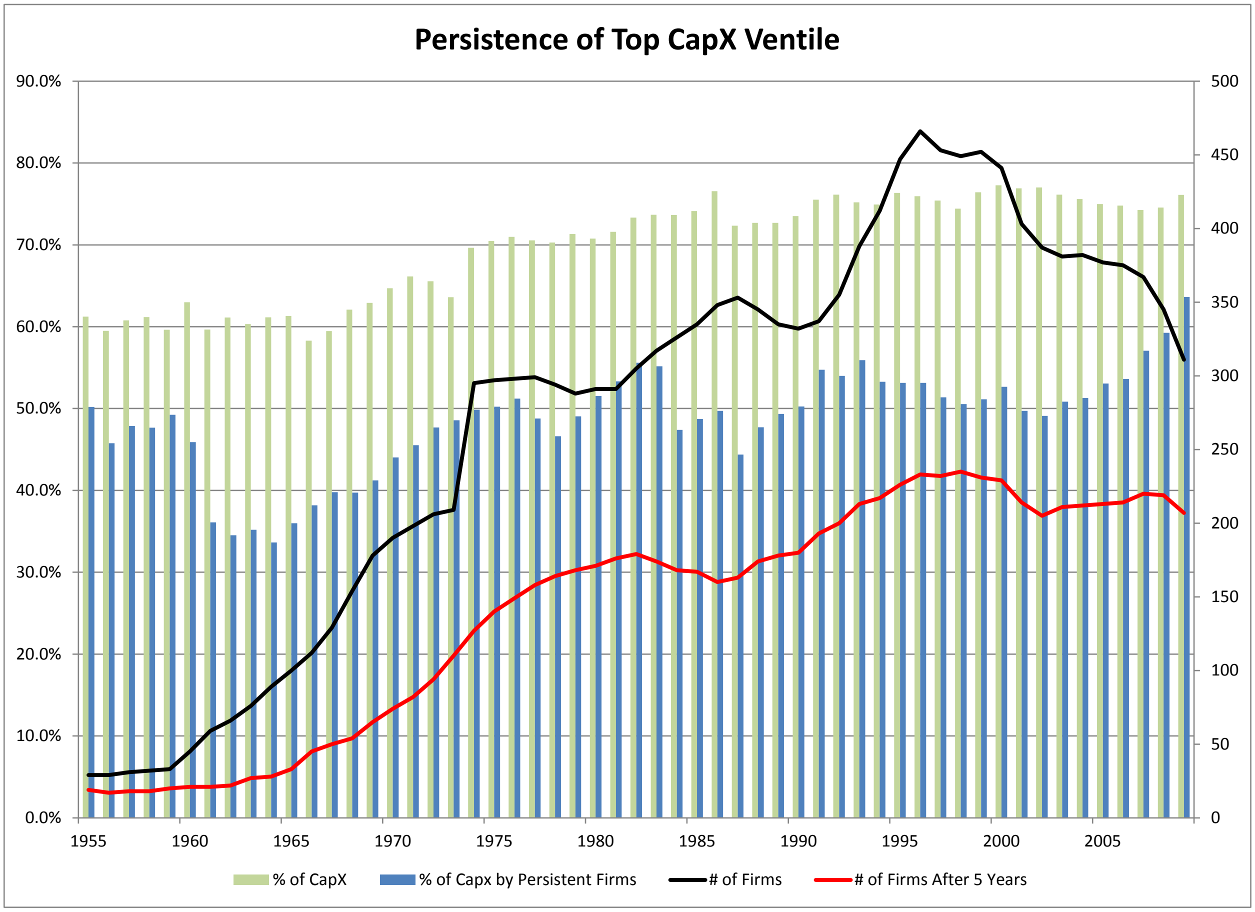
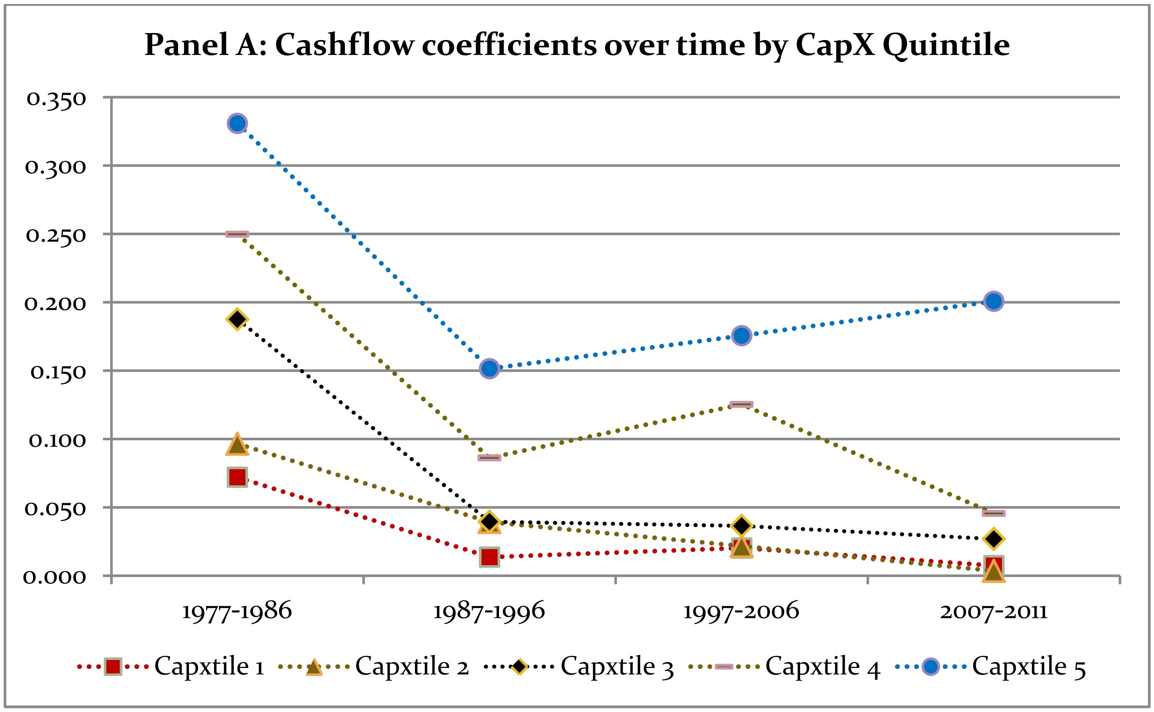


Figure 3
Trends in the Coefficients of Tobin's Q and Cash Flows

This figure shows the trend in the coefficients from regressions of investment rates on lagged Tobin's q and operating cashflow rates. All regressions are estimated correcting for measurement error in Tobin's q using the differenced instrumental variables approach in Almeida et. al (2010). Regressions are estimated separately by quintiles of aggregate investment intensity (percentage of each year's total capital expenditure).



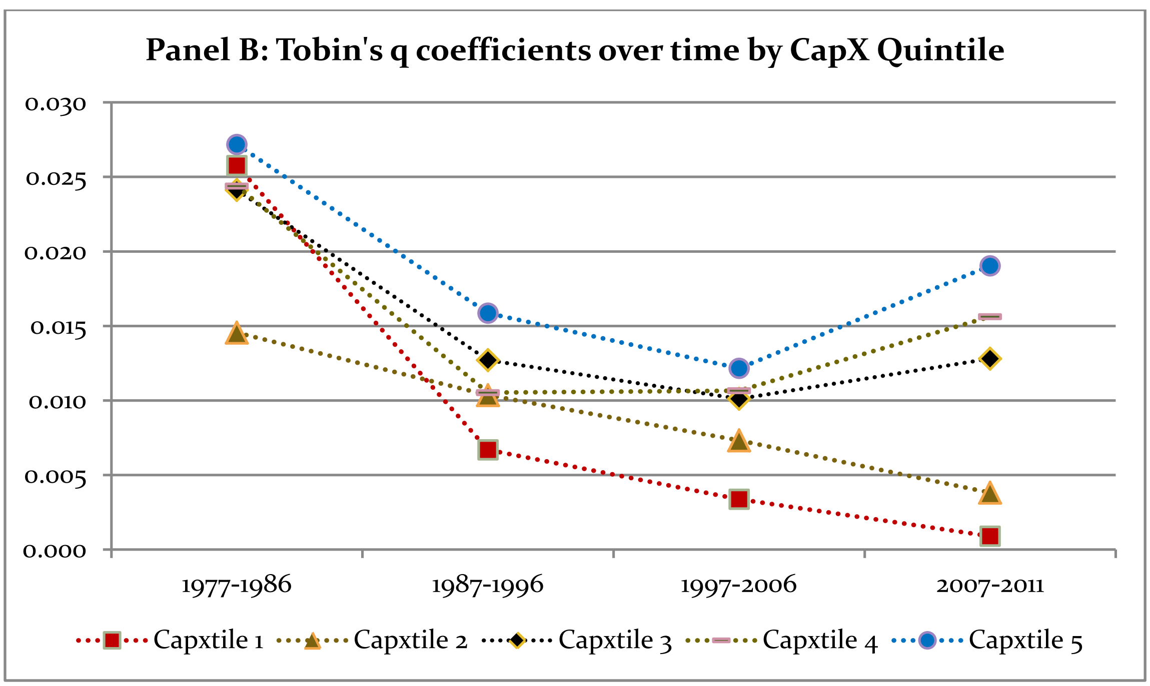
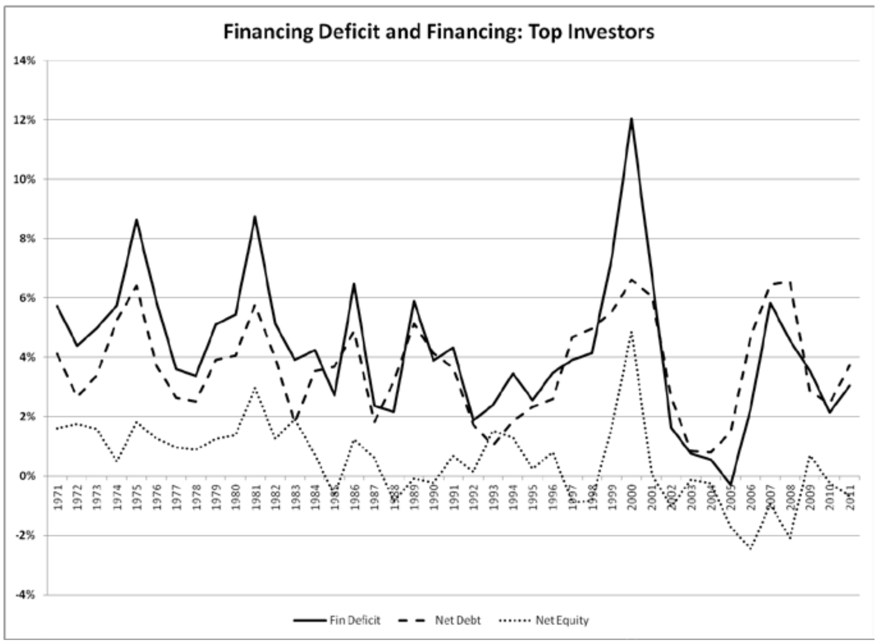


Figure 4

This figure shows average financing deficit to net assets, net debt issued to net assets, and net equity issued to net assets for firms over the entire sample period of 1971-2011. Panel A depicts the means of each measure for firms in the top ventile of investment each year, whereas Panel B depicts these means for firms in the next to lowest ventile of investment. The financing deficit is defined as in Frank & Goyal (2003) as cash dividends plus investments plus changes in working capital minus internal cashflow.

Panel A:



Panel B:

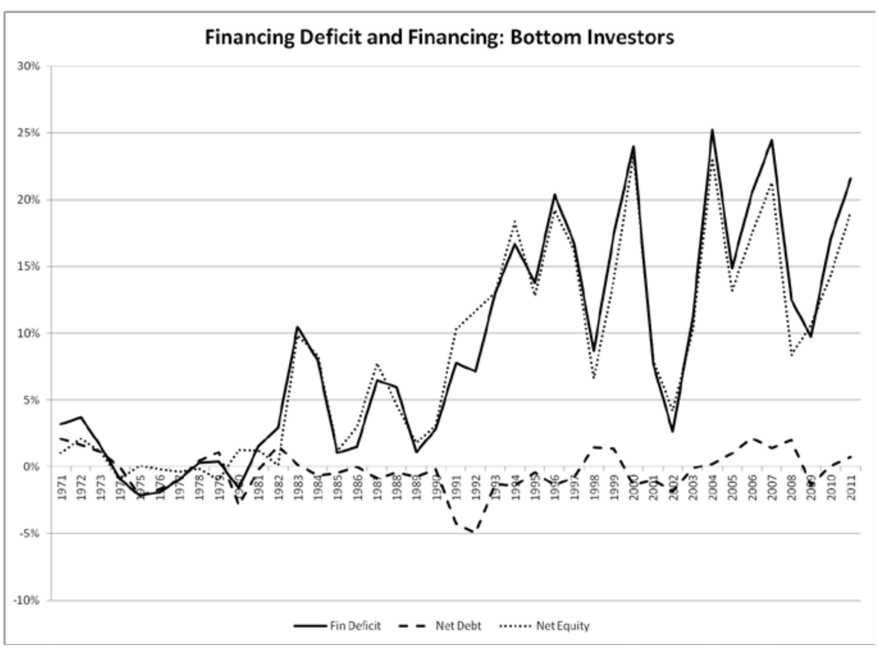
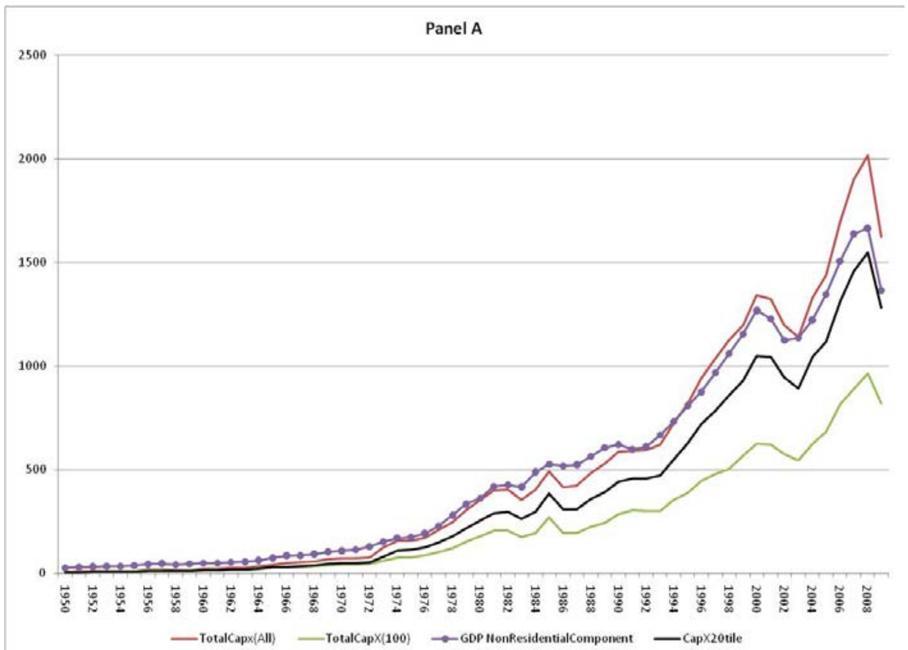


Figure 5
Aggregate Investment in the U.S.

This figure compares non-residential business fixed investment from the Bureau of Economic Analysis GDP tables to the sum of capital expenditures from firms in the Compustat annual file. The four series are, respectively, the Non-Residential Fixed Investment component of the GDP in nominal terms (billions of dollars), the sum of all capital expenditures for all firms in Compustat, the sum of capital expenditures for the largest top 100 spenders each year, and the sum of capital expenditures for the largest 5% of spenders each year. Panel A reports results for all firms in Compustat and Panel B reports results for only domestically incorporated firms.



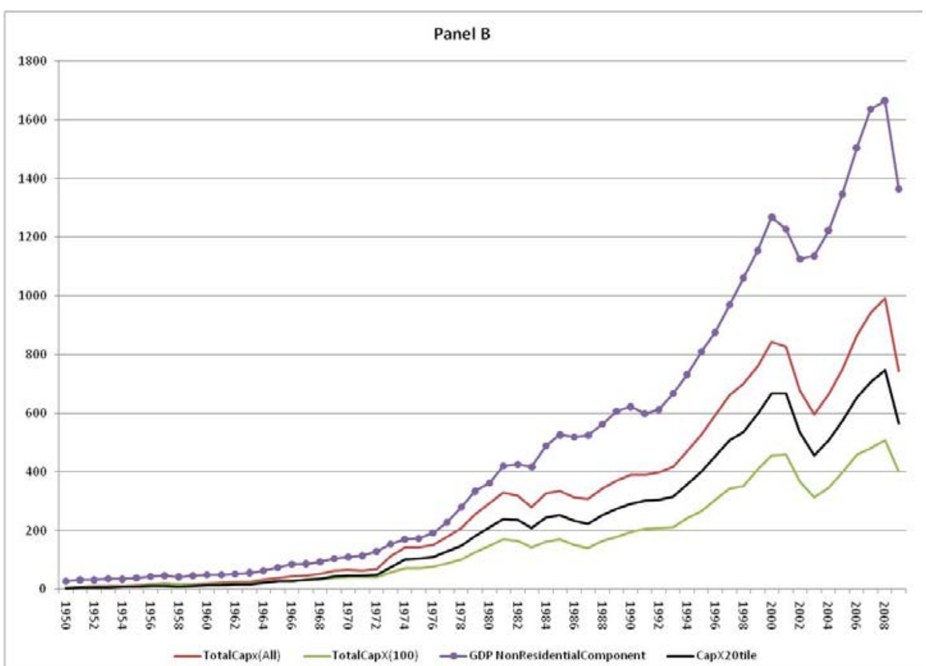


Table 1
The Distribution of Investment Spending in the U.S.

This table reports the distribution of investment spending in the U.S. Firms are ranked based on their total capital expenditures each year from largest to smallest. The sample includes all (non-financial and non-utilities) firms on Compustat with positive market and book values and with assets greater than $10 million. Values for the top 2,000 firms in 1990 and 2000 are reported, while since there are 1,645 firms which make our criteria in 1973, the last entry in the 1973 column contains only 45 firms. Investment expenditures are adjusted to 2010 dollars using the Consumer Price Index for that year, calculated as the average annualized value throughout that year.

	Percent of total investment (%)			Cumulative % of total investment (%)			Real Investment ($ billions, 2010 dollars)		
	1973	**1990**	**2010**	**1973**	**1990**	**2010**	**1973**	**1990**	**2010**
Top 100	66.0	56.7	62.0	66.0	56.7	62.0	188.7	370.6	769.5
101-200	12.8	15.3	13.8	78.8	72.0	75.8	36.5	99.8	171.7
201-300	7.0	8.2	7.1	85.8	80.1	82.9	20.1	53.3	88.0
301-400	4.3	5.4	4.5	90.1	85.5	87.4	12.2	35.3	56.0
401-500	2.7	3.6	2.9	92.8	89.1	90.3	7.8	23.5	35.8
501-600	1.9	2.4	2.1	94.7	91.5	92.3	5.5	16.0	25.7
601-700	1.4	1.7	1.5	96.1	93.3	93.9	4.0	11.3	19.0
701-800	1.0	1.3	1.2	97.1	94.5	95.0	2.9	8.2	14.6
801-900	0.8	1.0	0.9	97.9	95.5	96.0	2.2	6.4	11.5
901-1000	0.6	0.8	0.7	98.5	96.3	96.7	1.7	5.2	9.2
1001-1100	0.5	0.6	0.6	99.0	96.9	97.3	1.3	4.2	7.4
1101-1200	0.4	0.5	0.5	99.3	97.5	97.8	1.0	3.4	6.0
1201-1300	0.3	0.4	0.4	99.6	97.9	98.2	0.8	2.7	5.0
1301-1400	0.2	0.3	0.3	99.8	98.2	98.5	0.5	2.3	4.1
1401-1500	0.1	0.3	0.3	99.9	98.5	98.8	0.4	1.9	3.3
1501-1600	<0.1	0.2	0.2	100.0	98.8	99.0	0.2	1.6	2.7
1601-1700	<0.1	0.2	0.2	100.0	99.0	99.2	0.0	1.4	2.3
1701-1800		0.2	0.1	100.0	99.1	99.3	0.0	1.2	1.8
1801-1900		0.1	0.1	100.0	99.3	99.5	0.0	1.0	1.6
1901-2000		0.1	0.1	100.0	99.4	99.6	0.0	0.8	1.3

Table 2
The Concentration of Investment Spending, Operating Cash Flows, and Dividends

This table presents summary statistics on the set of firms jointly in the top ventiles of aggregate investment intensity (percentage of each years total capital expenditures), percentage of positive operating cashflows, and percentage of total dividends paid. The statistics reported are the number of firms in the top 5% of all categories and the cumulative amount of capital expenditures, operating cashflow, and total dividends they accounted for in each year.

Overlapping Top Ventiles of Investment, Dividends, and Earnings

	n	Inv %	CF %	Div %		n	Inv %	CF %	Div %
1950	9	44.8	39.7	41.9	1981	105	56.2	53.0	51.9
1951	12	41.5	38.7	36.7	1982	106	54.7	52.3	52.5
1952	14	48.1	41.6	36.8	1983	115	55.6	56.3	54.7
1953	14	50.3	43.3	40.3	1984	124	56.0	55.4	54.5
1954	14	53.6	43.6	41.7	1985	114	54.4	55.0	52.4
1955	13	50.2	42.9	41.8	1986	114	53.2	56.5	53.3
1956	15	51.3	44.5	43.7	1987	117	51.5	54.1	52.3
1957	15	49.8	44.9	42.7	1988	117	52.0	53.9	52.4
1958	14	49.7	41.6	41.2	1989	118	52.9	55.3	51.3
1959	15	50.0	42.1	42.1	1990	111	51.1	53.8	49.1
1960	17	53.2	45.2	42.6	1991	114	53.7	53.3	49.9
1961	16	54.3	44.4	43.9	1992	129	55.0	54.4	53.6
1962	22	50.7	42.5	42.0	1993	155	55.8	51.3	54.0
1963	26	50.5	43.8	43.3	1994	168	55.6	51.4	54.1
1964	26	48.1	41.8	43.2	1995	164	57.2	51.8	50.4
1965	30	49.0	42.9	43.5	1996	183	57.2	52.3	52.0
1966	35	49.0	42.5	43.5	1997	180	54.8	49.8	53.3
1967	40	50.1	43.7	43.5	1998	168	50.8	48.6	52.4
1968	44	50.3	44.3	44.2	1999	162	50.7	46.0	49.5
1969	48	49.6	44.8	44.9	2000	146	46.9	45.6	48.2
1970	51	51.0	44.3	44.1	2001	133	46.5	42.9	46.2
1971	51	53.1	45.7	44.1	2002	122	44.5	43.7	45.3
1972	65	53.0	45.7	46.3	2003	123	46.6	41.8	47.3
1973	91	51.8	50.1	51.2	2004	136	50.1	48.3	54.3
1974	103	53.6	51.5	51.7	2005	136	51.1	49.8	57.1
1975	108	55.7	51.9	52.7	2006	135	49.9	48.5	52.6
1976	108	57.1	52.0	54.0	2007	123	46.9	50.2	52.0
1977	108	55.7	52.7	54.3	2008	118	46.2	52.5	51.7
1978	109	54.8	52.3	53.0	2009	124	53.4	51.3	58.4
1979	104	54.5	53.7	52.2	2010	114	49.3	47.7	52.6
1980	105	55.5	53.3	51.3	2011	114	51.9	49.7	52.7

Table 3
The Effect of Tobin's Q and Cash Flows on Investment Rates

This table presents regression results from regressions of investment rates on lagged Tobin's q and operating cashflow rates. All regressions are estimated correcting for measurement error in Tobin's q using the differenced instrumental variables approach in Almeida et. al (2010) and clustering standard errors by firm. Regressions are estimated separately by ventiles of aggregate investment intensity (percentage of each year's total capital expenditure). T-statistics test the coefficient's difference from zero and betas are the standardized coefficients for each variable. Columns to the right of the regression coefficients report (respectively) the means over years of the cumulative percentage of capital expenditures, positive operating cashflows, and dividend payouts for each ventile.

Investment Concentration and the Link between Investment and Stock Prices

		Q_1			***CF/Assets***			***Cum%***	***Cum%***	***Cum%***
CapX 20-tile	*N*	*coef*	*[t-stat]*	*beta*	*coef*	*[t-stat]*	*beta*	***of Invest***	***of Div***	***of Earn***
1	3307	0.01	[1.30]	0.24	0.03	[3.20]	0.08	0.01	0.20	0.06
2	3286	-0.01	-[0.74]	-0.23	0.03	[2.68]	0.09	0.03	0.07	0.05
3	3284	0.00	[0.25]	0.04	0.02	[3.31]	0.06	0.05	0.11	0.08
4	3279	-0.01	-[0.73]	-0.14	0.05	[4.55]	0.13	0.07	0.14	0.11
5	3283	0.00	-[0.08]	-0.02	0.04	[2.64]	0.09	0.10	0.20	0.14
6	3290	0.00	-[0.29]	-0.05	0.06	[3.45]	0.12	0.13	0.25	0.17
7	3279	-0.01	-[1.16]	-0.15	0.09	[5.17]	0.14	0.18	0.31	0.22
8	3281	0.00	[0.23]	0.02	0.09	[3.86]	0.13	0.24	0.40	0.28
9	3287	0.02	[1.36]	0.19	0.09	[3.45]	0.12	0.32	0.52	0.37
10	3277	0.02	[1.24]	0.18	0.07	[4.36]	0.10	0.43	0.67	0.53
11	3296	0.01	[0.62]	0.10	0.11	[4.28]	0.15	0.58	0.85	0.69
12	3281	0.00	[0.24]	0.02	0.12	[4.84]	0.14	0.77	1.09	0.89
13	3288	0.04	[2.14]	0.35	0.08	[2.02]	0.09	1.04	1.44	1.23
14	3280	0.02	[2.25]	0.18	0.16	[5.09]	0.17	1.44	1.91	1.67
15	3283	0.05	[3.44]	0.47	0.11	[4.17]	0.14	2.05	2.68	2.45
16	3285	0.03	[2.89]	0.26	0.13	[4.34]	0.15	2.99	3.60	3.28
17	3287	0.03	[2.44]	0.29	0.15	[4.04]	0.16	4.60	5.31	5.14
18	3280	0.03	[2.20]	0.27	0.17	[3.79]	0.18	7.54	8.23	8.57
19	3288	0.02	[2.28]	0.15	0.23	[8.27]	0.24	14.33	15.13	17.41
20	3265	0.02	[3.66]	0.21	0.25	[6.53]	0.26	63.10	56.88	56.66

Table 4
Summary Statistics by Level of Investment Spending

This table presents summary statistics for each quintile of investment intensity. Median values are presented in brackets below sample means. The variables are defined in Section 2 of the paper.

	Smallest	Quintile 2	Quintile 3	Quintile 4	Largest	Total
Assets	95	209	562	1,674	15,379	3,580
	[42]	[126]	[329]	[995]	[5,536]	[350]
Age	29	35	43	52	65	45
	[22]	[25]	[32]	[44]	[62]	[32]
Cashflow	2	11	40	139	1,460	330
	[2]	[9]	[27]	[90]	[504]	[27]
CapX	1	6	20	76	1,039	228
	[1]	[5]	[18]	[65]	[397]	[18]
Dividends	1	2	6	25	318	70
	[0]	[0]	[2]	[10]	[83]	[1]
Sales	88	254	668	1,783	12,267	3,009
	[53]	[156]	[408]	[1,060]	[4,787]	[384]
Mkt Val	79	213	573	1,643	10,883	2,676
	[27]	[85]	[233]	[727]	[2,925]	[244]
Q	1.41	1.47	1.54	1.58	1.51	1.50
	[1.08]	[1.17]	[1.24]	[1.28]	[1.22]	[1.20]
CapX/Assets (%)	2.76	5.81	7.75	9.42	10.70	7.28
	[2.03]	[4.46]	[5.89]	[7.06]	[8.49]	[5.33]
Cashflow/Assets	2.75	8.02	10.10	11.20	11.50	8.72
	[5.70]	[8.81]	[10.10]	[10.80]	[10.70]	[9.37]
Div/Assets (%)	0.86	1.18	1.45	1.79	2.26	1.51
	[0.00]	[0.07]	[0.88]	[1.45]	[1.92]	[0.89]
KZ Index	0.79	0.69	0.72	0.72	0.77	0.74
	[0.96]	[0.85]	[0.86]	[0.82]	[0.86]	[0.86]
Hadlock-Pierce	-3.35	-3.93	-4.52	-5.10	-5.71	-4.52
	-[3.11]	-[3.60]	-[4.09]	-[4.76]	-[5.61]	-[4.02]
Net Equity (%)	3.32	1.40	0.52	0.00	-0.48	0.96
	[0.00]	[0.02]	[0.02]	[0.01]	[0.00]	[0.00]
Net Debt (%)	(0.16)	1.74	3.04	3.49	3.54	2.33
	-[0.25]	-[0.06]	[0.00]	[0.00]	[0.52]	[0.00]
Fin. Deficit (%)	4.54	3.89	3.85	3.58	3.09	3.79
	-[0.40]	-[0.10]	[0.00]	[0.07]	[0.59]	[0.00]

Table 5
Investment Regressions by Quintiles based on Investment Levels and Financial Constraints

This table presents regression results from regressions of investment rates on lagged Tobin's q and operating cashflow rates. All regressions are estimated correcting for measurement error Tobin's q using the differenced instrumental variables approach in Almeida et. al (2010) and clustering standard errors by firm. We group panels into quintiles based on various measures of investment intensity and financial constraints. Panel A reports coefficients of lagged q and cashflow for quintiles formed on the percentage of total capital spending in the previous year. Panel B reports coefficients of lagged q and cashflow for quintiles formed on the median KZ index value by firm as in Baker, Stein, & Wurgler (2003). Panel C reports coefficients of lagged q and cashflow for quintiles formed using a measure of financial constraints based on Hadlock and Pierce (2010), where age is calculated using data in Jovanovich & Rousseau (2001), and both size and age variables are winsorized at their 95th percentile in every year. T-statistics test the hypothesis of no difference between the regression coefficients in each quintile and the quintile 1.

Panel A: Capx Quintiles

		Q					CF/A			
Capx		**N**	*b*	*(se)*	[t-stat]	β	*c*	*(se)*	[t-stat]	β
Quintile	**1**	12,336	-0.001	0.006		-0.021	0.030	0.005		0.087
	2	12,313	-0.001	0.007	[0.04]	-0.010	0.061	0.010	[2.82]	0.111
	3	12,318	0.010	0.007	[1.24]	0.103	0.090	0.012	[4.76]	0.127
	4	12,317	0.037	0.006	[4.50]	0.354	0.103	0.016	[4.48]	0.125
	5	12,304	0.022	0.005	[2.96]	0.202	0.194	0.020	[7.91]	0.215

Panel B: KZ Index Quintiles

		Q					CF/A			
KZ Index		**N**	*b*	*(se)*	[t-stat]	β	*c*	*(se)*	[t-stat]	β
Quintile	**1**	12,321	0.008	0.003		0.146	0.062	0.009		0.112
	2	12,332	0.028	0.004	[4.03]	0.390	0.057	0.010	-[0.38]	0.102
	3	12,313	0.021	0.005	[2.06]	0.248	0.063	0.011	[0.09]	0.108
	4	12,319	0.038	0.007	[4.02]	0.338	0.063	0.012	[0.10]	0.097
	5	12,303	0.044	0.012	[2.78]	0.298	0.073	0.011	[0.80]	0.105

Panel C: Hadlock-Pierce Index Quintiles

		Q					CF/A			
Hadlock Index		**N**	*b*	*(se)*	[t-stat]	β	*c*	*(se)*	[t-stat]	β
Quintile	**1**	12,324	0.019	0.004		0.188	0.084	0.011		0.127
	2	12,322	0.042	0.007	[2.90]	0.360	0.090	0.016	[0.28]	0.111
	3	12,321	0.020	0.004	[0.20]	0.242	0.087	0.013	[0.18]	0.134
	4	12,288	0.019	0.004	[0.02]	0.237	0.062	0.009	-[1.58]	0.105
	5	12,312	0.013	0.004	-[1.05]	0.171	0.050	0.006	-[2.67]	0.097

Table 6
Investment Regressions by Quintiles based on Investment Levels and Financial Constraints: Double Sort

This table presents regression results from regressions of investment rates on lagged Tobin's q and operating cashflow rates. All regressions are estimated correcting for measurement error in Tobin's q using the differenced instrumental variables approach in Almeida et. al (2010) and clustering standard errors by firm. We sort first on aggregate investment intensity by year and then within those quintiles by the quintiles of the 4-component KZ index and report coefficients and t-statistics for the difference from zero for each regression. Columns to the right of the regression coefficients report (respectively) the percentage of aggregate investment, the mean of a financial constraints index based upon Hadlock and Pierce (2010), and the percentage of aggregate positive cashflow for each sub-quintile.

Double-Sort on Capital Expenditures and KZ Index

			Q_1		*CF/Assets*		*Cum%*	*Avg*	*Cum%*
Capx 5-tile	**KZ 5-tile**	*N*	*coef*	*[t-stat]*	*coef*	*[t-stat]*	*of Invest*	*Had Index*	*Of Cashflow*
1	1	3115	0.00	-[0.35]	0.03	[3.55]	0.03	-3.49	0.13
	2	3098	0.01	[0.69]	0.03	[3.87]	0.03	-3.37	0.09
	3	3098	0.01	[1.62]	0.02	[3.33]	0.03	-3.34	0.12
	4	3098	0.01	[1.66]	0.03	[4.98]	0.03	-3.32	0.10
	5	3081	0.02	[1.17]	0.02	[1.14]	0.03	-3.28	0.08
2	1	3113	0.01	[1.90]	0.08	[4.71]	0.13	-4.04	0.31
	2	3094	0.02	[1.72]	0.05	[3.00]	0.13	-3.95	0.24
	3	3090	0.02	[1.86]	0.04	[2.06]	0.13	-3.94	0.21
	4	3094	0.13	[1.39]	-0.02	-[0.34]	0.13	-3.92	0.21
	5	3075	-0.01	-[0.19]	0.06	[1.97]	0.13	-3.88	0.18
3	1	3111	0.04	[2.86]	0.02	[0.59]	0.42	-4.62	0.84
	2	3094	0.02	[1.92]	0.09	[3.59]	0.42	-4.61	0.66
	3	3093	0.03	[1.96]	0.09	[3.80]	0.42	-4.63	0.59
	4	3094	0.10	[2.02]	0.02	[0.30]	0.42	-4.51	0.56
	5	3075	0.09	[1.11]	0.06	[0.88]	0.41	-4.26	0.49
4	1	3112	0.02	[2.05]	0.12	[4.70]	1.45	-5.16	2.49
	2	3095	0.04	[2.47]	0.10	[3.11]	1.54	-5.36	2.06
	3	3091	0.05	[3.45]	0.09	[2.94]	1.54	-5.25	1.83
	4	3095	0.05	[2.87]	0.12	[2.85]	1.52	-5.05	1.73
	5	3076	0.21	[1.60]	-0.03	-[0.15]	1.48	-4.69	1.53
5	1	3109	0.02	[2.78]	0.20	[5.12]	20.52	-5.80	25.56
	2	3092	0.05	[2.51]	0.12	[2.07]	16.95	-5.92	16.69
	3	3088	0.02	[0.58]	0.17	[2.36]	18.10	-5.80	16.03
	4	3092	0.04	[1.04]	0.23	[2.79]	15.86	-5.69	13.66
	5	3072	0.06	[2.00]	0.15	[2.76]	18.16	-5.33	13.64

Table 7
Investment Regressions by Quintiles based on Investment Levels and Financial Constraints: Double Sort

This table presents regression results from regressions of investment rates on lagged Tobin's q and operating cashflow rates. All regressions are estimated correcting for measurement error in Tobin's q using the differenced instrumental variables approach in Almeida et. al (2010) and clustering standard errors by firm. We sort first on aggregate investment intensity by year and then within those quintiles by the quintiles of a financial constraints index based upon Hadlock and Pierce (2010) and report coefficients and t-statistics for the difference from zero for each regression. Columns to the right of the regression coefficients report (respectively) the percentage of aggregate investment, the mean 4-component KZ index, and the percentage of aggregate positive cashflow for each sub-quintile.

Double-Sort on Capital Expenditures and Hadlock Index

			Q_1		*CF/Assets*		*Cum%*	*Avg*	*Cum%*
Capx 5-tile	**Had 5-tile**	*N*	*coef*	*[t-stat]*	*coef*	*[t-stat]*	*of Invest*	*KZ Index*	*Of Cashflow*
1	1	3113	0.03	[1.50]	0.03	[2.33]	0.04	0.65	0.25
	2	3098	0.02	[1.61]	0.04	[3.35]	0.03	0.71	0.10
	3	3096	0.01	[1.48]	0.02	[3.43]	0.03	0.81	0.08
	4	3098	0.01	[0.70]	0.03	[4.00]	0.03	0.85	0.06
	5	3079	0.00	-[0.19]	0.02	[3.49]	0.02	0.90	0.03
2	1	3109	0.03	[3.07]	0.05	[2.76]	0.14	0.64	0.30
	2	3093	0.02	[2.67]	0.06	[3.67]	0.13	0.57	0.27
	3	3088	0.01	[1.94]	0.05	[3.21]	0.13	0.71	0.24
	4	3092	0.02	[2.86]	0.05	[3.29]	0.13	0.73	0.22
	5	3075	0.03	[2.16]	0.04	[2.68]	0.12	0.78	0.13
3	1	3104	0.07	[3.13]	-0.02	-[0.58]	0.44	0.60	0.78
	2	3092	0.04	[2.77]	0.06	[1.64]	0.43	0.56	0.71
	3	3088	0.04	[2.55]	0.07	[2.39]	0.42	0.70	0.67
	4	3092	0.03	[2.84]	0.08	[3.42]	0.42	0.80	0.59
	5	3070	0.04	[3.10]	0.11	[4.35]	0.39	0.79	0.39
4	1	3111	0.02	[2.56]	0.06	[2.63]	1.65	0.55	2.51
	2	3091	0.02	[2.28]	0.11	[2.97]	1.53	0.53	2.14
	3	3093	0.02	[2.52]	0.12	[4.04]	1.47	0.62	1.92
	4	3091	0.02	[2.12]	0.13	[4.21]	1.47	0.78	1.70
	5	3076	0.05	[4.25]	0.17	[5.72]	1.40	0.85	1.36
5	1	3105	0.01	[2.33]	0.13	[4.11]	20.45	0.57	22.71
	2	3089	0.05	[4.86]	0.11	[2.84]	19.40	0.69	18.63
	3	3088	0.03	[2.98]	0.17	[4.85]	16.37	0.74	15.01
	4	3092	0.02	[3.10]	0.22	[4.64]	15.93	0.81	13.81
	5	3065	0.02	[1.69]	0.24	[4.80]	17.41	0.81	15.38

Table 8
The Predictive Power of Cash Flows and Tobin's q

This table presents average investment rates by cashflow and Tobin's q terciles. Firms are sorted into terciles at the beginning of each decade, and the average rate and sum of realized capital investment is calculated through the decade. Standard errors are presented under the averages. Cashflow is calculated as income before extraordinary items plus depreciation, and Tobin's q is calculated as equity market value plus assets minus book equity divided by assets.

	Average Investment Rate (%)								
	1980-1989			1990-1999			2000-2009		
	Q			***Q***			***Q***		
Cashflow	*Low*	*Mid*	*High*	*Low*	*Mid*	*High*	*Low*	*Mid*	*High*
Low	5.84	7.28	8.75	5.50	5.68	5.82	4.76	4.21	4.14
	(0.10)	*(0.11)*	*(0.38)*	*(0.12)*	*(0.16)*	*(0.21)*	*(0.12)*	*(0.13)*	*(0.18)*
Mid	7.83	8.92	9.18	7.39	7.52	6.39	7.00	5.65	4.73
	(0.13)	*(0.15)*	*(0.19)*	*(0.14)*	*(0.13)*	*(0.13)*	*(0.18)*	*(0.10)*	*(0.16)*
High	9.87	10.53	11.05	11.17	9.54	8.33	9.75	8.27	5.81
	(0.25)	*(0.22)*	*(0.14)*	*(0.42)*	*(0.21)*	*(0.10)*	*(0.51)*	*(0.22)*	*(0.09)*

Table 9
The Predictive Power of Cash Flows and Tobin's q by Level of Investment Spending

This table presents average investment rates and total investment by cashflow and Tobin's q terciles for firms with low, medium, and high investment. Within each investment tercile, firms are sorted into terciles for cashflow and Tobin's q at the beginning of each decade, and the average rate of realized capital investment is calculated through the decade. Cashflow is calculated as income before extraordinary items plus depreciation, and Tobin's q is calculated as equity market value plus assets minus book equity divided by assets.

Realized Investment by Cashflow and Q Terciles

	Average Investment Rate (%): Low Capital Expenditures								
	1980-1989			**1990-1999**			**2000-2009**		
	Q			***Q***			***Q***		
Cashflow	*Low*	*Mid*	*High*	*Low*	*Mid*	*High*	*Low*	*Mid*	*High*
Low	5.05	4.59	5.43	4.50	4.38	5.69	3.03	3.48	3.34
	(0.22)	*(0.17)*	*(0.37)*	*(0.27)*	*(0.20)*	*(0.55)*	*(0.18)*	*(0.25)*	*(0.22)*
Mid	6.15	5.90	6.76	4.86	4.88	5.21	4.09	3.56	2.95
	(0.21)	*(0.23)*	*(0.27)*	*(0.21)*	*(0.19)*	*(0.31)*	*(0.26)*	*(0.15)*	*(0.18)*
High	7.94	7.23	7.43	7.74	6.66	6.24	5.25	5.02	3.52
	(0.33)	*(0.28)*	*(0.20)*	*(0.52)*	*(0.27)*	*(0.18)*	*(0.43)*	*(0.25)*	*(0.13)*

	Average Investment Rate (%): Medium Capital Expenditures								
	1980-1989			**1990-1999**			**2000-2009**		
	Q			***Q***			***Q***		
Cashflow	*Low*	*Mid*	*High*	*Low*	*Mid*	*High*	*Low*	*Mid*	*High*
Low	6.99	8.26	10.69	6.57	6.11	7.86	5.50	4.05	5.02
	(0.17)	*(0.24)*	*(0.92)*	*(0.23)*	*(0.26)*	*(0.46)*	*(0.22)*	*(0.19)*	*(0.42)*
Mid	8.19	9.11	9.39	9.24	7.01	7.12	8.24	5.22	3.86
	(0.24)	*(0.27)*	*(0.34)*	*(0.29)*	*(0.20)*	*(0.28)*	*(0.35)*	*(0.18)*	*(0.20)*
High	10.40	10.08	10.96	11.83	8.93	7.90	13.14	7.47	5.75
	(0.45)	*(0.39)*	*(0.22)*	*(0.73)*	*(0.43)*	*(0.18)*	*(1.04)*	*(0.32)*	*(0.17)*

	Average Investment Rate (%): High Capital Expenditures								
	1980-1989			**1990-1999**			**2000-2009**		
	Q			***Q***			***Q***		
Cashflow	*Low*	*Mid*	*High*	*Low*	*Mid*	*High*	*Low*	*Mid*	*High*
Low	8.16	8.65	10.58	6.34	6.70	5.89	6.35	5.97	4.00
	(0.17)	*(0.17)*	*(0.65)*	*(0.14)*	*(0.22)*	*(0.25)*	*(0.16)*	*(0.24)*	*(0.22)*
Mid	9.89	10.35	10.37	8.97	8.77	6.98	9.94	6.71	5.16
	(0.26)	*(0.24)*	*(0.31)*	*(0.29)*	*(0.22)*	*(0.16)*	*(0.38)*	*(0.17)*	*(0.17)*
High	12.98	13.66	13.04	12.66	11.12	9.95	13.82	12.97	6.23
	(0.53)	*(0.46)*	*(0.26)*	*(0.76)*	*(0.37)*	*(0.19)*	*(0.78)*	*(0.53)*	*(0.14)*

Table 10
Relation Between Debt and the Financing Deficit by Level of Investment Spending

This table presents results from regressions of net debt on the financing deficit for ventiles formed using either capital expenditure or size. For each ventile we estimate:

$$\Delta D_{it} = \alpha_i + \tau_t + \beta DEF_{it} + \varepsilon_{it}$$

Where where ΔD is the amount of net debt issued and *DEF* is the financing deficit. The financing deficit is defined as the sum of dividends and investment plus any increases in working capital, cash, and short term debt less net cash flow after interest and taxes. Both variables are scaled by net assets. Regressions are estimated with firm fixed effects and year dummies.

Net Debt and Financing Deficit

	Capx				***Assets***			
Ventiles	*N*	*coef*	*[t-stat]*	*R2*	*N*	*coef*	*[t-stat]*	*R2*
Smallest	8177	0.3880	[4.73]	32.5%	8173	0.3177	[2.11]	20.2%
2	8145	0.0356	[1.36]	4.3%	8148	0.0879	[1.82]	6.0%
3	8143	0.0514	[1.36]	5.8%	8145	0.1492	[6.48]	14.3%
4	8142	0.0323	[1.40]	3.3%	8147	0.0311	[1.43]	3.6%
5	8146	0.1214	[6.68]	16.2%	8143	0.0687	[1.11]	6.8%
6	8141	0.0494	[8.92]	15.1%	8152	0.0603	[1.49]	6.4%
7	8136	0.2900	[3.15]	34.3%	8142	0.1253	[4.32]	12.9%
8	8144	0.1511	[1.87]	18.0%	8143	0.1368	[4.12]	17.7%
9	8142	0.1003	[1.62]	10.8%	8141	0.0863	[2.13]	11.4%
10	8133	0.1670	[3.73]	21.5%	8130	0.0639	[3.72]	17.3%
11	8153	0.0946	[4.00]	11.6%	8153	0.1656	[2.40]	20.5%
12	8139	0.1514	[3.92]	13.0%	8126	0.3399	[4.19]	39.9%
13	8146	0.0834	[1.77]	11.5%	8142	0.3103	[2.82]	44.9%
14	8133	0.4843	[3.94]	52.2%	8128	0.2203	[3.30]	27.3%
15	8129	0.7863	[7.06]	85.8%	8125	0.1408	[1.47]	18.0%
16	8126	0.3221	[7.46]	48.7%	8126	0.2843	[2.62]	34.9%
17	8129	0.4176	[5.54]	53.1%	8126	0.6611	[8.31]	76.8%
18	8122	0.6026	[11.77]	72.4%	8115	0.7180	[3.59]	79.3%
19	8121	0.5168	[16.55]	78.8%	8101	0.6282	[9.83]	68.9%
Largest	8054	0.8232	[10.98]	89.4%	8088	0.7134	[14.56]	76.8%

Table 11
The Impact of the Top Capital Spenders on Aggregate Investment

This table reports results from regressions relating the change in the log of aggregate net fixed private non-residential investment to the changes in the log of the total investment made by the top capital spenders in the U.S over the period 1967-2011. TOP50 is the sum of all the capital expenditures made by the top 50 capital spenders. TOP100, TOP250, and TOP500 are defined in a similar way. BELOW500 is the sum of all the capital expenditures made by all the firms ranked below 500. Robust standard errors are reported in parentheses below coefficient estimates. *** denotes significance at the 1% level.

	Dependent Variable: Change in the Log of Net of Aggregate Net Fixed Private Non-Residential Investment							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.03***	0.03***	0.03***	0.03***	0.03***	0.03***	0.03***	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
TOP50	0.49***	0.46***						
	(0.08)	(0.07)						
TOP100			0.53***	0.51***				
			(0.08)	(0.07)				
TOP250					0.53***	0.52***		
					(0.08)	(0.08)		
TOP500							0.52***	0.50***
							(0.09)	(0.09)
BELOW500		0.03		0.02		0.02		(0.01)
		(0.03)		(0.02)		(0.02)		(0.02)
Observations	45	45	45	45	45	45	45	45
R^2	58.4%	59.6%	63.6%	64.3%	66.0%	66.5%	66.4%	66.6%