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Why Does Equity Capital Flow out of High Tobin’s q Industries?

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High Tobin’s q industries receive more funding from capital markets than low Tobin’s q industries from 1971 to 1996. Since then, the opposite is true. The key to understanding this shift is that large firms, for which q is more a proxy for rents than investment opportunities, have become more important within industries. For these firms, repurchases but not capital expenditures increase in the cross-section with q, so that q explains the variation of repurchases more than of capital expenditures. Consequently, equity capital flows out of high q industries because for these industries stock repurchases are high and issuances are low. (*JEL*)

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In market economies, a critical role of capital markets, or more generally, of the financial sector, is to allocate capital across industries and firms. Bagehot, in 1873, already observed that in England “capital runs as surely and instantly where it is most wanted, and where there is most to be made of it, as water runs to find its level.”[1] Schumpeter (1934) emphasized how the financial sector’s skills in allocating funds to their best use facilitates economic growth. More

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[1] Bagehot’s quote is reported by Levine (1997).

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financially developed economies are expected to perform this task better as they are more efficient at funneling funding to industries that cannot fully exploit their investment opportunities without external finance (Rajan and Zingales 1998). Wurgler (2000) provides evidence that capital is allocated more efficiently across industries in countries with a more developed financial sector, and Morck, Yavuz, and Yeung (2011) show that banking systems controlled by tycoons or families lead to poorer capital allocation.

Doidge et al. (2018) report that from 1997 to 2016 the number of public firms in the United States fell by roughly half, and these firms repurchased equity in excess of equity issuance for $3.6 trillion in 2015 dollars. These facts suggest that the role of public capital markets in the United States has changed. We investigate in this paper whether the U.S. capital markets have been allocating capital differently across industries since 1997 than they did before. We begin by using Tobin's q as a proxy for an industry's investment opportunities to examine whether capital flows more to the industries with the best growth opportunities. We find that industry capital flows are positively correlated with industry Tobin's q from 1971 to 1996, but, surprisingly, they are negatively correlated with Tobin's q from 1997 to 2014. We show that this change is due to the fact that high q industries have negative equity capital flows—that is, they repurchase more equity than they issue. After documenting this shift, we investigate possible explanations for it.

Using the Fama and French (1997) 48 industries, we measure industry capital flows as the sum of net equity and debt issuance for an industry divided by the total assets of the industry and call this ratio an industry's net funding rate. We expect an industry's Tobin's q to proxy for the industry's growth opportunities since Tobin's q is "the most widely used measure of a firm's incentive to invest" (Erickson and Whited 2006). In frictionless dynamic models, q alone or with cash flow is a sufficient statistic for investment (Hayashi 1982; Abel and Eberly 2011). With Tobin's q as a proxy for investment opportunities, we show in the next section that industries with a higher Tobin's q should receive more funds from capital markets controlling for internal cash flow.

During the period up to 1996, the year when the number of corporations listed on U.S. exchanges peaked (Doidge, Karolyi, and Stulz 2017), industries in the top quintile sorted cross-sectionally on industry q almost always had a higher net funding rate than industries in the bottom quintile. In the post-1996 period, the average net funding rate of industries in the bottom quintile of the industry q distribution is greater than the average net funding rate of industries in the top quintile. More formally, when we estimate panel regressions of the net funding rate on Tobin's q and cash flow with year fixed effects, we find a significantly positive coefficient on Tobin's q for the period ending in 1996. Afterward, the coefficient on Tobin's q is insignificant. The difference in the coefficient on Tobin's q between the two periods is significant. For simplicity, we call the period 1971–1996 the prepeak period in the following and the period 1997–2014 the postpeak period. These results are inconsistent with capital flowing more to the industries with the best investment opportunities in the postpeak period if an industry's Tobin's q is to proxy for its investment opportunities.

One might be tempted to think that an explanation for our results is simply that Tobin's q is a noisy proxy for growth opportunities. Such an explanation is improbable, as it would require Tobin's q to be a good proxy for growth opportunities in the prepeak period but become a noisy one in the postpeak period. However, we still explore this possibility and find evidence against it. Specifically, our results hold after accounting for intangibles (Peters and Taylor 2017) as well as after using the Minimum Distance Estimation proposed in Erickson, Jiang, and Whited (2014) as a remedy for errors-in-variables in q. They also hold if we shorten our prepeak period to start in 1982 to avoid the years with the highest inflation. Finally, we find similar results after measuring growth opportunities using industry value–added growth instead of q (Wurgler 2000).

We investigate other explanations for the change in the cross-sectional relation between the industry funding rate and industry q, or equivalently, the change in the q-sensitivity of industry capital flows, by examining whether the change occurs for both debt funding and equity funding. We find a consistent decrease in the q-sensitivity of net equity funding after the peak in listings, but there is no equivalent decrease for debt funding. When we split net equity funding into new issuances and repurchases, we find mixed evidence that the q-sensitivity of equity issuance falls in the postpeak period but strong evidence that the q-sensitivity of repurchases increases, meaning that aggregate repurchases in an industry increase significantly more with industry q after 1996 than before. It follows from this that the change in the q-sensitivity of industry capital flows is due mostly to an increase in the q-sensitivity of repurchases.

Repurchases were highly restricted before 1982 (Grullon and Ikenberry 2000). In 1982, the SEC adopted Rule 10B-18 that effectively made repurchases much easier for corporations. To better examine the impact of repurchases on our results, we further use a sample with a prepeak period starting in 1982. We call this prepeak period the short prepeak period and the sample period from 1982 to 2014 the short sample period. The q-sensitivity of repurchases is insignificant in the short prepeak period but significantly positive in the postpeak period. One way of putting the greater q-sensitivity of repurchases in the postpeak period into perspective is to compare it with the q-sensitivity of capital expenditures. In the postpeak period, the coefficient on q in a regression of capital expenditures on q and cash flow is virtually zero and the R^2 is 0.5%. In contrast, in a regression using repurchases instead of capital expenditures, the coefficient on q is 0.011 and the R^2 is 37.4%. In other words, industry q and cash flow (also industry q alone) explain repurchases much better than capital expenditures. This is not the case in the prepeak period.

Why does q become so good at explaining the industry repurchase rate in the cross-section? Why do repurchases at the industry level even increase with industry q? To answer these questions, we turn to firm panel regressions. We first show that when we weight firms in an industry by their asset size (in order to replicate the industry-level results reported earlier), we continue to find that the net equity funding rate for firms is positively related to q in the prepeak period but negatively related in the postpeak period. In contrast, when we weight firms equally, we find that the q-sensitivity of the net equity funding rate does not change from the prepeak period to the postpeak period. This suggests that an equally weighted average of firms within an industry is a better proxy for the industry in the prepeak period than in the postpeak period. For that to be the case, large firms must have become more influential during the postpeak period. Doidge, Karolyi, and Stulz (2017) attribute the decrease in the number of listed firms to a decrease in IPOs, an increase in mergers, and a high delist rate of young firms. These developments mean that, in the postpeak period, our firm-level panel contains fewer young firms, the age of the firms is higher, and firms are larger.

Can the increase in firm size and age explain our results? The q-sensitivity of net equity funding is higher for young firms than for old firms, but both young and old firms have a positive q-sensitivity. It follows that age alone cannot explain why the q-sensitivity of net equity funding at the industry level becomes negative. In contrast, large firms, defined as firms with more than $10 billion in assets in 2014 dollars, have negative q-sensitivity of net equity funding in contrast to small firms that have a large positive q-sensitivity. The contrast is even sharper when we focus on young small firms and old large firms. For all those subgroups, the within-group changes in the q-sensitivity of net equity funding are small compared to the between-group differences. Consequently, compositional changes are critical to explain why the q-sensitivity of net equity funding at the industry level has changed so much. Among these compositional changes, the increase in the fraction of assets of large firms within industries is the key to explaining the change in q-sensitivity. In the prepeak period, seven industries had more than half of industry assets held by large firms. In the postpeak period, 19 industries are in that situation. In 30 industries out of 43, the fraction of assets held by large firms increased significantly from the prepeak period to the postpeak period. Focusing on old large firms, only four industries had more than half of their assets held by them in the prepeak period, but it increased to 13 industries in the postpeak period. As many as 29 industries saw their assets held by old large firms increase significantly from the prepeak to the postpeak period.

Why does the q-sensitivity of net equity funding differ so much between large and small firms? On average, large firms—and old large firms in particular—repurchase more equity than they issue. The opposite is true for small firms and more so for young small firms. A simple explanation for this comes from the life cycle model of the firm (DeAngelo, DeAngelo, and Stulz 2006). With Schumpeter (1934), young firms are building assets that will enable them to be profitable and generate cash flow. Those assets may produce rents in the future. With this view, creating sources of rents is what young firms do, and exploiting these rents is what old firms do. Mueller (1972) models this view of the firm, calling it the life cycle theory of the firm (see Loderer, Stulz, and Waelchli 2017 for a review of this literature and empirical evidence). Mueller (1972) predicts that firms are more likely to overinvest as they become older, and Grabowski and Mueller (1975) show that more mature firms experience lower rates of return on retentions. This logic also underlies Jensen's theory of free cash flow (Jensen 1986). With this theory, we expect large old firms to have free cash flow, not young small firms.[2]

With the life cycle theories, young firms take advantage of growth opportunities by investing aggressively. Once these firms have done so successfully, they have become large, harvest the cash flows from their investments, and are left with much fewer investment opportunities. As a result, they invest less, pay out more, and rely less on growth opportunities for their value than they used to when they were young and small. Unlike a young small firm whose high Tobin's q is a measure of its incentives to invest, an old large firm's high Tobin's q reflects its valuable assets in place. We therefore expect q to be related differently to net funding and net equity funding for small young firms and large old firms. As reported earlier, throughout our sample period, the q-sensitivity of net equity funding is significantly negative for large old firms and significantly positive for small young firms.

In fact, the existing literature on Tobin's q offers an explanation for why Tobin's q should be interpreted differently for small young firms and large old firms. Tobin's q is used differently in the traditional investment literature and in the industrial organization literature (Abel and Eberly 2011; Eggertsson, Robbins, and Wold 2018). In the investment literature, under some assumptions, q is a sufficient statistic for investment: the greater the q, the greater the incentives of a firm to invest. With free entry and no monopoly or Ricardian rents, new entrants could purchase or replicate the portfolio of assets of incumbents, and, by doing so, they could make a profit as long as the incumbents' q is greater than one (Ross and Lindenberg 1981). As those profit opportunities are captured by new entrants or incumbents, q should fall. When Tobin's q is expected to behave this way, we call it investment q.

Alternatively, in the industrial organization (IO) literature, q is mostly used as a measure of monopoly and Ricardian rents. Abel and Eberly (2011) show that, even with a neo-classical production function, the sensitivity of investment to q falls with imperfect competition. One strand of this literature, started with Stigler (1962) and Lindenberg and Ross (1981), takes q to be a measure of rents earned because of industry concentration, that is, because firms have

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[2] A related literature focuses on the life cycle of products (Agarwal and Gort 2002). With this literature, there is no difference between the life cycle of a product and the life cycle of a firm specialized in that product, but firms may be able to innovate with new products, so that they bypass the lack of investment opportunities that would otherwise occur as they age (Hoberg and Maksimovic 2019).

market power.[3] Recent literature shows that with market power, firms invest less for a given q (Gutiérrez and Philippon 2017a, 2017b). This view helps explain the lower corporate investment in the postpeak period as well as other macroeconomics facts (Eggertsson, Robbins, and Wold 2018). Another strand of the literature takes a more encompassing view of rents, so that q includes so-called Ricardian rents, namely factors of production that the firm acquired over time but cannot be obtained easily by competitors (Montgomery and Wernerfelt 1988). Organizational assets as well as many other intangible assets could be sources of Ricardian rents, so that the documented increase in the importance of intangible assets (see Kahle and Stulz 2017 for references) is expected to lead to an increase in the importance of Ricardian rents among industry-dominant firms.

Unlike investment q, if a firm has a high q because of rents, its q may not fall even if it exceeds one. It is because there is not enough new entry (in the case of monopoly rents) or other firms cannot replicate the incumbents' assets (in the case of Ricardian rents). The firm's high q does not imply that the firm should increase its size through investment, because its unique assets are not readily duplicated and the firm wants those assets to be in short supply. Thus, we would expect the firm to have free cash flow stemming from the excess of its rents over its investment, and we would expect this free cash flow and Tobin's q to be positively related. In short, in this case, Tobin's q measures rents, and we call it IO q.

With agency costs of free cash flow, firms could invest those cash flows in unprofitable projects (Jensen 1986). However, with good governance in place, firms will pay out some or all of their free cash flow. As the importance of institutional investors grows and the incentives of managers become more focused on shareholder wealth creation (Holmstrom and Kaplan 2001), we expect more free cash flow to be paid out. With IO q, we would thus expect high q firms with more free cash flow to pay out more. Because firms are well known to be reluctant to cut dividends (see DeAngelo, DeAngelo, and Skinner 2009 for a review), repurchases would be used more to pay out free cash flow because of their greater flexibility. This explains why the q-sensitivity of repurchases can be positive. The dividend payout literature generally finds that firms with better investment opportunities are less likely to pay dividends (see Denis 2011 for references) and that their payout ratio is negatively related to investment opportunities (e.g., Faulkender, Thakor, and Milbourn 2006). Our result that the q-sensitivity of repurchases is positive and highly significant cannot be reconciled with the traditional view of payout policy that firms with a higher market-to-book ratio should have lower payouts due to their better investment opportunities. This view relies solely on investment q and ignores IO q.

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[3] Stigler (1962) uses market-to-book instead of q, but the implications are the same.

To explain our findings, we first assess whether large old firms have more market power than small young firms. We find that this is the case using the Lerner index, which is a widely used firm-level measure of market power. We show that the Lerner index is higher for large firms than for small firms and that the Lerner index increases from the prepeak to the postpeak period for large firms but not for small firms. In other words, large firms increase their market power compared to small firms. Those patterns are more pronounced when we focus on the difference between large old firms and small young firms. Our evidence is consistent with evidence in Grullon, Larkin, and Michaely (2018) of an increase in the Lerner index over time.

We then investigate whether investment q is more relevant for small (young) firms and IO q is more important for large (old) firms. Our evidence is strongly supportive of this prediction. Specifically, we find that q works well at explaining the capital expenditures of small firms but not large firms. With cash flow as another regressor, capital expenditures of large firms are not significantly related to q for the prepeak periods and are significantly and negatively related to q for the postpeak period. This pattern is stronger for large old firms. This evidence is consistent with q having more information about rents than investment opportunities for large and large old firms. Given this evidence, it is not surprising that when we regress repurchases or capital expenditures on a constant and q, q explains the cross-sectional variation in repurchases better for large old firms than the cross-sectional variation in capital expenditures. The opposite is the case for small young firms. We also expect that IO q applies more to firms with a high Lerner index (i.e., firms with market power) and investment q applies more to firms with a low Lerner index (i.e., firms with little or no market power). We show that this is the case. Specifically, the q-sensitivity of repurchases is higher for high Lerner index firms and the q-sensitivity of capital expenditures is higher for low Lerner index firms. To come full circle, we show that the correlation between free cash flow and q is positive for high Lerner index firms and it is negative for low Lerner index firms.

Hoberg and Phillips (2010) document the existence of booms and busts at the industry level in the United States. With their evidence, high valuations are followed by poor returns. We would therefore be remiss if we did not consider as a possible explanation for our evidence that the capital market price signals are wrong after the mid-1990s, so that the financial markets ignore these signals when they allocate capital. The problem with this explanation for our findings is that the firms that repurchase their common stock are highly valued, a phenomenon noticed earlier in the literature, for instance, by Dittmar and Dittmar (2004). We would not expect firms to repurchase massive amounts of their stock if the market overvalues that stock. Rather, we would expect such firms to use their overpriced equity to raise more capital and invest more (see Stein 1996 for an analysis of the implications of misvaluation for capital budgeting and references) or make more acquisitions (Shleifer and Vishny

2003). Hence, our evidence is equally puzzling if valuation signals are correct as a proxy for investment opportunities throughout our sample period or correct only before the middle of the 1990s.

A growing related literature explores the increase in concentration within the United States and within industries (Grullon, Larkin, and Michaely 2019) and the potential impact of that increase on corporate investment (Gutiérrez and Philippon 2017a, 2017b; Alexander and Eberly 2018; Crouzet and Eberly 2018). The focus of this literature is different from the focus of this paper. We are interested in finding out whether capital flows to high q industries as we would expect with q as a proxy for growth opportunities. That is, our focus is on capital flows in the cross-section.

Our paper is also related to papers by Hoberg and Maksimovic (2019) and Frank and Yang (2018). Hoberg and Maksimovic explore the relation between firm investment and q across product life cycle stages, with textual analysis used to classify life cycle stages. They find that the relation between q and capital expenditures is strongest for firms with products past the development stage that are not yet mature. While we use age as a proxy for the stage of the life cycle of a firm, Hoberg and Maksimovic show that there are gains to be made from a text-based approach that focuses on product life cycle stage. Unfortunately, their method cannot be used for our prepeak period because 10-Ks are not machine-readable for that period. Frank and Yang investigate whether capital flows to more productive firms and find, as we do but for a longer period, that more productive firms tend to distribute funds rather than raise new funds from capital markets.

1. When Do Industry Net Funding Flows Increase with Tobin's *q*?

There is a considerable literature in finance that derives conditions under which Tobin's q for a firm is a sufficient statistic for investment. With that literature, investment increases with q. It is easy to check that if a relation between investment and Tobin's q holds at the firm level, it also holds at the industry level. For instance, if a firm's investment over assets is an increasing function of its Tobin's q where q is defined as the market value of assets over book assets, the industry investment to industry assets would increase with the industry q, which is defined as the market value of industry assets divided by industry book assets. In short, if the q theory of investment holds in that q is a sufficient statistic for investment, everything else equal, we expect industries with a higher q to invest more.

Building on the cash flow identity of a corporation, there is a relation between investment and net funding flow at the industry level. To see this, note that the cash flow identity can be written as follows:

$$\begin{aligned}&\text{Investment} + \text{Change in net working capital}\\&\quad = \text{Cash flow before financing} + \text{Net funding flow}.\end{aligned} \tag{1}$$

If two industries have the same change in net working capital and cash flow before financing, the industry with the higher Tobin's q is expected to have the higher net funding flow, as long as the higher q industry invests more. For this relation to be correct, however, it requires a broader definition of investment than is typical. The literature often focuses on capital expenditures, but the definition of investment in the cash flow identity is broader than capital expenditures, as it includes any expenditure leading to a net increase in assets.

In a neoclassical model, we expect all assets held by the firm to have the same marginal productivity. With this view, an increase in net working capital is investment for the firm as well. We call net investment the sum of investment and the change in net working capital. With this simplification, we have:

$$\text{Net investment} = \text{Cash flow before financing} + \text{Net funding flow}. \quad (2)$$

With this relation, if cash flow is given, then the net funding flow increases with net investment. If net investment increases with q, then net funding flow must increase with q given cash flow. Hence, without controlling for cash flow, it is not necessarily the case that net funding increases with q.

Consider now the implications of the cash flow identity if we regress net funding on q. Assume that net investment, I, cash flow before financing, C, and the net funding flow, N, are differentiable functions of q. With this notation and assumption, it must be true that:

$$\frac{\partial I}{\partial q} = \frac{\partial C}{\partial q} + \frac{\partial N}{\partial q}. \quad (3)$$

A necessary condition for the net funding flow to increase with q is therefore that:

$$\frac{\partial I}{\partial q} > \frac{\partial C}{\partial q}. \quad (4)$$

With this relation, the net funding flow increases with q if investment increases more with q than cash flow before funding. Conversely, to the extent that the increase of cash flow with q is greater than the increase of investment with q, the net funding flow decreases with q, and in the cross-section, higher q industries raise less net funding than lower q industries.

For example, when q proxies for monopoly or Ricardian rents, cash flow rises with q because those rents generate cash flow and are also capitalized into q. At the same time, firms that have invested and built assets that generate rents may no longer invest as much because these assets are not easily duplicated. Furthermore, if a firm's manager works in the best interests of shareholders (so that q is not lowered by agency costs), the cash flow after all positive net-present-value projects are taken—that is, free cash flow—will be paid out to investors. In sum, if Tobin's q stands for IO q that proxies for rents, it will be insignificantly or even negatively related to net industry capital flows.

There is a long literature outside of finance that predicts Tobin's q or market-to-book to be higher for firms that draw more rents. Stigler (1962) seems to be first in using market-to-book, and Lindenberg and Ross (1981) seem to be first using Tobin's q. In general, this literature does not draw implications for the investment rate. However, Abel and Eberly (2011) model investment when there is imperfect competition and show that the relation between investment and q weakens with imperfect competition. With their model, if two firms have the same q but one has more market power, the firm with more market power invests less.

2. Data and Funding Rate

To construct the sample, we begin with all Compustat firms incorporated in the United States with positive total assets (AT) and sales (SALE) and with property plant and equipment (PPEGT) of at least 5 million. We assign those firms to one of Fama-French's 48 industries. For industry information, we first use the historical SIC code in Compustat. If that information is missing, we seek the historical SIC code in CRSP. The matching between Compustat and CRSP is based on CUSIP (up to eight digits) and data date (year and month). If the CRSP historical SIC code is also missing, we use the header SIC code in Compustat. We drop firms with no SIC data and firms that do not belong to any of Fama-French's 48 industry groups. Additionally, we exclude firms with an SIC code between 4900 and 4999 (utilities), between 6000 and 6999 (financials), and 9000 and higher (public service, international affairs, or nonoperating establishments). Firms in regulated industries as identified by Barclay and Smith (1995) are also excluded from the sample.[4] We require a Fama-French industry group to have at least 10 firms in a given year. Finally, our analysis uses only the firms for which Tobin's q, the Peters and Taylor (2017) q, which we denote by PT q, capital expenditures (CAPEX), and total funding rate can be calculated.

Our selection criteria give us 131,401 firm-year observations and 1,708 industry-year observations during our study period of 1971–2014 (fiscal years). Table 1 reports summary statistics by year. Column 2 shows that the number of industries with at least 10 analyzable firms does not change much over time, as it ranges between 37 and 41 during the sample period.

Our key variable is the funding raised in external capital markets. We follow Fama and French (2005) and others in measuring equity funding as the difference between equity issuance and equity repurchases. More precisely, equity funding during a year is computed as the sale of common stock and preferred stock minus the purchase of common and preferred stock. Debt funding is the issuance of long-term debt minus the reduction in long-term debt plus the change in short-term debt. Total funding is the sum of equity and debt funding. The total funding rate of an industry, or an industry's capital flows,

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[4] Those industries are railroads (SIC 4011) and trucking industry (SIC 4210 or 4213) up to 1980, airline industry (SIC 4512) up to 1978, and telecommunications industry (SIC 4812 or 4813) up to 1982.

Table 1
Industry funding rate

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		Summary statistics of industry funding rate						Mean industry q	
Year	No. of industries	Mean, %	Min, %	q1, %	Median, %	q3, %	Max, %	Tobin's q	PT q
All years	1,708	1.4	−8.0	−1.0	1.0	3.1	16.3	1.52	0.86
1971	40	3.2	−1.9	1.6	2.8	3.9	16.3	1.46	0.78
1972	40	2.5	0.3	0.9	1.8	3.0	13.5	1.60	0.92
1973	40	1.9	−3.0	0.7	1.2	2.7	9.1	1.63	0.93
1974	40	3.2	−1.5	1.3	2.8	4.6	12.4	1.30	0.58
1975	41	1.7	−4.7	0.1	1.8	3.2	13.5	1.01	0.29
1976	41	0.8	−5.1	−0.3	0.6	1.5	9.5	1.13	0.40
1977	41	2.1	−2.6	0.6	2.0	3.0	10.4	1.17	0.43
1978	39	2.7	−1.1	0.5	2.2	4.0	16.3	1.09	0.35
1979	39	3.1	−7.5	1.0	2.4	5.7	11.7	1.08	0.32
1980	39	3.5	−0.7	1.0	2.8	5.1	16.1	1.12	0.37
1981	40	3.3	−1.6	0.7	2.3	3.6	16.3	1.20	0.47
1982	39	2.3	−3.0	0.6	2.0	3.5	15.0	1.11	0.38
1983	38	1.9	−3.2	−0.1	1.0	3.6	16.3	1.20	0.48
1984	39	1.6	−8.0	−0.5	1.4	3.7	15.6	1.31	0.58
1985	39	3.1	−3.3	0.7	2.6	4.2	16.3	1.23	0.50
1986	38	3.6	−8.0	0.6	2.9	6.3	16.3	1.32	0.59
1987	40	2.1	−8.0	−1.4	1.6	5.3	16.3	1.39	0.74
1988	39	1.1	−8.0	−3.1	1.2	3.4	14.2	1.40	0.73
1989	39	2.4	−8.0	−0.7	2.5	5.1	16.3	1.38	0.80
1990	39	1.0	−8.0	−0.9	1.3	3.0	6.9	1.47	0.91
1991	39	0.8	−3.5	−1.1	0.3	2.1	16.3	1.37	0.79
1992	39	1.3	−8.0	−0.8	0.8	2.6	12.0	1.58	0.97
1993	38	1.2	−3.7	−0.3	1.0	2.7	7.1	1.62	0.97
1994	38	2.0	−6.0	−1.1	0.9	3.3	16.3	1.68	1.08
1995	38	2.4	−8.0	−0.8	2.3	5.7	10.3	1.58	0.95
1996	38	2.2	−8.0	−0.6	1.5	4.7	15.6	1.77	1.15
1997	38	2.7	−8.0	−0.5	1.4	5.5	16.3	1.85	1.23
1998	39	3.4	−4.1	0.4	2.8	5.6	14.6	1.95	1.39
1999	37	2.1	−3.8	0.0	1.8	3.0	10.9	1.97	1.39
2000	37	1.7	−3.1	−1.5	0.7	3.4	12.0	1.98	1.40
2001	37	0.4	−8.0	−2.3	−0.2	2.5	8.4	1.93	1.38
2002	37	−1.1	−4.5	−2.9	−1.6	0.3	10.0	1.84	1.27
2003	38	−0.7	−6.0	−3.3	−1.0	0.6	14.8	1.64	0.97
2004	39	−1.0	−6.2	−3.1	−1.0	0.2	8.2	1.80	1.15
2005	39	−1.1	−7.4	−3.7	−1.8	0.0	16.3	1.82	1.20
2006	39	−1.1	−7.2	−4.0	−1.2	1.4	10.5	1.80	1.18
2007	40	0.0	−8.0	−3.2	−1.2	1.5	16.3	1.83	1.18
2008	39	−0.5	−8.0	−3.0	−0.7	1.1	16.3	1.77	1.15
2009	38	−1.4	−6.5	−3.4	−1.5	0.2	6.0	1.46	0.76
2010	38	−1.1	−8.0	−2.8	−1.2	0.7	12.8	1.55	0.87
2011	38	−0.5	−8.0	−1.9	−1.1	−0.2	16.3	1.68	1.02
2012	38	0.3	−6.1	−1.3	0.1	2.5	6.1	1.58	0.91
2013	39	0.3	−3.8	−2.3	−0.1	1.9	7.6	1.65	0.98
2014	38	−0.2	−6.9	−2.4	0.1	2.1	6.0	1.81	1.20

The sample is based on all Compustat firms incorporated in the United States with positive total assets and sales and with property, plant, and equipment of at least \$5 million. Those firms are assigned to one of Fama-French's 48 industries. We drop firms with no SIC data, firms that do not belong to any of Fama-French's 48 industry groups, firms with an SIC code between 4900 and 4999 (utilities), between 6000 and 6999 (financials), and 9000 and higher (public service, international affairs, or nonoperating establishments), and firms in regulated industries as identified by Barclay and Smith (1995). Each of the resulting Fama-French industry groups is required to have at least 10 firms in a given year. We keep only the firms for which Tobin's q, the Peters and Taylor (2017) q (called PT q below), capital expenditures rate, and total funding rate can be calculated. The funding rate of an industry is the sum of all equity and debt funds raised by the industry's firms during the year, divided by the sum of those firms' total assets at the start of the year. Equity funds are equity issuances minus equity repurchases, while debt funds are long-term debt issuances and changes in short-term debt minus long-term debt reduction. Tobin's q is the ratio of industry total assets plus industry market value of equity minus industry book value of equity, to the industry total assets, all measured at the beginning of the year. PT q is based on Peters and Taylor (2017) and is a ratio of the sum of industry market value of equity and industry book value of long-term and short-term debt less the industry book value of current assets, to the sum of industry balance sheet intangible assets, off–balance sheet intangible assets, and property, plant, and equipment, all measured at the beginning of the year. More details on the construction of the variables are presented in the Appendix. We winsorize at the 1st and 99th percentiles over the full sample.

is the sum of all equity and debt funds raised by the industry's firms during the year, divided by the sum of the total assets of the firms in the industry at the start of the year. Given the data requirement mentioned above, our sample firms—and industries—should have at least one nonmissing funding variable (out of five) and thus a valid value for the total funding rate. It is possible that the equity or debt funding rate is missing, in which case we treat it as zero.[5] We winsorize the funding rates and other variables at the 1st and 99th percentiles over the data set that is used for estimation.

Columns 3 through 8 of Table 1 report summary statistics for the industry funding rates. The top row is for the entire sample period (i.e., across the 1,708 industry-year observations), and the other rows give year-by-year statistics. The average funding rate across industries and years is 1.4%. This funding rate varies substantially over time. The lowest mean is −1.4% in 2009, and the highest is 3.6% in 1986. Looking at differences across years, the average funding rate in the 2000s is noticeably lower than in earlier years. First, since 2001, the average funding rate never exceeds 0.5%, while before that no year has a funding rate below this level. Second, the funding rate averages 2.2% and is never negative before 2002, but it is negative for 10 years after with an average of −0.6%.

The last two columns of Table 1 show data for two versions of industry q ratios. The first one, named Tobin's q, is a version of the q ratio commonly used in corporate finance (see Bakke and Whited 2010 for a justification) but computed at the industry level rather than at the firm level. The numerator of the ratio is industry total assets plus the industry market value of equity minus the industry book value of equity, and the denominator is industry total assets, all measured at the beginning of the year. The other q ratio, dubbed PT q, is the one based on Peters and Taylor's (2017) method. They use the sum of balance sheet intangible assets, off–balance sheet intangible assets, and property, plant, and equipment for the denominator, and the sum of the market value of equity and long-term and short-term debt less current assets for the numerator. As with Tobin's q, we compute PT q by aggregating the numerators and the denominators across firms in an industry. Not surprisingly, PT q is much lower than Tobin's q. For the sample average, PT q is 0.86 and Tobin's q is 1.52. The pooled correlation between Tobin's q and PT q is 0.83. It is interesting to note that the ratio of Tobin's q to PT q exceeds 2 from 1974 to 1986. After 1986, the ratio never exceeds 2 again. Our method for obtaining industry q means that small firms, which are the ones where errors in q are likely to be largest, are unlikely to have much impact on our measurement of industry q.

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[5] We obtain similar results if we do not use variables with missing observations instead of setting them to zero.

3. Does Capital Flow More to Industries with a High Tobin's q?

In this section, we investigate whether capital flows more to industries with a high industry Tobin's q. We begin by showing, in Figure 1, the average net funding rate for industries in the top quintile of the industry q distribution and for industries with q in the bottom quintile. This figure shows that high q industries have a higher net funding rate than low q industries in 20 out of the 26 years of the prepeak period but in only three years out of 18 in the postpeak period. In the remainder of this section, we use a number of different approaches to assess the relation between an industry's net funding rate and its Tobin's q. We also use a non-q measure of growth opportunities. All approaches lead to the same conclusions.

3.1 Correlation between the Net Funding Rate and q

Our first approach estimates the yearly Spearman rank correlation between the industry net funding rate and the industry Tobin's q. The advantage of using the Spearman rank correlation is that it is much less sensitive to potential outliers. The correlation should be positive if capital flows more to industries with a higher q. Figure 2 plots the Spearman rank correlation for each year in our sample period, and Table 2 reports the annual correlations and their significance. Negative correlations are rare in the prepeak period but abundant subsequently. It is not surprising that a Chow test shows that the best years to split the sample are 1996 and 1997. In the postpeak period, only three correlations are positive; in

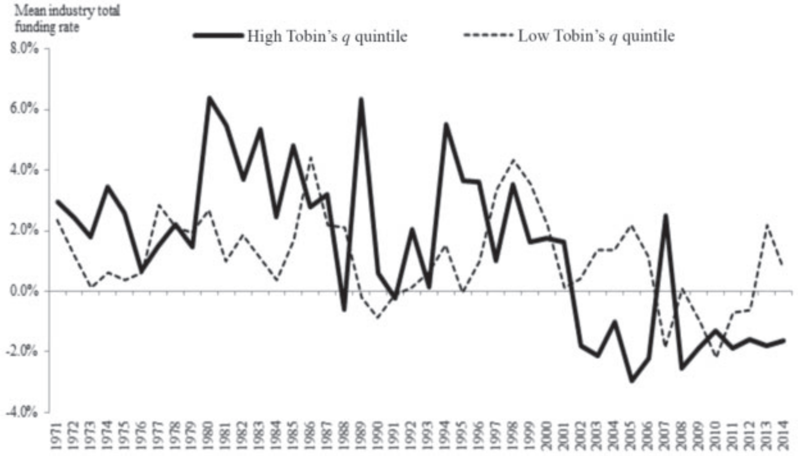


Figure 1
Industry funding rates for Tobin's q sorted industry quintiles
Each year, sample industries are sorted into quintiles by their Tobin's q ratio at the start of the year. The average funding rate is then computed across the industry funding rates within a given q-sorted quintile. We only report the average industry funding rate for the bottom ("low") and the top ("high") quintiles. More details on the construction of the variables are in the Appendix. We winsorize at the 1st and 99th percentiles over the full sample.

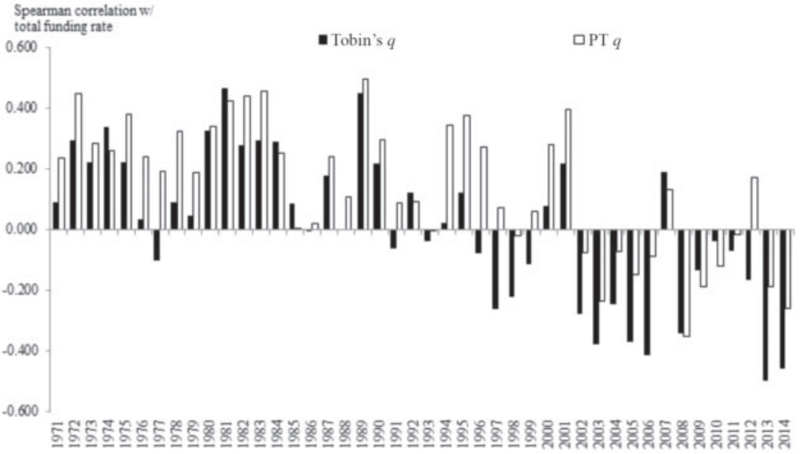


Figure 2
Year-by-year Spearman correlation between industry q and total funding rate
Each year, the Spearman rank correlation coefficient is estimated across sample industries between industry q (Tobin's q or PT q) and industry total funding rate. More details on the construction of the variables are in the Appendix. We winsorize at the 1st and 99th percentiles over the full sample.

the prepeak period, only five are negative. No year before 1997 has a significant negative correlation. In the postpeak period, starting in 2003, six correlations are significantly negative. Using Newey-West t-statistics with two lags, Table 2 also shows that the average correlation in the prepeak period is significantly positive at the 1% level on average and the average correlation in the postpeak period is significantly negative at the same level of significance. Not surprisingly, the two average correlations are significantly different at the 1% level. A concern might be that capital markets react more slowly to data about q, so that the relevant q is a lagged q. We investigate the correlations by lagging q by one or by two years. The pattern documented in Figure 2 stays the same when we use a one-year lag as shown in Figure IA1 in the Internet Appendix.

One might be tempted to argue that such a change is because our sample period includes the period in the late 1990s and early 2000s when valuations are extremely high and considered by some to be unrelated to fundamentals. However, this explanation does not work in that the highest negative correlations between industry q and the industry funding rate in absolute value are, in order, in 2013, 2014, 2006, 2003, 2005, and 2008. All these years are far removed from the high valuation years of the late 1990s and early 2000s.

Another potential concern with our results is that intangible assets have become more important for American firms and book assets do not account for intangible assets acquired organically. Figure 2 and Table 2 also show the annual Spearman rank correlation between the total funding rate and PT q, which incorporates intangibles in the measurement of q (Peters and Taylor 2017). It is immediately clear that the change in correlations from the prepeak

Table 2
Year-by-year Spearman correlation between industry q and industry total funding rate

	Spearman correlation of total funding rate with:			
Year	Tobin's q	(p-val)	PT q	(p-val)
1971	0.090	(.579)	0.239	(.137)
1972	0.296	(.064)	0.449	(.004)
1973	0.223	(.166)	0.284	(.076)
1974	0.339	(.032)	0.260	(.105)
1975	0.224	(.159)	0.381	(.014)
1976	0.033	(.837)	0.242	(.128)
1977	−0.100	(.534)	0.193	(.227)
1978	0.089	(.588)	0.326	(.043)
1979	0.045	(.785)	0.188	(.252)
1980	0.329	(.041)	0.341	(.034)
1981	0.467	(.002)	0.426	(.006)
1982	0.280	(.085)	0.440	(.005)
1983	0.295	(.073)	0.457	(.004)
1984	0.291	(.072)	0.252	(.122)
1985	0.087	(.597)	0.004	(.980)
1986	−0.004	(.982)	0.022	(.894)
1987	0.178	(.272)	0.242	(.132)
1988	0.003	(.987)	0.107	(.516)
1989	0.452	(.004)	0.496	(.001)
1990	0.218	(.182)	0.295	(.068)
1991	−0.061	(.713)	0.090	(.584)
1992	0.123	(.457)	0.094	(.571)
1993	−0.038	(.819)	−0.001	(.997)
1994	0.023	(.893)	0.345	(.034)
1995	0.122	(.467)	0.378	(.019)
1996	−0.075	(.654)	0.272	(.098)
1997	−0.260	(.115)	0.072	(.668)
1998	−0.220	(.178)	−0.017	(.916)
1999	−0.114	(.500)	0.063	(.713)
2000	0.077	(.649)	0.280	(.093)
2001	0.221	(.189)	0.397	(.015)
2002	−0.278	(.096)	−0.077	(.652)
2003	−0.378	(.019)	−0.235	(.155)
2004	−0.244	(.135)	−0.069	(.676)
2005	−0.371	(.020)	−0.149	(.366)
2006	−0.412	(.009)	−0.086	(.603)
2007	0.190	(.241)	0.135	(.407)
2008	−0.343	(.033)	−0.351	(.028)
2009	−0.134	(.422)	−0.187	(.261)
2010	−0.038	(.819)	−0.118	(.479)
2011	−0.069	(.680)	−0.014	(.933)
2012	−0.166	(.319)	0.175	(.293)
2013	−0.496	(.001)	−0.187	(.254)
2014	−0.459	(.004)	−0.258	(.118)

	Average Spearman correlation of total funding rate with:			
Subperiod	Tobin's q	(p-val)	PT q	(p-val)
Prepeak period	0.151	(.000)	0.262	(<.0001)
Postpeak period	−0.194	(.002)	−0.035	(.498)
p-value for difference	(<.0001)		(<.0001)	

Each year, the Spearman rank correlation coefficient is estimated across sample industries; p-values for the prepeak and postpeak period averages, as well as the difference in average correlation between the two subperiods, are computed using Newey-West t-statistics with two lags.

period to the postpeak period that we observe with Tobin's q is not due to using a measure of q that does not account for intangible assets. The results using PT q are largely similar to the results using Tobin's q. With PT q, there is only one negative correlation in the prepeak period and it is insignificant; in contrast, there are 13 positive correlations that are significant at the 10% level. In the postpeak period, there are only two positive significant correlations. However, while 12 correlations are negative since 1997, only one is significant. As a result, while the prepeak period average correlation is significantly positive, the postpeak average correlation is negative and insignificant, but it is significantly lower than the prepeak average correlation. Accounting for intangibles changes the sign of the correlation in seven years for the period 1971–2014, and in three years for the postpeak period. Only one of the correlations whose sign changes is significant, namely the correlation in 1996. The use of PT q seems to have some impact on the dating of the change in the sign of the correlation in that large negative correlations arise later than with Tobin's q in the postpeak period. However, this difference is not important for the main message of the paper, as whether we use Tobin's q or PT q, the q-sensitivity of net funding is strikingly different in the postpeak period from the prepeak period. Overall, accounting for intangibles in estimating Tobin's q does not change our conclusions.

3.2 Regression evidence on the relation between the net funding rate and *q*

We now turn to panel regression tests. As discussed in Section 1, controlling for cash flow, we expect the net funding rate to be higher for industries with a higher q, as long as q measures investment opportunities. We therefore estimate regressions of net funding on a constant, cash flow, and q. The literature suggests that clustering is appropriate for the panel estimation of standard errors provided that the number of clusters is not too small. As stated by Cameron and Miller (2015), there is no clear-cut definition of too small, but in practice, a rule of thumb of a minimum of 50 clusters is often used. In our case, we have as few as 15 yearly clusters (1982–1996 period). For industries, we have at most 41 clusters. When there are too few clusters, one is more likely to fail to reject the null hypothesis. We thus report panel results where we do not cluster by year but cluster by industry. We do not use industry fixed effects, as our focus is on whether industries with a higher q have a higher net funding rate in the cross-section, but we employ year fixed effects by using observations that are de-meaned by yearly averages. Cash flow is defined as the operating income before depreciation minus interest expenses, taxes, and cash dividends, plus a fraction of investment in intangibles, scaled by lagged total assets (see the Appendix for detailed variable definitions). Given the change we document in Figures 1 and 2, we estimate the regressions separately for the prepeak period and the postpeak period.

Table 3 first shows the estimates for Tobin's q and cash flow using the long prepeak period and the long sample period. Column 1 shows that Tobin's q

Table 3
Panel regressions of industry total funding rate on industry *q*

Dependent variable: Industry total funding rate	(1): Prepeak period (up to 1996)			(2): Postpeak period (1997–2014)			(3): Full period (up to 2014)		
	Coeff	(p-val)	R^2, %	Coeff	(p-val)	R^2, %	Coeff	(p-val)	R^2, %
	From 1971						From 1971		
Tobin's q	0.017	(.002)	3.0	0.000	(.928)	2.5	0.014	(.006)	2.5
Cash flow	−0.128	(.015)		−0.117	(.063)		−0.117	(.003)	
Tobin's q * D_{post}							−0.015	(.007)	
PT q	0.023	<.0001	7.2	0.002	(.672)	0.1	0.021	(.000)	3.7
Cash flow 2	−0.043	(.338)		−0.023	(.776)		−0.032	(.423)	
PT q * D_{post}							−0.018	(.002)	
	From 1982						From 1982		
Tobin's q	0.016	(.065)	1.9	0.000	(.928)	2.5	0.013	(.096)	1.8
Cash flow	−0.096	(.186)		−0.117	(.063)		−0.091	(.032)	
Tobin's q * D_{post}							−0.014	(.041)	
PT q	0.024	(.000)	6.4	0.002	(.672)	0.1	0.019	(.001)	2.5
Cash flow 2	−0.008	(.905)		−0.023	(.776)		−0.006	(.898)	
PT q * D_{post}							−0.018	(.003)	

The industry's total funding rate is regressed on industry q (Tobin's q or PT q) and cash flow (Cash flow or Cash flow 2). Year fixed effects are employed by de-meaning observations by year-specific average values and thus do not affect regression R^2; p-values in parentheses are computed by clustering standard errors by industry. The full-period regressions include the interaction between industry q and an indicator variable that takes the value of one for the postpeak period and is denoted by D_{post}. More details on the construction of the variables are in the Appendix. We winsorize at the 1st and 99th percentiles over the estimated sample.

has a coefficient of 0.017, which is significant at the 1% level, for the prepeak period. The coefficient on Tobin's q for the postpeak period, shown in column 2, is zero with a p-value of .928. We compare the two periods by estimating a full-period regression of the industry net funding rate on a constant, q, cash flow and an interaction between q and the indicator variable that takes a value of one for the postpeak period. The interaction should be negative and significant if the q-sensitivity of a funding variable falls from the prepeak to the postpeak period. Column 3 reports a negative coefficient on the interaction of –0.015 with a p-value of .007, meaning that the coefficient on q drops significantly from the prepeak to the postpeak period.

We re-estimate the regressions using PT q instead of Tobin's q and report the results below those for Tobin's q. The results are similar. We find a significant positive coefficient on PT q for the long prepeak period and an insignificant coefficient for the postpeak period. Comparison of the two coefficients is again conducted with the full-period regression with the interaction term. Column 3 shows that the interaction term is significantly different from zero at the 1% level. It follows that the net funding rate increases with PT q in the prepeak period but not in the postpeak period.

3.3 Robustness checks

A concern with our estimates is that the 1970s could be unusual. For instance, inflation was much higher and variable during that decade than in subsequent decades. It is also the case that corporations were more restricted in their use of repurchases before 1982, as discussed in the Introduction. The bottom half of Table 3 re-estimates the regressions using the short prepeak period that begins in 1982. (The results for the postpeak period remain unchanged.) The resulting coefficients on q are similar to those estimated over the long prepeak period and continue to be significantly different from the coefficients on q for the postpeak period. Therefore, our results are not dependent on the 1970s.

It is well known that, at the firm level, estimation error in q can lead to wrong inferences. Estimation error is likely to be a much smaller issue when we use industry q, as this aggregate q generally is not affected much by the smallest firms. Nevertheless, we re-estimate the panel regressions using Erickson, Jiang, and Whited's (2014) cumulant estimator, and Table IA1 of the Internet Appendix tabulates the results. We find that the coefficient on q is significantly positive for the prepeak period and is insignificant for the postpeak period. The interaction term also has a significantly negative coefficient when estimated over the long sample period.

Throughout this section, we have used the Fama-French industry classifications that are based on SIC codes. Since the publication of Fama and French (1997), the literature has developed industry classifications that are based on similarity inferred from firm disclosures. We would expect such measures to improve on SIC codes, as with these codes firms that engage in similar activities can sometimes have quite different SIC codes. Hoberg and Phillips (2016) make available text-based industry classifications. Unfortunately, we cannot replicate our analysis with these classifications for our whole sample period, because these classifications are not available for the whole period. Nevertheless, we re-estimate the Spearman rank correlations of Table 2 and the regressions of Table 3 for 1997–2014 using these classifications. The results are shown in Table IA2 of the Internet Appendix. For our analysis, we require what they call their fixed classifications, which create mutually exclusive industries, and we use their 50-industries classification. When we use those classifications, we find (as shown in Figure IA2 of the Internet Appendix) that the Spearman rank correlations between the industry net funding rate and industry Tobin's q are all negative, except for three years (1999, 2000, and 2009) when they are insignificantly positive. With PT q, all correlations after 2001 are negative except for 2005 and 2009 (both insignificant). Turning to the panel regressions, the coefficients on Tobin's q and PT q are insignificant for the postpeak period. It follows that the results using the Hoberg and Phillips (2016) industry classifications are consistent with the results using the SIC codes.

One might be concerned that our results are due to a shift in payouts from dividends to repurchases. With standard measures of equity financing like the one we use, repurchases come as a deduction from equity issuance, but dividends are not deducted. Instead, we subtract dividends from operating cash flows to be consistent with the cash flow identity. Such an approach is justified, as repurchases are capital market transactions but dividends are not. Nevertheless, we show in Table IA3 of the Internet Appendix that if we subtract

Table 4
Panel regressions of changes in industry fixed capital on changes in industry value added

	1963–1995		1971–1995		1998–2008		1971–2008	
Regressor	Estimate	(p-val)	Estimate	(p-val)	Estimate	(p-val)	Estimate	(p-val)
d_va	0.746	(.000)	0.717	(.000)	0.368	(.032)	0.717	(.000)
$D_{1998-2008}$							−0.031	(.012)
d_va * $D_{1998-2008}$							−0.349	(.007)
R^2, %	14.7		14.8		4.3		14.1	
No. of observations	576		450		242		692	

Industry fixed capital and value added are obtained from INDSTAT-2 (based on two-digit ISIC) for the period of 1963–2008 (with 1996 and 1997 missing). For regressions, both the dependent variable (changes in industry fixed capital or *d_fix*) and the dependent variable (changes in industry value added or *d_va*) are truncated at −100% and +100%. An intercept is in the regressions but is not reported below; p-values in parentheses are computed by clustering standard errors by industry.

dividends from net equity issuance (instead of operating cash flow), we still find that the q-sensitivity of net funding falls significantly from the prepeak period to the postpeak period. We also find that the q-sensitivity of net funding is insignificantly negative in the postpeak period.

A concern with the results reported so far is that all the results use some measure of industry q. Wurgler (2000) uses value added to assess industry capital allocation across countries, where value added reflects value added by labor as well as capital. Specifically, he estimates for a given country the relation between industry value-added growth and industry fixed capital formation. Hence, it indirectly reveals industry capital allocation via investment instead of directly examining net capital flows. His data come from the United Nations' *General Industrial Statistics*. We use INSTAT-2, which covers 23 industries from 1963 to 2008. Unfortunately, years 1996 and 1997 are missing from the data set. Using this data set, we find similar results to those we obtain with the q-ratios. Table 4 shows that, from 1963 to 1995, the sensitivity of the annual change in fixed capital to changes in value added is 0.746 and highly significant. For comparison, Wurgler (2000) has an estimate of 0.723, which is from the same estimation period of 1963–1995 but with a narrower industry classification (i.e., INSTAT-3). Unfortunately, the data for his industry definition are not available after 1995. For a period more similar to our prepeak period, namely 1971–1995, the sensitivity is estimated at 0.717 and is significant. From 1998 to 2008, we find an estimate of 0.359, which is significantly lower than the estimate for the prepeak period.

In summary, across a wide range of approaches, we find that the industry q-sensitivity of industry net funding differs sharply between the prepeak period and the postpeak period. During the prepeak period, for given cash flow, industries with a higher q receive more net funding. This is no longer the case for the postpeak period.

4. Where Is the Change Coming from?

We have seen that there is a sharp change in the relation between the industry funding rate and industry q from the prepeak period to the postpeak period. Before the peak, capital flows are higher toward industries with a higher Tobin's q. After the peak in exchange listings, it does not appear to work that way. Capital flows are the sum of net debt funding and net equity funding. In panel A of Figure 3, we compare the average net debt funding rate of industries with industry q in the top quintile of industry q to the average net debt funding rate of industries with industry q in the bottom quintile of industry q. Throughout the sample period, high q industries typically have a higher net debt funding rate than low q industries. In contrast, panel B shows that in the postpeak period, high q industries have a net equity funding rate that is lower than the net equity funding rate of low q industries in all years but 2000. Further, and importantly, the net equity funding rate of high q industries is negative in every postpeak year.

In the remainder of this section, we examine more formally whether the q-sensitivities of the industry net equity funding rate and of the industry net debt funding rate evolve similarly. We show that the change in the correlation between the net funding rate and Tobin's q is explained entirely by a decrease in the correlation between the net equity funding rate and Tobin's q. The same result holds for PT q. Net equity funding is equity issuance minus equity repurchases. We find that the q-sensitivity of equity issuance falls and the q-sensitivity of equity repurchases increases. Both changes have the effect of decreasing the q-sensitivity of the net equity funding. The result for repurchases is stronger than the result for equity issuance.

4.1 Equity versus debt flows to industries

Figure 4 shows separately the Spearman rank correlations of the net debt funding rate and of the net equity funding rate with industry q. Figure 4, panel A, shows that the correlation for the net debt funding rate is almost always positive. There is no evidence of a change in sign of the correlation around the peak in the number of exchange listings. In contrast, as seen in panel B of Figure 4, the correlation for the net equity funding rate and Tobin's q shows a similar pattern to the correlation for the net funding rate and Tobin's q (reported in Figure 2). During the prepeak period, there is only one significant negative correlation. After the listing peak, all correlations but two are significantly negative. Results are largely similar with PT q in both panels of Figure 4.

We turn next to regression analysis to assess whether the change in the q-sensitivity of the net funding rate differs between net debt funding and net equity funding. To assess how q-sensitivities change from the prepeak period to the postpeak period, we continue to estimate full-period regressions with the interaction between q and the indicator variable for the postpeak period. Our focus is on the interaction. It should be negative and significant if the

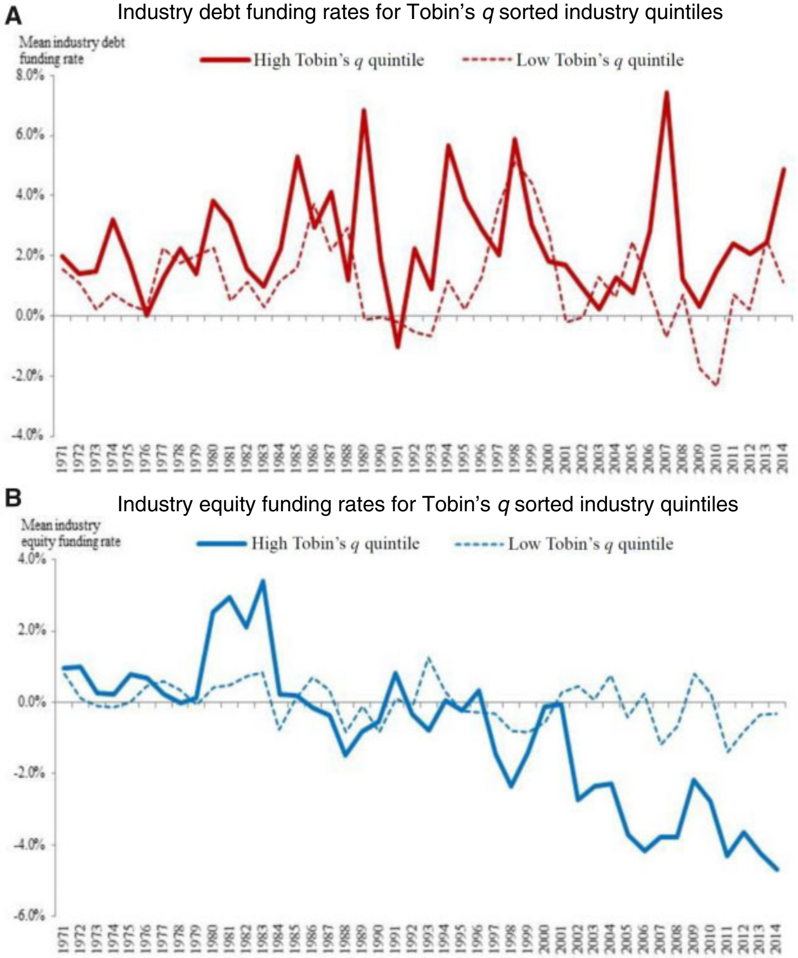


Figure 3
Industry debt or equity funding rates for Tobin's q sorted industry quintiles
Each year, sample industries are sorted into quintiles by their Tobin's q ratio at the start of the year. The average debt or equity funding rate is then computed across the industry debt or equity funding rates within a given q-sorted quintile. Panel A reports the debt funding rate, and Panel B reports the equity funding rate. We only report for the bottom ("low") and the top ("high") quintiles. More details on the construction of the variables are in the Appendix. We winsorize at the 1st and 99th percentiles over the full sample.

q-sensitivity of a funding variable falls from the prepeak to the postpeak period. As before, we have a long sample period of 1971–2014 and a short sample period of 1982–2014.

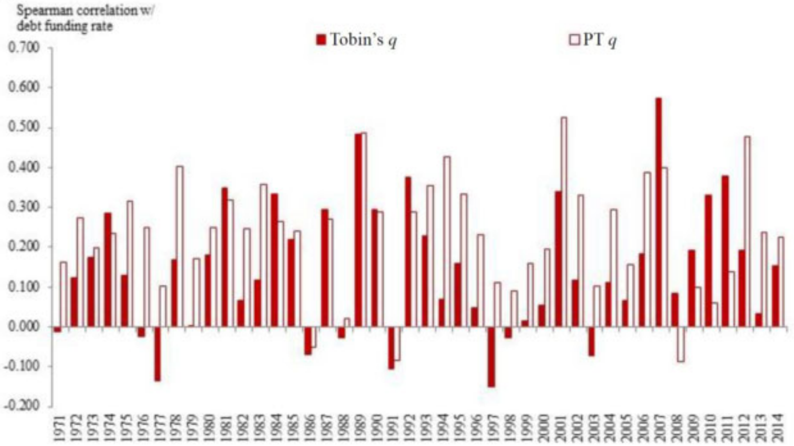
Table 5, column 1, shows results for the net equity funding rate using Tobin's q. We see that the interaction of q with the postpeak period indicator has a negative coefficient that is highly significant, so that the q-sensitivity of net

Table 5
Panel regressions of industry funding rate on industry q

	Full period (up to 2014) regressions for the following dependent variables:											
	(1): Industry net equity funding rate			(2): Industry net debt funding rate			(3): Industry net equity issuance rate			(4): Industry equity repurchase rate		
	Coeff	(p-val)	R^2, %	Coeff	(p-val)	R^2, %	Coeff	(p-val)	R^2, %	Coeff	(p-val)	R^2, %
		From 1971			From 1971			From 1971			From 1971	
Tobin's q	0.007	(.180)	10.1	0.009	(.040)	1.3	0.007	(.046)	4.7	0.001	(.685)	30.6
Cash flow	−0.074	(.018)		−0.045	(.100)		−0.040	(.076)		0.072	(<.0001)	
Tobin's q * D_{post}	−0.016	(.001)		0.001	(.890)		−0.004	(.090)		0.017	(<.0001)	
PT q	0.007	(.055)	5.7	0.014	(.011)	3.8	0.007	(.025)	5.4	0.000	(.873)	17.4
Cash flow 2	−0.047	(.062)		0.017	(.572)		−0.016	(.297)		0.080	(<.0001)	
PT * D_{post}	−0.013	(.001)		−0.006	(.283)		−0.006	(.022)		0.012	(.002)	
		From 1982			From 1982			From 1982			From 1982	
Tobin's q	0.004	(.571)	10.3	0.010	(.058)	1.2	0.006	(.188)	3.5	0.004	(.327)	30.2
Cash flow	−0.081	(.028)		−0.012	(.649)		−0.033	(.169)		0.094	(<.0001)	
Tobin's q * D_{post}	−0.012	(.064)		−0.004	(.449)		−0.004	(.248)		0.011	(.015)	
PT q	0.006	(.279)	5.3	0.015	(.010)	3.9	0.005	(.157)	3.4	0.000	(.941)	17.5
Cash flow 2	−0.054	(.074)		0.049	(.143)		−0.017	(.328)		0.093	(<.0001)	
PT * D_{post}	−0.011	(.019)		−0.008	(.168)		−0.004	(.158)		0.011	(.009)	

Industry debt funding, equity funding, net equity issuance, or equity repurchase rate is regressed on industry q ratio (Tobin's q or PT q), cash flow (Cash flow or Cash flow 2), and the interaction between industry q and an indicator variable that takes the value of one for the postpeak period and is denoted by D_{post}. Year fixed effects are employed by de-meaning observations by year-specific average values and thus do not affect regression R^2; p-values in parentheses are computed by clustering standard errors by industry. More details on the construction of the variables are in the Appendix. We winsorize at the 1st and 99th percentiles over the estimated sample.

A Spearman rank correlation between industry *q* and industry net debt funding rate



B Spearman rank correlation between industry *q* and industry net equity funding rate

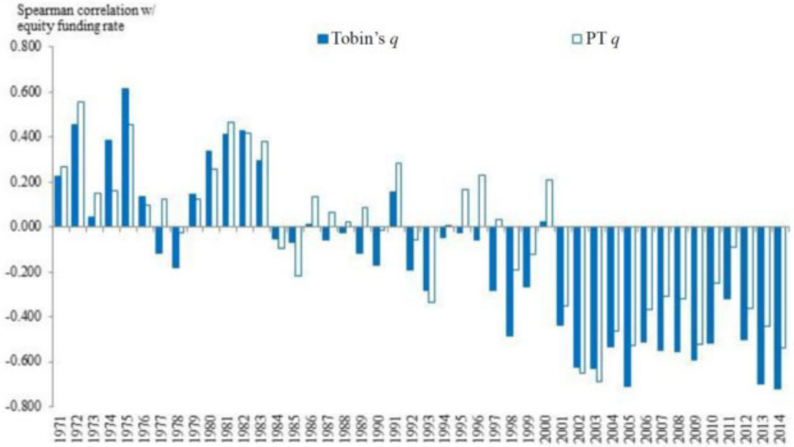


Figure 4
Year-by-year Spearman correlation between industry *q* and debt or equity funding rate
Each year, the Spearman rank correlation coefficient is estimated across sample industries between industry *q* (Tobin's *q* or PT *q*) and industry debt or equity funding rate. Panel A reports the debt funding rate, and Panel B reports the equity funding rate. More details on the construction of the variables are in the Appendix. We winsorize at the 1st and 99th percentiles over the full sample.

equity funding falls significantly from the prepeak period to the postpeak period. This result holds irrespective of whether we use the long or the short sample period and whether we use Tobin's q or PT q. Column 2 shows the regressions for net debt funding. In this case, the interaction coefficients are not significant. It follows from the regressions in columns 1 and 2 that the q-sensitivity of the net debt funding rate does not change from the prepeak period to the postpeak period. In contrast, the q-sensitivity of net equity funding falls significantly.

4.2 The evolution of the components of equity funding

Recall that the net equity funding rate is the equity issuance rate minus the equity repurchase rate. To understand better why the q-sensitivity of the net equity funding rate changes, we investigate the change in q-sensitivities of equity issuance and of repurchases separately. We use *net* equity issuance, which corresponds to an increase in the equity outstanding. With this approach, a firm that issues equity to offset share repurchases, so that the total number of shares does not change, has zero net equity issuance.

Column 3 of Table 5 shows estimates for equity issuance. We find that the interaction coefficient is significantly negative for the long sample period but not the short one. The next column, column 4, shows estimates for equity repurchases. We find that the coefficient on the interaction is large and significant for the long and short prepeak periods. It follows from this that the increased sensitivity of repurchases to Tobin's q is the driving force of both the decreased sensitivity of the net equity funding rate and the net total funding rate to Tobin's q. The estimates for PT q are consistent with those for Tobin's q.

5. Why Does the q-Sensitivity of Net Equity Funding Fall?

As shown in Section 4, the change in the q-sensitivity of funding at the industry level is due to a sharp decrease in the q-sensitivity of net equity funding. This decrease in the q-sensitivity of net equity funding arises because of a decrease in the q-sensitivity of net equity issuance and an increase in the q-sensitivity of repurchases. The decrease in the q-sensitivity of net equity issuance is only significant over the long sample period starting in 1971. The increase in the q-sensitivity of repurchases holds irrespective of the sample period. In this section, we turn to firm-level evidence to explain these changes.

Table 6 reports the firm-level panel regressions of the q-sensitivity of net equity funding at the firm level controlling for cash flow. In this analysis, we are interested in the magnitude of the coefficients on q rather than in the change in the magnitude of these coefficients between periods. We thus report the coefficients on Tobin's q for the long and short prepeak periods as well as the postpeak period. The results for PT q are shown in Table IA4 of the Internet Appendix. They are consistent with the Tobin's q results.

Row 1 of Table 6 shows results using asset weights within industries, which should—and do—parallel the industry-level results. Row 2 estimates the same regressions using equal weights. The results are starkly different. First, the q-sensitivities in row 2 are much higher than in row 1. For instance, in the postpeak periods, the q-sensitivity is significantly negative for the asset-weighted results but positive and large for the equal-weighted results (–0.004 vs. 0.043). Second, the q-sensitivities in the equal-weighted results are economically similar across subperiods. For instance, the q-sensitivity for the long prepeak period is 0.039 and is comparable to the q-sensitivity for the postpeak period of 0.043.

Table 6
Panel regressions of firm-level (industry-level) funding rate on firm-level (industry-level) q

Specification	(1): Long prepeak period (1971–1996)			(2): Short prepeak period (1982–1996)			(2): Postpeak period (1997–2014)		
	Coeff on Tobin's q	(p-val)	R^2, %	Coeff on Tobin's q	(p-val)	R^2, %	Coeff on Tobin's q	(p-val)	R^2, %
(1): Equity funding; asset weight; all	0.009	(.001)	1.3	0.007	(.132)	0.5	−0.004	(.030)	2.7
(2): Equity funding; equal weight; all	0.039	(<.0001)	9.9	0.050	(<.0001)	11.6	0.043	(<.0001)	18.7
(3): Equity funding; equal weight; large	−0.009	(.003)	6.6	−0.016	(<.0001)	10.8	−0.009	(.000)	14.0
(4): Equity funding; equal weight; small	0.040	(<.0001)	10.0	0.050	(<.0001)	11.7	0.044	(<.0001)	19.1
(5): Equity issuance; equal weight; large	−0.001	(.356)	0.3	−0.002	(.006)	1.2	0.001	(.228)	0.3
(6): Equity issuance; equal weight; small	0.034	(<.0001)	9.0	0.043	(<.0001)	10.4	0.028	(<.0001)	12.7
(7): Equity repurchase; equal weight; large	0.010	(.001)	10.9	0.016	(<.0001)	14.4	0.013	(<.0001)	22.7
(8): Equity repurchase; equal weight; small	0.001	(<.0001)	0.7	0.001	(<.0001)	1.0	0.003	(<.0001)	5.4
(9): Equity funding; equal weight; large old	−0.011	(.002)	8.5	−0.016	(<.0001)	14.6	−0.011	(<.0001)	15.9
(10): Equity funding; equal weight; small young	0.050	(<.0001)	11.3	0.063	(<.0001)	13.0	0.053	(<.0001)	19.0
(11): Equity issuance; equal weight; large old	−0.001	(.218)	0.2	−0.002	(.002)	1.3	0.000	(.922)	0.02
(12): Equity issuance; equal weight; small young	0.043	(<.0001)	9.7	0.052	(<.0001)	10.9	0.035	(<.0001)	12.0
(13): Equity repurchase; equal weight; large old	0.011	(.001)	14.0	0.017	(<.0001)	18.1	0.015	(<.0001)	25.0
(14): Equity repurchase; equal weight; small young	0.000	(.050)	0.5	0.000	(.019)	0.8	0.002	(<.0001)	3.2
(15): Equity repurchase; industry	0.002	(.390)	9.1	0.006	(.263)	13.8	0.011	(<.0001)	37.4

Firm-level (industry-level) equity funding, net equity issuance, or equity repurchase rate is regressed on firm-level (industry-level) Tobin's q ratio and cash flow (Cash flow). We only report the coefficients on q. The column "specification" details the dependent variable, the aggregation level (in case of industry-level regressions), and the observation weighting scheme and the group of firms over which the regressions are estimated (in case of firm-level regressions). Asset weight uses total book assets at the beginning of year. Year fixed effects are employed by de-meaning observations by year-specific average values and thus do not affect regression R^2; p-values in parentheses are computed by clustering standard errors by industry for industry-level regressions or by firm for firm-level regressions. More details on the construction of the variables are in the Appendix. We winsorize at the 1st and 99th percentiles over the estimated sample.

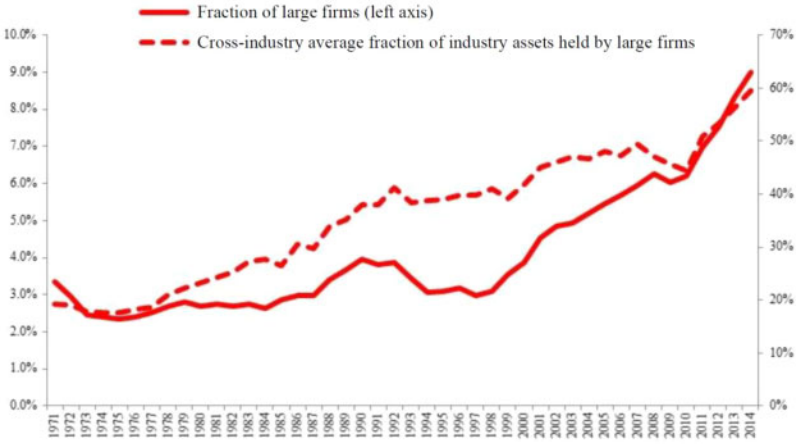


Figure 5
Fraction of large firms and industry assets held by large firms
Each year, large firms, defined as those whose beginning-of-year total assets are $10 billion or more in 2014 dollars, are counted and their fraction in the sample is computed. Each year, the fractions of industry beginning-of-year assets held by large firms are also computed and then averaged across industries.

Within a given period, for results to differ sharply when the observations are weighted by assets from when they are equally weighted, it must be that large firms have different q-sensitivities than small firms. Within asset-weighted results, to have changes over time in q-sensitivities, it must be that the relative importance of large and small firms changes over time within industries. To see whether this is the case, we split the sample into large and small firms, where small firms are all the firms that are not large. We want to define large firms in a way that is constant through time and does not depend on market valuations. We use total assets in constant dollars. In the following, we consider a firm to be large in a certain year if its assets at the start of the year exceed $10 billion in constant dollars using 2014 as the base year. These firms are at the tail of the distribution of firm size as, on average, from 1971 to 2014, 4% of firms have more than $10 billion assets in constant dollars. The percentage of large firms is fairly stable from 1971 to 1996. The average is 3%. The highest value is 3.9% and the lowest is 2.3%. After the listing peak, the percentage of large firms increases steadily. It falls in only one year, 2009. This percentage increases from 3% in 1997 to 9% in 2014, and the average is 5.6% for the postpeak period. Figure 5 shows the evolution of that percentage from 1971 to 2014. It confirms that the percentage of large firms is much higher in the postpeak period. Figure 5 also shows the average across industries of the percentage of industry assets held by large firms. This percentage exceeds 40% only once in the 1971–1996 period, in 1992, by 1%. In contrast, this percentage exceeds 40% in every postpeak year except 1997 (39.7%) and 1999 (39.2%). It also exceeds 50% in the last four sample years and reaches a peak of 60% in 2014.

We now show that the q-sensitivity of net equity funding differs sharply between small and large firms. Row 3 of Table 6 shows estimates for the q-sensitivity of net equity funding for large firms, and row 4 for small firms. For large firms, the q-sensitivity of net equity funding is significantly negative in each period. In contrast, it is significantly positive for small firms in each period. The variation of the q-sensitivity across periods is small compared to the variation within periods across small and large firms. We then show the same split, but for the q-sensitivity for net equity issuance. In row 5, we see that the q-sensitivity is insignificant for large firms for the long prepeak period and the postpeak period and significantly negative for the short prepeak period. It is positive and significant in all three periods for small firms, as shown in row 6. Lastly, we show results for the q-sensitivity of repurchases. This sensitivity is positive and large for large firms (row 7); it is positive but much smaller for small firms (row 8). Again, for both net equity issuance and repurchases, the variation across time within a size-sorted group is much less than the variation across size-sorted groups during each period.

In the prepeak period, large firms on average hold 28% of industry assets. In the postpeak period, they hold 47%. It follows that, since large firms become more influential at the industry level, we expect that the q-sensitivity of net equity funding at the industry level should fall, the q-sensitivity of net equity issuance should fall, and the q-sensitivity of equity repurchases should increase. This is exactly what we find in Section 4 with the industry-level regressions.

With our earlier discussion of the life cycle model, we would expect the q-sensitivities of large old firms to be low for net equity funding and net equity issuance and to be high for repurchases. We would expect the opposite result for small young firms. Defining old firms to be firms of 10 years or older and young firms to be younger than 10 years since listing, we show the results for net equity funding in rows 9 to 14. First, the q-sensitivity of net equity funding is negative and significant for large old firms (row 9) and positive and significant for small young firms (row 10). Turning to net equity issuance, we find that the q-sensitivity is negative or insignificant for large old firms (row 11) and large and positive for small young firms (row 12). Lastly, we turn to the q-sensitivity of repurchases. This sensitivity is positive and significant for large old firms (row 13). However, it is close to zero for the two prepeak periods for small firms; for the postpeak period, it is positive and significant, but nearly nine times smaller than for large firms (row 14). With all three equity funding measures, the estimates do not change much across periods within a size- and age-sorted subgroup, but they differ substantially across subgroups. Another striking result is the difference in R^2. For example, in the postpeak period, a regression of repurchases on q and cash flow has an R^2 of 25% for large old firms but only of 3.2% for small young firms. In contrast, the R^2 is 0.02% for the regression of net equity issuance for large old firms, but 12% for small young firms. The last row of Table 6 shows the estimates of industry-level regressions of repurchases on q and cash flow. Perhaps not surprisingly, the estimates show that the q-sensitivity of repurchases at the industry level evolved as we would expect if large firms became more important, namely that the industry q-sensitivity resembled more the q-sensitivity of large old firms in the postpeak period than in the prepeak period.

We also estimate the regressions separately for young and old firms and show the results in Table IA5 of the Internet Appendix. As might be expected, we find that the q-sensitivity of equity net funding is much lower for old firms than young firms, but it is never negative for either young or old firms. Consequently, the aging of American firms contributes to a reduction in the q-sensitivity of net equity funding at the industry level, but it alone cannot explain why the industry q-sensitivity of net equity funding is negative in the postpeak period.

6. Investment or IO q?

We have thus far seen that large firms have a negative net equity funding q-sensitivity and small firms have a positive one. As large firms become more important within industries, we expect—and confirm—that the industry q-sensitivity of net equity funding falls. In this section, we investigate whether the distinction between investment q and IO q can help us understand the differing q-sensitivities of net equity funding between small and large firms. Remember that with the life cycle theory, we expect large and large old firms to invest less and thus pay out more. However, the life cycle theory does not explain why these firms have a negative q-sensitivity of net equity funding. With investment q, the investment of large old firms should be positively related to q, so that large old firms with a higher q would invest more and require higher net funding. With IO q, on the other hand, large old firms can have a negative q-sensitivity of equity funding as they earn rents because of market power: Tobin's q capitalizes these rents, so that large old firms with a higher q have more cash flow that is available for payouts.

With this view, we expect q to be correlated with free cash flow—that is, the cash flow after any profitable investment opportunities are taken—differently for firms with market power and firms without. For firms with market power, we expect free cash flow and q to be positively correlated because their q is better explained by IO q than investment q. That is, their q capitalizes free cash flow that arises from rents. In contrast, the q of firms without market power would reflect investment opportunities and would be better described by investment q. Consequently, q should not be highly positively correlated with free cash flow. In fact, if q measures growth opportunities, we would expect firms with a higher q to have lower free cash flow as, everything else equal, these firms would invest more and hence would be more likely to exhaust their internal cash flow.

As discussed by Syverson (2019), the most direct measure of market power is the price–cost margin. Following Aghion et al. (2005), we use the Lerner index, a proxy for price–cost margin, as our indicator of product market competition.

The Lerner index attempts to measure by how much price exceeds marginal cost. We adopt the approach of Grullon, Larkin, and Michaely (2019) in computing the index. They use the ratio of operating income net of depreciation divided by total sales. We set the ratio to zero if it is negative. This index has two advantages for our study. First, it is a firm-level indicator, in contrast to the often-used Herfindahl index. Second, in contrast to the Herfindahl index, it does not make assumptions about the market in which firms operate. For instance, a Herfindahl index for an industry could be high using only U.S. firms, but it could be that these firms face aggressive foreign competition. All proxies for market power are imperfect. However, microeconomists have largely stopped using the Herfindahl index but are using the Lerner index (Syverson 2019).

Panel A of Figure 6 shows that the correlation between free cash flow and Tobin's q is fundamentally different between firms with a high Lerner index and firms with a low Lerner index. To select low and high Lerner index firms, we compute the median each year from 1971 to 1996. We then compute the average of these medians. In a given year during 1971 to 2014, firms with a Lerner index above that mean are high Lerner index firms. Free cash flow is the operating income before depreciation minus interest expenses, taxes, and capital expenditure, scaled by lagged total assets. Unlike the cash flow used in the regression, we do not add back the fraction of investment in intangibles, nor do we subtract dividends. Firms with a high Lerner index have a positive correlation between q and free cash flow. In contrast, firms with a low Lerner index have a negative correlation with q. Thus, the correlations for the low Lerner index firms are consistent with investment q, namely that a high q firm has many investment opportunities and thus its free cash flow is low as the firm invests to exploit these opportunities. The correlation for high Lerner index firms is better explained by IO q, with which a high q firm collects rents from its assets but, with less incentive or ability to expand its asset base, ends up having high free cash flow.

In panel B of Figure 6, we show the correlation between free cash flow and Tobin's q for big old firms and small young firms. The correlation for large old firms is much larger than the correlation for small young firms throughout our sample period. This evidence is again consistent with the prediction that Tobin's q capitalizes rents for large old firms.

We turn next to the relation between market power and firm size. In the previous sections, we posit that large firms have more market power. Figure 7 confirms this by plotting the ratio for each year of the average Lerner index of large firms to the average Lerner index of small firms. On average, through our sample period, the Lerner index of large firms exceeds the Lerner index of small firms by 47%. However, the Lerner index of large firms is much larger compared to the Lerner index of small firms in the postpeak period. In the prepeak period starting in 1971, the Lerner index of large firms exceeds the Lerner index of small firms by 32%. In the postpeak period, the Lerner index of large firms exceeds the Lerner index of small firms by 67%. The

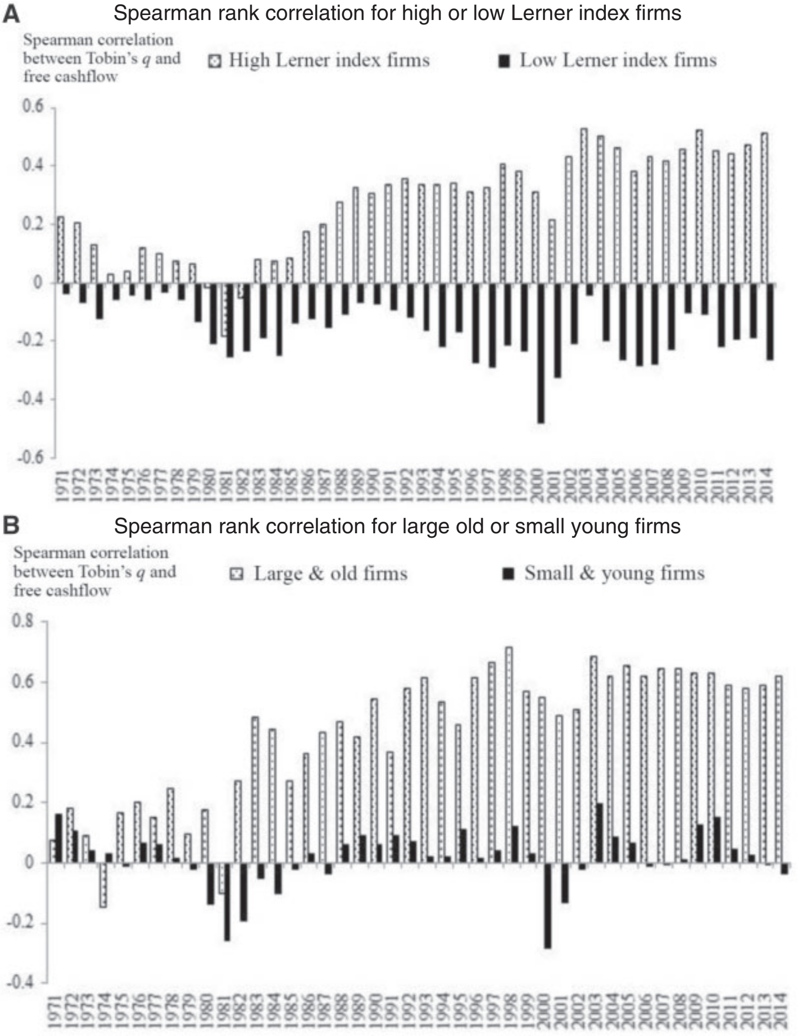


Figure 6
Year-by-year Spearman correlation between firm Tobin's *q* and firm free cash flow
Each year, the Spearman rank correlation coefficient is estimated across a subset of sample firms between Tobin' *q* and free cash flow. More details on the construction of the variables are in the Appendix. We winsorize at the 1st and 99th percentiles over the full sample.

figure also shows the evolution of the average Lerner index for industries. If large firms have a higher Lerner index and large firms become more important within industries, we would expect the Lerner index to increase at the industry level. The increase in Figure 7 is consistent with the increase in the Lerner index documented for the U.S. economy as a whole by Grullon, Larkin, and Michaely (2019).

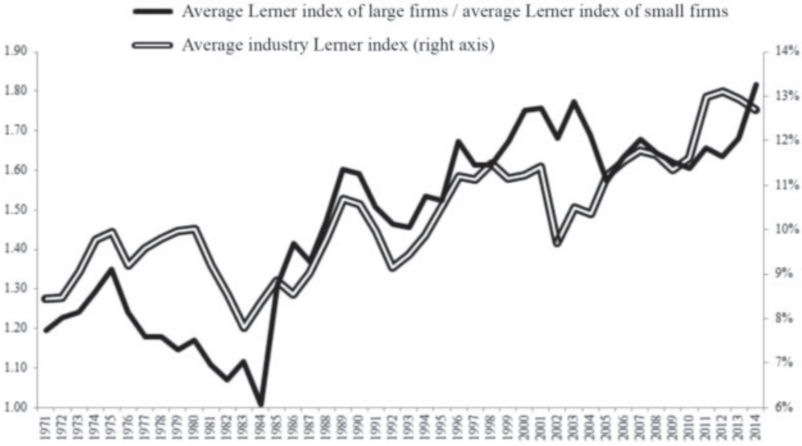


Figure 7
Evolution of Lerner index
Each year, a ratio of the average Lerner index of large firms to the average Lerner index of small firms is computed. Each year, the industry-level Lerner indices are also computed and then averaged across industries. More details on the construction of the variables are in the Appendix. We winsorize at the 1st and 99th percentiles over the full sample.

Note that an increase in the Lerner index for a firm implies that q capitalizes more rents and the cash flow available for payouts increases, everything else equal. This suggests that as IO q has become more important over time, the q-sensitivity of repurchases should have risen. In Table 7, we show that the high Lerner index firms have a positive significant q-sensitivity of repurchases through our sample period, but that sensitivity is substantially higher in the postpeak period (row 1). The q-sensitivity of repurchases for firms with a low Lerner index is slightly below zero in each prepeak period and becomes positive in the postpeak period, but the coefficient on q is smaller than one-tenth what it is for the high Lerner index firms (row 2).

As already discussed, with investment q, we expect investment to increase with q. With IO q, we expect investment to increase less with q than with investment q. We investigate these predictions next in Table 7. If IO q has become more important at the industry level, we would expect that the q-sensitivity of industry CAPEX should fall. We show in row 3 that the industry q-sensitivity of CAPEX collapses from the prepeak periods to the postpeak period. During the postpeak period, there is no relation between CAPEX and q at the industry level. We could define investment more broadly and add investment in intangible assets to CAPEX. The problem with investment in intangibles is that it has to be estimated, and to do so, one has to make many assumptions. We estimate investment in intangibles using the approach of Peters and Taylor (2017) and find that the results are similar (row 4). This evidence is consistent with our explanation for the change in the industry q-sensitivity of

Table 7
Panel regressions of firm-level (industry-level) funding or investment rate on firm-level (industry-level) q

Specification	(1): Long prepeak period (1971–1996)			(2): Short prepeak period (1982–1996)			(2): Postpeak period (1997–2014)		
	Coeff on Tobin's q	(p-val)	R^2, %	Coeff on Tobin's q	(p-val)	R^2, %	Coeff on Tobin's q	(p-val)	R^2, %
(1): Equity repurchase; equal weight; high Lerner index	0.001	(.007)	0.3	0.001	(.001)	0.5	0.006	(<.0001)	6.4
(2): Equity repurchase; equal weight; low Lerner index	−0.0001	(.284)	0.3	−0.0001	(.324)	0.4	0.0005	(.000)	1.4
(3): CAPEX; industry	0.025	(.005)	7.9	0.031	(.016)	10.8	−0.0003	(.948)	0.5
(4): CAPEX+investment in intangibles; industry	0.031	(<.0001)	73.7	0.037	(<.0001)	75.9	0.007	(.188)	62.0
(5): CAPEX; equal weight; large	0.001	(.844)	13.9	−0.005	(.372)	12.2	−0.006	(.007)	3.9
(6): CAPEX; equal weight; small	0.027	(<.0001)	9.4	0.024	(<.0001)	8.0	0.009	(<.0001)	2.5
(7): CAPEX+investment in intangibles; equal weight; large	0.011	(.012)	70.2	0.007	(.148)	73.2	0.004	(.087)	47.6
(8): CAPEX+investment in intangibles; equal weight; small	0.044	(<.0001)	34.4	0.049	(<.0001)	31.5	0.046	(<.0001)	20.8
(9): CAPEX; equal weight; large old	0.0002	(.974)	16.7	−0.006	(.269)	15.6	−0.010	(.000)	6.8
(10): CAPEX; equal weight; small young	0.028	(<.0001)	8.3	0.024	(<.0001)	6.2	0.008	(<.0001)	2.1
(11): CAPEX+investment in intangibles; equal weight; large old	0.009	(.048)	73.4	0.003	(.581)	77.6	−0.0004	(.881)	55.8
(12): CAPEX+investment in intangibles; equal weight; small young	0.049	(<.0001)	28.5	0.053	(<.0001)	25.2	0.045	(<.0001)	20.1
(13): CAPEX; equal weight; high Lerner index	0.013	(<.0001)	6.9	0.009	(<.0001)	5.9	−0.001	(.221)	2.1
(14): CAPEX; equal weight; low Lerner index	0.038	(<.0001)	11.0	0.034	(<.0001)	9.5	0.011	(<.0001)	4.4
(15): CAPEX+investment in intangibles; equal weight; high Lerner index	0.014	(<.0001)	44.6	0.013	(<.0001)	45.5	0.009	(<.0001)	36.8
(16): CAPEX+investment in intangibles; equal weight; low Lerner index	0.087	(<.0001)	35.7	0.085	(<.0001)	32.4	0.062	(<.0001)	28.4
(17): CAPEX; equal weight; largest	0.014	(.182)	18.0	0.017	(.184)	20.9	−0.005	(.629)	5.2
(18): CAPEX; equal weight; others	0.027	(<.0001)	9.4	0.024	(<.0001)	7.9	0.008	(<.0001)	2.4
(19): CAPEX+investment in intangibles; equal weight; largest	0.020	(.016)	67.7	0.026	(.044)	70.2	0.002	(.840)	49.2
(20): CAPEX+investment in intangibles; equal weight; others	0.044	(<.0001)	34.6	0.049	(<.0001)	31.8	0.045	(<.0001)	20.7

Firm-level (industry-level) funding or investment rate is regressed on firm-level (industry-level) Tobin's q ratio and cash flow (Cash flow). We only report the coefficients on q. The column "specification" details the dependent variable, the aggregation level (in case of industry-level regressions), and the observation weighting scheme and the group of firms over which the regressions are estimated (in case of firm-level regressions). Year fixed effects are employed by de-meaning observations by year-specific average values, and thus do not affect regression R^2; p-values in parentheses are computed by clustering standard errors by industry for industry-level regressions or by firm for firm-level regressions. More details on the construction of the variables are in the Appendix. We winsorize at the 1st and 99th percentiles over the estimated sample.

net equity funding, namely that large firms that earn rents have become more important in industries.

We now investigate at the firm level whether large firms have a lower q-sensitivity of CAPEX especially during the postpeak period. As shown in row 5, we find that they do. In fact, the q-sensitivity of CAPEX is never significantly positive for large firms and is significantly negative for the postpeak period. In contrast, the sensitivity is positive and significant in each period for small firms, but this sensitivity is lower in the postpeak period (row 6). We repeat the regressions using CAPEX plus intangible investment in rows 7 and 8. Surprisingly, the q-sensitivity of total investment is significant in the long prepeak period and in the postpeak period for large firms but not in the short prepeak period, even though the coefficient is higher in that period. For small firms, the q-sensitivity of total investment is positive for all periods. The regression coefficient on q is more than 10 times larger for small firms than for large firms in the postpeak period. We repeat the analysis for large old firms and for small young firms. The results reported in rows 9 through 12 are largely similar. The one difference is that the coefficient on q in the regressions for large old firms' total investment is extremely small and insignificant during the postpeak period.

Next, we investigate how the q-sensitivity of investment is related to our measure of market power. We continue to split the sample into high and low Lerner index firms. As shown in rows 13 through 16, the coefficient on q for the CAPEX regression for high Lerner index firms is positive and significant prepeak but not postpeak. The q coefficient on low Lerner index firms is always significantly positive, and it is much larger than that of high Lerner index firms. Turning to total investment, we find that the coefficient on q is always significantly positive for both high and low Lerner index firms, but the magnitude for high Lerner index firms' q coefficients is less than one-fifth that for low Lerner index firms.

We expect that generally the largest firm in an industry has the most market power in that industry. We therefore re-estimate our regressions for the largest firm in an industry (rows 17–20). We find that the largest firm has an insignificant q-sensitivity of CAPEX for all three periods (row 17) and an insignificant q-sensitivity of total investment postpeak (row 19). In contrast, the other firms in an industry have a significant coefficient on q in all periods for both CAPEX and total investment (rows 18 and 20). Interestingly, those other firms' q coefficient for total investment does not change much during the sample period, whereas the largest firm's q-sensitivity of total investment drops more than 90% from the prepeak to the postpeak period.

We conduct two sets of robustness tests. First, we repeat the regressions in Table 7 using PT q instead of Tobin's q. We report the results in Table IA6 of the Internet Appendix. The results are largely similar. The one noticeable difference is that, with Tobin's q, the coefficient for total investment is small but significant for large firms and high Lerner index firms for the postpeak period.

With PT q, it is not significant. Second, we re-estimate the regressions without controlling for cash flow and show the results in Table IA7 of the Internet Appendix. Considering the correlation between q and cash flow, we expect the q-sensitivity of investment to be stronger in the absence of cash flow. While we confirm this prediction, we continue to find that the q-sensitivity of CAPEX is insignificant postpeak at the industry level as well as for large, large old, and largest firms.

Our results may appear to present a puzzle, as there is recent literature arguing that the q-theory of investment works better now than it has in the past (Andrei, Mann, and Moyen 2019). The better performance of the q-theory over time is borne out by the increase in within-firm R^2 of the q-investment regressions. What we document in this paper is the drop in between-firm (and between-industry) R^2 and in q-sensitivity. In other words, our focus is on the cross-section. We show that there is considerable heterogeneity in the q-sensitivity of investment in the cross-section and that investment is not sensitive or much less sensitive to q for firms that are more likely to have market power, namely large firms and firms with a high Lerner index.

7. Conclusion

In this paper, we show that there is a dramatic change in the role of capital markets in the financing of industries over our sample period from 1971 to 2014. During that period, listings peak in 1996. We show that for the period before the listing peak, industries with a high q have higher capital flows than industries with a low q. Such a relation between capital flows and Tobin's q would be expected if Tobin's q were proxying for growth opportunities, as we would expect capital to flow more to industries with better growth opportunities. After the listing peak, capital no longer flows more to industries with a higher Tobin's q. When we look at industries in the top quintile of the distribution of industry q, they are on average net receivers of capital during the prepeak period almost every year, but in the postpeak period they register on average net outflows of capital almost every year. More formally, we show that the cross-sectional correlation between industry capital flows and industry Tobin's q is positive in the prepeak period and is negative in the postpeak period. Our results cannot easily be explained by increased measurement error in q.

Having shown that capital flows out of high q industries and that capital flows are negatively correlated with q in the postpeak period, we investigate why this is so. We find that this change is explained by changes in equity capital flows rather than debt capital flows. Capital flows are the sum of equity and debt issuances minus debt redemptions and repayments and equity repurchases. Looking separately at changes in the q-sensitivity of net debt funding and net equity funding, we find that there is no change in the q-sensitivity of net debt funding between the prepeak and the postpeak periods. In contrast, the q-sensitivity of net equity funding is consistently negative in the postpeak period but not in the prepeak periods. Strikingly, high q industries return equity capital to investors in most years during the postpeak period.

After the listing peak, firms become older and larger because of fewer IPOs and more mergers. With the life cycle theory of the firm, firms invest when young and reap the cash flows generated from their investments when old. We therefore expect firms to have a positive q-sensitivity of net equity funding when young, as these firms invest more when they have a higher q and hence raise more equity. We find strong support for the prediction that small young firms have a positive q-sensitivity of equity funding. In contrast, large old firms have a negative q-sensitivity of equity funding. This is because they repurchase more when their q is higher. The life cycle theory of the firm can explain why large old firms repurchase more, but it cannot explain why the q-sensitivity of repurchases for large old firms is positive. We explain this result by the fact that large firms have more market power. As a result, for these firms, Tobin's q reflects the rents they draw, and an increase in Tobin's q means that they draw more rents. The view that Tobin's q capitalizes rents is prevalent in the industrial organization literature, so we call this view IO q. With IO q, a higher q means more free cash flow, so that if firms pay out their free cash flow, a higher q means more repurchases. We show that large firms have more market power using the Lerner index and that the market power of large firms has increased over time. We also show that firms with a high Lerner index are firms with a higher q-sensitivity of repurchases. Finally, we find that q is highly correlated with free cash flow for firms with a high Lerner index. All this evidence supports the view that, as large firms become more important within industries, IO q becomes a more relevant description of the information in Tobin's q compared to investment q. With IO q, high q firms have a negative q-sensitivity of equity funding because an increase in q is associated with an increase in repurchases.

There has been much concern in recent years from some observers and market participants that incentives of corporate executives and pressures from analysts are such that firms focus on achieving short-term gains at the expense of long-run value creation. This "short-termism" has been blamed for the decrease in investment that has been observed since the early 2000s. We do not focus on the level of investment in this paper, but rather on its sensitivity to q. Nevertheless, as firms become older and larger, we expect them to invest less with the life cycle theory of the firm. Further, we show that the sensitivity of investment to q falls as firms become older and larger. With our theory, repurchases are not evidence that corporate managers have poor incentives, but instead they are the natural result of having older firms whose management is incentivized to maximize shareholder wealth.

An important topic for future research is that our work is limited by the use of data for public firms only. Our results show that capital no longer flows to high q industries when capital flows are measured for public firms. In the last 20 years, there has been a dramatic increase in the amount of funds invested in corporations by venture firms and private equity firms. These firms invest mostly in nonpublic firms. It is possible, even likely, that while public firms in high q industries repurchase more than they issue, nonpublic firms in these industries issue more than they repurchase. The data to conduct such an examination using the approach of this paper are not available for the United States as of this writing. However, further research should attempt to measure private equity flows to industries.

In summary, our study shows that the role of public capital markets in financing industries has changed considerably over our sample period. While high q industries had positive net inflows of capital and equity before 1997, since then they have had mostly net capital outflows driven by large net outflows of equity. Another way to put this is that high q industries repurchase more stock than they issue. These results make little sense if high q industries are the ones with the best investment opportunities and competition leads them to expand up to the point where these opportunities are used up. However, these results make sense if the dominant firms in high q industries draw rents from scarce assets, so that their high q reflects their ability to collect rents. As long as their cash flows from rents are high enough and management has incentives to maximize shareholder wealth, it is optimal for these firms to use the cash flows to fund payouts. The funds paid out can then be used by investors to invest where their funds have better uses, which is more efficient than if the firms use these funds to invest in poor projects.

Appendix. Variable Definitions

Table A.1

Variable	Definition
Net total funding rate	(SSTK - PRSTKC + DLTIS - DLTR + DLCCH) / AT, where AT is lagged by one year. As long as any of the five variables in the numerator has a valid value, the net total funding rate is computable. If all five variables are missing, then the net total funding rate is not computable and we treat it as missing.
Net debt funding rate	(DLTIS - DLTR + DLCCH) / AT, where AT is lagged by one year. If all three variables in the numerator are missing and the net debt funding rate is not computable, we treat it as zero.
Net equity funding rate	(SSTK - PRSTKC) / AT, where AT is lagged by one year. If all two variables in the numerator are missing and the net equity funding rate is not computable, we treat is as zero.
Equity issuance rate	(Maximum of: SSTK - PRSTKC, 0) /AT, where AT is lagged by one year. If the equity issuance rate is missing, we treat it as zero.
Equity repurchase rate	PRSTKC/AT, where AT is lagged by one year. If the equity repurchase rate is missing, we treat it as zero.
Tobin's q	(AT - (CEQ + TXDITC) + market value of equity) / AT, all at the end of the previous year. Market value of equity is computed as: CSHO * PRCC_F. If this Compustat valuation is missing, the market value of equity is computed as CRSP per-share price * CRSP number of shares outstanding. Matching between Compustat and CRSP is based on CUSIP (up to eight digits) and data date (year and month).
PT q	"Total q" provided by Peters and Taylor (2017) for firm-level analysis and ((DLTT + DLC - ACT) + market value of equity) / (PPEGT + K_INT) for industry-level analysis, all at the end of the previous year. Market value of equity is the same as the one in Tobin's q. K_INT is the total intangible assets, which are the within-industry sum of firm-level K_INT that are provided by Peters and Taylor (2017).
Cash flow	(OIBDP - XINT - TXT - DV + INV_INT*0.7) / AT, where AT is lagged by one year. INV_INT is investment in intangibles based on the method of Peters and Taylor (2017).
Cash flow 2	(OIBDP - XINT - TXT - DV + INV_INT*0.7) / (PPEGT + K_INT), where the denominator is lagged by one year. INV_INT is the same as the one in Cash flow. K_INT is the same as the one in PT q.
Free cash flow	(OIBDP - XINT - TXT - CAPX) / AT, where AT is lagged by one year.
Lerner index	(OIBDP - DP) / SALE, all at the end of the previous year. If the Lerner index is negative, we set it to 0.
Capex	CAPX /AT, where AT is lagged by one year.
Investment in intangibles	INV_INT /AT, where AT is lagged by one year. INV_INT is the same as the one in Cash flow.
Large vs small firms	Large firms are those whose beginning-of-year total assets are $10 billion or more in 2014 dollars. All other firms are defined as small.
Old vs young firms	Old firms are those whose CRSP age is 10 years or older. Firms whose CRSP age is between 0 and 9 are defined as young.
High vs low Lerner index firms	Each year from 1971 to 1996, the median firm-level Lerner index is computed, and those annual median values are averaged across the 1971–1996 period. The resulting single value is used each year to define high Lerner index firms (whose Lerner index is higher than the cutoff) and low Lerner index firms (whose Lerner index is lower than the cutoff).

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