Finance Constraints or Free Cash Flow? The Impact of Asymmetric Information on Investment

Robert E. Carpenter
Department of Economics
Emory University
Atlanta, GA 30322
404-727-7834

January 13, 1994

I thank Steven Fazzari, Bruce Petersen, Gerald Dwyer, Phil Keefer and Mark Vaughan for comments. I gratefully acknowledge the University Research Committee of Emory University for financial support and Robert Parks for technical advice and support.

1. Introduction

It has long been known that firms prefer internal to external finance for funding their investments. William Baumol (1965, p.74) clearly articulated what would be called a "financing hierarchy" by later researchers, stating "[i]t would appear that the bulk of business enterprise should finance its investment insofar as possible entirely out of retained earnings *because that is, characteristically, the cheapest way to raise additional funds*. Only when it becomes impossible to provide enough money from internal sources should the firm turn to the stock market or to borrowing for resources" (emphasis in original). And although many researchers agree that the information asymmetries which are that root cause of the preference for internal finance have an important impact on investment, there is substantially less agreement about their cause. The question of whether information asymmetries between borrowers and lenders, lead to firms that face "financing constraints," where profitable investment projects are not exploited, or whether agency costs lead managers to waste the firms resources by using its "free cash flow" to pursue unprofitable projects remains largely unanswered.[1]

By far, the largest portion of the research examining the empirical effects of these asymmetries has taken their source as given. For example, much of the recent literature in macroeconomics emphasizes the view that some firms face constraints which limit access to external finance.[2] In effect, firms "prefer" internal finance because external finance is unavailable or prohibitively costly. These finance constraints limit investment expenditure which may cause or propagate the business cycle. Bernanke (1983) and Calomiris (1993) suggest that capital market imperfections were contributing factor in the Great Depression.[3] Kashyap, Lamont, and Stein (1993) and Gertler and Gilchrist (1993) suggest that some of the impact of monetary policy works through a financial propagation mechanism where internal finance

---

[1] Jensen (1987) defines free cash flow as the portion of cash flow that remains after all positive net present value projects are undertaken.

[2] Recent papers include Fazzari, Hubbard and Petersen (1988), Devereux and Schianterelli (1990), Hoshi, Kashyap and Scharfstein (1991), and Oliner and Rudebusch (1992).

[3] Financial elements play an important role in Minsky's (1975) and Greenwald and Stiglitz's (1993) explanation of the business cycle.

plays a central role and Carpenter, Fazzari and Petersen (1993) suggest that finance constraints link the procyclical movements of inventory investment and cash flow.

An alternative body of research suggests that the separation of ownership from control, in concert with costly monitoring, leaves managers with the ability to deploy the firm's resources in unprofitable configurations. The recognition of the divergence of the incentives of managers and the owners of a public corporation dates back at least to Berle and Means (1932). Gordon Donaldson (1961) suggests that managers prefer internal funds because "internal financing is the line of least resistance" and "are funds over which management has complete control." Using internal finance "avoids the glare of publicity...which accompanies the decisions and actions of management if [investment is] externally financed" (Donaldson, 1961 p.54). Jensen and Meckling (1976) show that incomplete monitoring provides managers with incentives to expand the scale of the firm faster than optimal. Jensen (1986) has proposed that, for some firms, information asymmetries between the managers and the owners of the firm provides incentives for managers to "over-invest," using free cash flow for unprofitable investment projects that increase managerial utility. From both the owners' and society's standpoints, it would be desirable for these firms to disgorge their free cash flow to the owners of the firm.

This paper examines the source of information-driven imperfections in financial markets and their impact on corporate investment decisions. To date, very little research has attempted to address this issue and the evidence is mixed. Lang and Litzenberger (1989) attempt to distinguish between under and over-investment theories by examining the response of stock prices to changes in dividends. They split firms into two categories, designating firms with Tobin's Q ratios of less than one as over-investors. Their results show that over-investing firms exhibit positive changes in the price of their equity in response to an increase in the amount of free cash flow paid to owners in the form of higher dividends, which they interpret as evidence consistent with the free cash flow hypothesis. Hoshi, Kashyap, and Scharfstein (1990) argue that if managers waste free cash flow investment should be highly sensitive to changes in internal finance because internal finance is difficult for outsiders to monitor. They find evidence against free cash flow theory, noting that firms with low values of Tobin's Q are less sensitive to changes in internal finance. Vogt (1993) also focuses on this interaction between level of Q and cash flow, reporting

evidence in support of free cash flow theory. Griffin (1988) interprets his finding of a role for cash flow in the determination of exploration activity in the petroleum industry as providing only limited support for free cash flow theory. Oliner and Rudebusch (1992) report evidence in favor of a financing hierarchy when compared to an alternative model motivated by transactions costs.

Both theories predict that the preference for internal funds will lead to a positive relationship between investment and internal finance. As a result, it is difficult to develop empirical tests based soley on the firm's response to changes in cash flow that will fully distinguish between them. Instead, we focus not only on cash flow, but also on the fundamental difference in the role that debt plays in the corporation's financing decision in each model. If asymmetric information leads to finance constraints and under-investment, then debt is a source of external finance used to fund profitable investment projects. If firms over-invest because of managerial opportunism, debt may be used as a monitoring device to restrict managers' ability to invest in unprofitable projects.

We construct a sample of manufacturing firms from the COMPUSTAT files over the period 1980-1990. Following Lang and Litzenberger (1989) we divided the sample into over-investors and under-investors based on the firm's average Tobin's *Q*. We use this criterion as a starting point, dividing the sample more finely, by both *Q* and the firm's dividend behavior, to more sharply differentiate between over and under-investing firms. In addition, we construct a sample of firms based on Jensen's (1986) suggestion that firms can pledge their free cash flow by issuing debt without retention of its proceeds. We examine a group of firms classified as over-investors on the basis of their average *Q* ratios that use new issues of long-term debt to repurchase equity, a restructuring that Jensen (1987) argues maximizes the control effects of debt. Free cash flow theory suggests that over-investing firms use debt to reduce investment in unprofitable projects. If the control effect of long-term debt is exceptionally strong, these firms should reduce their capital expenditures upon this restructuring. Donaldson (1961, p.83) also recognized the relationship between added debt and increased managerial efficiency noting "[a]dded debt has the...disadvantage of adding to the rigidity of outflows...Substantial additions to debt invariably mean increased attention to cash flow forecasting and tighter controls over cash flow."

We find that the financing hierarchy stems from both finance constraints and from the agency problems associated with the separation of ownership from control. Most of the empirical evidence is consistent with a financial hierarchy that is based on limited access to external finance. Firms with poor investment opportunities (as defined by low values of Tobin's *Q)* or who pay low dividends exhibit investment that responds positively and strongly to changes in long-term debt; behavior consistant with the relaxation of a binding constraint. Firms with high values of Tobin's Q, and that also pay high dividends are least likely to view external finance as a constraint on their behavior. We find that debt has little explanatory power for these firms.

However, when we examine a small subset of the data that includes firms that restructure by swapping debt for equity, we find some evidence consistent with asymmetric information theories based on the agency costs of free cash flow. Even though investment exhibits a strong, positive response to an increase in long-term debt for these firms, after a debt-for-equity restructuring debt's effect on investment, as well as that of internal finance variables, falls.

The rest of the paper proceeds as follows: In section 2, we discuss the alternative theories in more detail, drawing testable hypotheses from the theoretical framework of the models. Section 3 describes the empirical model of investment, estimated with firm-level data and modified to include measures of internal and external finance, used to determine the source of the financing hierarchy and highlights the key empirical predictions from each model. Section 4 describes the construction of the sample and presents summary statistics. Section 5 contains the results of the estimation for each of the main splits of the sample and section 6 concludes.

2. Asymmetric Information and Investment

Finance Constraints

The central proposition of models linking information asymmetries to investment decisions is that the exchange of information is costly. In the most extreme case, Stiglitz and Weiss (1980) suggest that equilibria in the credit markets can exist concurrently with an excess demand for loans. If lenders engage in rationing credit some firms' investment may be constrained by their internal finance. In less extreme cases lenders may charge a price based on the average quality of the borrowers. In this case, borrowers who are successfully able to conceal high default-risks from lenders will be subsidized by low default-risk borrowers. Therefore, borrowers with profitable investments will pay a premium that in part reflects the lender's uncertainty about the prospect of repayment

Empirical evidence linking internal finance to investment dates back to at least to Meyer and Kuh (1957). More recently, Fazzari, Hubbard, and Petersen (FHP, 1988) show that firms with low dividend-income ratios exhibit a strong linkage between internal financial flows and investment. Hoshi, Kashyap, and Scharfstein (1991) find that the integration between Japanese firms and banks reduces the extent to which internal finance affects investment decisions by reducing the costs of exchanging information between borrowers and lenders[4]

The implication of this research is that the linkage between cash flow and investment results from credit market imperfections that increase the cost of external finance relative to internal finance and leads to "under-investment," i.e., profitable investment projects are not undertaken because of a shortage of low-cost internal funds. Firms prefer internal finance because it is relatively less costly than external funds. Once internal finance is exhausted, firms that suffer from financing constraints may be unable to invest in their remaining positive NPV investment projects. The existence of a finance constraint leads to a close relationship between internal finance and investment fluctuations where positive shocks to internal finance

[4] See Gertler (1988) for an extensive survey of this literature and footnote 2 for the citations of several more recent studies.

will lead to an increase investment. Unless their prospective investments are of sufficiently high quality to compensate lenders for uncertainty surrounding the project's prospective payoffs, a constrained firms' investment expenditures will be limited by their internal finance. As a result, firms that issue debt have investment projects with expected returns that are sufficient to cover the premium charged for asymmetric information. If these firms issue debt, they do it to purchase positive NPV investment projects; their investment expenditures should *increase*.

Free Cash Flow Theory

Free cash flow theory centers on the agency costs resulting from the separation of ownership and control and the incentives that managers have to pursue activities that are not in the principals' interest, reducing the profitability of the firm. For example, managers may be biased toward an above-optimal level of growth for the firm if their compensation is related to the size or the growth of the firm. Managers may also prefer growth if the non-pecuniary benefits they can consume grows with the size of the firm.[5] The pursuit of goals that are not in the shareholders interest leads firms to a preference for internal funds to avoid the "direct disciplining influences of the securities market," and "restrictions on the company's freedom of action which result from any restrictive provisions involved in the issue [of securities]" (Baumol, 1965 pp. 70-75).

Jensen (1986) suggests that managers can limit the agency problems of free cash flow by issuing debt and paying the proceeds to stockholders. Leverage restricts the use of internal finance generated by the firm by forcing managers to use cash flow to meet their contractually specified interest obligations. The reduction of managers' incentive to invest in negative net present value (NPV) projects may be attributed to creditors legal rights to reorganize or even liquidate the firm in the event of default.

---

5. Murphy (1985) shows that managerial compensation and the growth in the firms sales are positively related. Joskow, Rose, and Shepard (1993) show that the elasiticty of CEO compensation with respect to the size of the firm is over twice as large as the elasticity of compensation with respect to the firms stock market return. Also, see the discussion in Jensen and Meckling (1976) that relates managerial consumption of non pecuniary benefits to the optimal scale of the firm.

Free cash flow theory has important implications for the effect of leverage on a firm's investment-financing decisions. The free cash flow model implies that for an over-investor an increase in leverage should lead to a reduction in unprofitable investment spending. Additional leverage leaves less free cash flow at the discretion of the managers at the same time that it increases the level of intensity at which the firm's activities are monitored. Overall investment will become more efficient as the firm substitutes contractually obligated debt service for negative net present value investments. Empirically, the reduction in unprofitable investment spending should lead to an increase in the price of the firm's equity that reflects increased efficiency of managerial investment decisions, and indeed, most empirical studies cited in support of the free cash flow hypothesis rely heavily on evidence that shows an increase in the price of the firms equity after a leverage increasing transaction.

However, free cash flow theory also predicts a change in the firms investment financing decisions that will be reflected in the relationship between debt finance and investment expenditures. If firms use additional leverage to restrict the manager's ability to pursue wasteful investment projects that are not in the interests of the shareholders, then debt acts as a monitoring device, rather than as a source of funds for investment. When a firm that was previously over-investing in unprofitable investment projects uses debt to pledge the free cash flow from its operations to shareholders investment expenditures should *decline* when long-term debt is issued, especially when the managers of the firm pay the proceeds of the issue to the shareholders.[6]

The response of firms' investment to changes in long-term debt forms the core of the empirical tests in this paper. Models based on the agency costs of free cash flow suggest that firms that over-invest by undertaking unprofitable investment projects may use debt to restrict the behavior of managers. Alternatively, where the primary consequence of capital market imperfections is the existence of finance constraints, debt is a marginal source of funds used when low-cost internal finance is insufficient or

---

[6] Blair and Litan (1990) use a similar argument to suggest that their finding of a negative relationship between the change in the capital stock and the level of debt finding at the industry level, is consistent with the predictions of free cash flow theory.

unavailable, and the returns from the investment project are sufficiently large to pay any premium charged for the lender's lack of knowledge about the projects payoff.

3. Empirical Specification

This section describes the fixed investment regressions that examine the link between internal sources of finance and long-term debt on investment expenditure. For our primary specification, we modify a widely used fixed investment equation. For firm i at time t let:

$$(I/K)_{it} = \alpha_i + \alpha_t + \beta_1 Q_{it} + \beta_2 + (CF/K)_{it} + \beta_3(\Delta W/K)_{it} + \beta_4(\Delta LTD/K)_{it} + u_{it} \quad (1)$$

The α_i are firm-specific intercepts, while the α_t allow for year effects. The variable u_{it} is a random disturbance. Capital expenditures are represented by I. Beginning of period Tobin's Q controls for changes in investment opportunities. Sources of internal finance are represented by cash flow, CF. Cash flow is internal funds that are generated from the operation of the business enterprise and are essentially income before extraordinary items and discontinued operations with non-cash charges against income added back in.[7] The change in working capital, current assets minus current liabilities, is denoted ΔW. Recent research by Fazzari and Petersen (1993) and Carpenter, Fazzari, and Petersen (1993) argues that firms may respond to shocks to internal finance by reducing the rate at which they accumulate assets. They argue that if cash flow falls, assets with relatively low adjustment costs (here working capital) will fall most, freeing up liquidity that may be used to maintain investment in assets with higher adjustment costs, like fixed investment. If firms use working capital as a source of funds to smooth fixed investment, working capital investment will enter the regression with a negative coefficient.

The firm's sources of external debt finance are represented by ΔLTD. We defined ΔLTD as new issues of long-term debt less retirements of long-term debt plus the change in current debt. This definition

[7] A more precise definition of cash flow may be found in the data appendix.

captures any change in leverage when convertible bonds are redeemed for equity. In addition, since the new long-term debt variable measures funds actually raised by the issuance of new long-term debt, it accounts for any discount or premium upon issuance of the debt. Lastly, the change in current debt controls for reclassification of long-term debt to current debt in the last year before it becomes due.[8] Investment, cash flow, ΔW and ΔLTD are scaled by the firm's beginning-of-period capital stock to control for heteroscedasticity and to reflect the theoretical relationship between investment, capital, and Q.[9]

Both the change in working capital and the net issue of long-term debt are endogenous variables. We estimated equation (1) with instrumental variables. The instruments include: beginning of period Q, cash flow, the beginning of period stock of working capital, the beginning of period level of long-term debt, all predetermined variables and the time dummies. The stock of long-term debt is an especially appropriate instrument for the change in long-term debt. With higher levels of long-term debt, the probability of default rises. Therefore, the marginal cost of debt should rise as its stock rises. The stock of outstanding debt should also be related to the intensity of monitoring so that with a larger stock of debt the ability of managers to waste cash flow falls. Both stories justify the use of the stock $(LTD/K)_{it}$ as an instrument. The justification for the use of the beginning of period stock of working capital is similar, and is discussed in Fazzari and Petersen (1993).

---

[8] Because current debt is also a current liability of the firm, we adjusted our definition of working capital to exclude current debt.

[9] The estimated replacement value of the firm's capital stock was calculated with an adaptation of the method used in Salinger and Summers (1983). See the data appendix of this paper for details on its construction.

Empirical Tests and Predictions

The empirical tests of this paper focus on splitting the sample into two groups, firms who face profitable, but unexploited investment opportunities (under-investors) and firms with unprofitable investments (over-investors). As stated above, we follow Lang and Litzenberger (1989) in using empirical estimates of Tobin's *Q* to segregate over-investors. Tobin's *Q* indicates the market's evaluation of the firm's investment opportunities. If marginal *Q* exceeds one the return to the investment project exceeds its costs, indicating that the project should be undertaken. If *Q* is less than one, the market value of the firm is less than the replacement cost of its capital stock, implying that the firm is an over-investor.[10] Lang and Litzenberger (1989) show that "an average *Q* ratio of less than unity is the sufficient condition for a firm to be over-investing." We denote firms with average *Q*'s less than 1 as over-investors. Firms with *Q*'s greater than one we call under-investors.

We also examine more detailed splits of the data. For both over and under-investors, we examine splits of the data by retention behavior. This ability to split in more than one dimension allows us to compare the effect of changes in internal and external finance on the investment of firms with several types of financial attributes. For example, low *Q*, low-dividend firms are firms with poor investment opportunities, as evaluated by the market, who also retain a substantial portion of their earnings. In a model where finance constraints restrict access to external finance, firms evaluated as poor risks by outsiders who also pay very low dividends are the quintessential financially constrained firm. These firms find external funds very costly, and rely principally upon internal finance for investment. Alternatively, in models where agency costs lead to over-investment and low *Q*'s, the firm's managers may retain an excessively high proportion of income to finance additional investment that is not able to be financed externally because of the monitoring role of the capital markets.

---

[10] Firms may also have Q values greater than one if they possess market power (see Lindenberg and Ross, 1981). In this case a monopolist with opportunistic managers may be placed into the under investor group.

The response of the firm's investment to changes in both internal and external finance is crucial in determining the source of the financing hierarchy. As mentioned in section 1, if firms are unable to invest in all of their profitable investment projects because of information-driven differentials in the cost of external finance, they are financially constrained. When such firms issue external finance, they will do so when their investment project is profitable not only with standard internal rate of return criteria, but also when it is either 1.) demonstrably profitable to suppliers of external finance, inducing them to provide credit to a firm rationed in the sense of Stiglitz and Weiss (1981), or 2.) has a high enough return to remain profitable even after any premium for asymmetric information is paid. For a finance-constrained firm, new debt indicates a relaxation of the constraint and the firm should respond by increasing its investment expenditures sharply. Empirically, a financed constrained firm should have a large, positive coefficient on ΔLTD.

Firms may also have low *Q*'s and pay little dividends if their managers use free cash flow to purchase unprofitable investment projects. In this case, firms in the low-*Q*, low-dividend group may not face finance constraints. These firms may issue debt to restrict the ability of managers to appropriate free cash flow. When new debt is issued to reduce wasteful investment spending the sign of the long-term debt coefficient should be negative. Thus, for low-*Q*, low-dividend firms we expect very large coefficients on the long-term debt variable if firms face finance constraints. If firms have low-*Q*'s and pay low dividends because they waste free cash flow, we expect much smaller coefficients, perhaps negative, coefficients for the long-term debt variable.

Our sample split by both Tobin's *Q* and retention ratios also gives us a sample of firms that have high average *Q*'s and pay high dividends. High *Q*'s are consistent with a favorable evaluation of the firm's investment projects by the markets. High dividends indicate that the firm may generate enough internal funds to finance its capital expenditures. This type of firm is least likely to face finance constraints. It is also least likely to have managers who waste free cash flow (the managers pay a relatively high proportion of income to shareholders as dividends). We expect such firms to exhibit relatively small cash flow coefficients because internal finance does not represent a constraint on investment. For the same reasons, we also expect relatively small (in absolute value) coefficients on the

change in working capital. Lastly, because firms are likely to be considered "good" risks, they may not face serious information problems in the capital markets. They are less likely to view new long-term debt as the relaxation of a binding external finance constraint and there is less cause to expect a tight relationship between new capital expenditures and new debt (such firms may issue debt for a variety of reasons, e.g., for tax shields).

Splitting the data on the basis of both retention behavior and Tobin's *Q* to segregate over and under-investors is a finer screen than splitting on the basis of Tobin's *Q* alone. However, we attempt a still finer screen of the data. As stated above, firms with Tobin's *Q* ratios less than one exhibit a sufficient condition for over-investment. However, over-investment is not a sufficient condition for managers who act in their own interests rather than in the shareholders. Average *Q*'s of less than one may be exhibited by firms who realized "bad" outcomes of investment projects where the expected net present value was positive as well as firms whose managers deliberately invest in negative net present value projects.

We examine the group of over-investors more closely with our third sample split. Jensen (1986, 1987) argues that the greatest reduction in the agency costs of free cash flow follows a leverage increasing transaction where the managers do not retain the proceeds of the issue. Therefore, from the over-investor (low *Q*) group, we examine firms who restructure by using new long-term debt to repurchase equity. The purchase of equity with debt is similar to the increase in absolute dividends emphasized in Lang and Litzenberger (1989), however the interest payments on the new debt are a contractual obligation where an increase in the dividend paid to holders of common equity are not. With this split we focus selectively on firms that most closely fit the agency model of free cash flow. If the root cause of over-investment is that the managers waste free cash flow, restructuring by using debt to repurchase equity is a type of transaction that will enhance the control features of debt (see Jensen 1987). We refer to this group of firms as the "agency" firms. Using the same arguments as above, we expect that the coefficient on the long-term debt variable will be very small, and perhaps negative, for this group of firms.

In addition to using the basic specification represented by equation (1) to examine the agency firms' response to changes in external (and internal) finance, we run an additional empirical test. Because the free cash flow model suggests that the reason that these firms restructure is to restrict the opportunistic behavior of managers, and because we can observe the restructuring from the firm's balance sheet, we examine changes in the agency firms' regression coefficients after a restructuring by using interaction dummy variables on the right hand side variables of the model to test for any change in the sensitivity of the firm's investment to investment opportunities or finance variables in the years that succeed a restructuring. The specification for this model is:

$$(I/K)_{it} = \alpha_i + \alpha_t + (\beta_1 + \gamma_1 D_{it})Q_{it} + (\beta_2 + \gamma_2 D_{it})(CF/K)_{it} + (\beta_3 + \gamma_3 D_{it})(\Delta W/K)_{it} + (\beta_4 + \gamma_4 D_{it})(\Delta LTD/K)_{it} + u_{it}. \quad (2)$$

Where the change in the model from equation (1) is due to the addition of the interaction dummy variable D_{it}, which takes on a value of one in the period that the firm restructures by swapping debt for equity and in all succeeding periods.[11] The γ's measure the change in the regression coefficients after the firm restructures. For example, if firms restructure because of a desire to reduce agency costs, pledging free cash flow to debt service, then γ_4 should take a negative value, indicating a reduction in the effect that new long-term debt has on investment expenditures because of a reduction in free cash flow.

[11] The precise restructuring criteria used to identify an agency firm is discussed below.

4. Data and Summary Statistics

The Compustat industrial and over-the-counter data tapes provided the sample of publicly traded manufacturing (SIC codes 20-39) firms used in this study. Compustat contains up to twenty years of data for each firm. However, the longer the time series, the fewer the firms that report data in every time period, reducing the cross sectional dimension of the sample. We selected the period 1978-1990 as being a good compromise between the length of the time series and the breadth of the cross section. After the construction of ratios and lags, the time period used in the regressions runs from 1980 to 1990. We selected firms for the sample if they contained information for every year of the data sample with respect to their capital expenditures, issuance and retirement of long-term debt, current debt, income before extraordinary items and discontinued operations (necessary to construct the cash flow variable), and their outstanding shares of common stock along with its year-end closing price (necessary to construct an estimate of Tobin's *Q*). In addition, we included only those firms for whom an estimate of their replacement cost capital stock could be estimated and whose replacement capital was valued at greater than $5 million.

For the 706 firms that remained, we calculated an average Tobin's *Q* for each firm over the sample period.[12] Tobin's *Q* summarizes the investment opportunities available to the firm. To split the sample into under and over-investors we follow Lang and Litzenberger (1989). Firms with mean values of Tobin's *Q* less than one are placed into the "over-investor" group, referred to in the tables below as low *Q* firms. Firms with mean values of *Q* greater than one are "under-investors" and denoted high *Q* firms. The sample split gives us 215 low *Q* firms and 491 high *Q* firms. For both the high and the low *Q* firms, we divided the sample into two additional groups based on their retention behavior. We examined the percentage of income each firm paid as dividends over the sample period. Firms that paid less than 5 percent (on average) of their income as dividends we call low-dividend firms. Firms that paid 5 percent or more of income as dividends we call high-dividend firms.

---

12. More details on the construction of the regression variables may be found in the data appendix.

As we mentioned above, we also examine a subset of the low *Q* over-investors which we call agency firms. These firms undergo a substantial restructuring during the sample period, purchasing a substantial fraction of their outstanding common stock by issuing new debt. To be placed into this category, the firm's shares of outstanding common stock must have declined by at least 5 percent within a single year, and it must concurrently issue new debt must have been issued in an amount sufficient to purchase more than 50 percent of the value of this stock during the same period. We examined a number of other combinations of debt issues and stock repurchases, the composition of the sample and the empirical results below were insensitive to the choice.

Some descriptive statistics from the sample are presented in Table 1. Because of substantial skewness in the data, we present sample medians. Retention practices seem to be correlated with firm size. Low-dividend firms tend to be much smaller than high-dividend firms for both low and high *Q* firms. For firms with low *Q*'s, the firms that also pay low dividends have real sales of $155.21 million and total assets of $118.79 million. The low *Q*, high-dividend firms are approximately six times larger, with median sales of $871.51 million and total assets of $732.47 million. For high *Q* firms there is also a large difference in size between dividend classes, real sales of $129.32 million and total assets of $126.17 million for low-dividend firms v. real sales of $429.12 million and total assets of $347.39 million for high-dividend firms. However, the difference in firm size across dividend classes for the high *Q* firms is not as pronounced as that of the low *Q* firms. High-dividend firms with low *Q*'s are about twice as large as high-dividend firms with high *Q*'s, the low-dividend firms in each group are approximately the same size. The agency firms have sales and total assets that place them about halfway between high and low-dividend firms with low *Q*'s. Firms with high *Q*'s were growing more quickly over the sample period, with a median sales growth rate of approximately 3.5 percent. By contrast, both low *Q* and agency firms exhibited negative growth rates for sales.

Median values of some selected financial statistics can also be found in table 1. All firms rely heavily on internal finance compared with other sources of funds. The ratio of cash flow to net sources (where net sources are defined as the sum of cash flow, ΔLTD, and funds raised by issuing common stock) is greater than 0.80 for all classifications of firms, more than 0.90 for high-dividend and agency firms. The

high retention ratios exhibited by low-dividend firms indicate that the median firm retains all of its internal finance. New equity issues are the least important source of finance, accounting for less than one percent of net sources. New long-term debt is a larger proportion of net sources for both low-dividend and agency firms, ranging from approximately four percent of net sources for agency firms to approximately nine percent for low *Q*, low-dividend firms.

Low *Q* firms also have larger debt equity ratios (a measure of solvency) than high *Q* firms, and low-dividend firms have larger debt equity ratios than high-dividend firms. The highest debt equity ratios are exhibited by low *Q*, low-dividend firms at 0.9056 and by agency firms at 0.6268. Lastly, low *Q* firms and agency firms seem to have less cash and short-term investments than high *Q* firms. The ratio of cash and short-term investments to fixed capital is between 0.040 and 0.055 for low *Q* and agency firms and between approximately 0.14 and 0.17 for high *Q* firms. Firms with opportunistic managers may have little cash on hand if they use such assets to maximize their own utility at the expense of the shareholders. Alternatively, firms that face finance constraints may also tend to have low levels of cash and liquid assets if they draw down their stocks of cash to finance other firm activities.

Table 2 reports summary statistics for low and high *Q* firms, divided by their dividend behavior, as well as agency firms, for the key regression variables. The faster growth of high *Q* firms relative to low *Q* firms observed in table 1 is also apparent from an examination of the ratio of fixed investment to capital in table 2. Low *Q* firms have mean I/K of approximately 0.10 and 0.13 for low and high-dividend firms, respectively. In contrast the I/K ratios for low and high-dividend firms in the high *Q* group are 0.22 and 0.19.

From an examination of the summary statistics of the sample, it appears that splitting by Tobin's *Q* separates slow-growing firms from those that are faster growing. Intuitively, small, fast-growing firms with investment opportunities valued highly by the market (high average *Q*'s) should be less likely to waste cash flow on unprofitable investment than their larger, slower growing cousins. Furthermore, the agency firms seem to be relatively large, slow growing firms with poor investment opportunities and relatively high retention rates (0.72 v. 0.68 for high-dividend, low *Q* firms). Jensen (1987) suggests that more debt will not always have "positive control effects" and that the control function of debt is most important for slowly

growing firms with large cash flow. The sample statistics show that both the low *Q* and the agency firms in the sample seem to have many of the characteristics that would tend to give debt positive control over managerial investment decisions.

5. Regression Results

We begin this section by reporting the results of the fixed investment regressions based on equation (1) for the sample split into over and under-investors based on their average Tobin's *Q*. We then proceed to examine finer splits of the data, first splitting the sample by both Tobin's *Q* and dividend behavior. We also discuss the results of the regressions for the agency firms, comparing the results for these firms to those based on splitting by Tobin's *Q* and dividends alone before running regressions for these firms based on equation (2).

Split by Tobin's *Q*

Tables 3 and 4 report the regression results from the specification given by equation 1. As we discussed in section 4, we used the beginning of period stocks of working capital and long-term debt as instruments for the endogenous change in working capital and in long-term debt. We argued that because the intensity of monitoring and the risk of bankruptcy increase with the stock of debt, its marginal costs will rise with a rise in its stock. Fazzari and Petersen (1993) apply similar reasoning for their justification for instrumenting the change in working capital with its lagged stock. The first-stage regressions of equation (1) agree with our justification . The stock of working capital and the stock of new long-term debt have negative and significant coefficients in the first-stage regressions for the change in working capital and the change in new long-term debt, respectively.[13]

---

[13] We find negative and significant coefficients for the stock of working capital and the stock of new long term debt in the first stage regressions for the change in working capital and the change in new long term debt for every regression in this paper.

Table 3 shows the results of equation (1) for low *Q*, high *Q* and agency firms (left to right). The standard errors of each coefficient estimate are in parentheses to the right of the point estimate. The results in table 3 seem inconsistent with the characterization of low *Q* firms as being over-investors because of the opportunistic behavior of managers. As we have discussed above, if low *Q* firms are over-investors because they waste free cash flow, then debt serves as a monitoring device to restrict the behavior of managers rather a source of external finance. However, table 3 indicates that new long-term debt has a strong positive influence on investment for the low *Q* firms. The point estimate for the change in long-term debt suggest that these firms spend close to one-half of new long-term debt on capital expenditures. For the agency firms, the point estimate for new long-term debt is 0.3046, also suggesting a strong positive impact on fixed investment. Low *Q* firms also exhibit the largest sensitivity to changes in internal finance. The absolute values of the cash flow and working capital coefficients are larger for low *Q* firms than for either high *Q* or agency firms.

The interpretation the internal finance coefficients is less clear. If firms have low *Q*'s through the opportunistic behavior of managers, their use of difficult-to-monitor internal funds to pursue bad investments may lead to large coefficients on internal finance variables, a point noted by Hoshi, Kashyap and Scharfstein (1991). Table 3 shows that the internal finance coefficients for the agency firms are smaller than for their parent group of low *Q* firms. This result is consistent with more efficient managerial investment decisions after the restructuring. However, we noted that firms may have low *Q*'s if positive expected NPV projects receive bad outcomes. A low *Q* means that the capital markets place a low value on the firm's investment opportunities, making it difficult for profit maximizing managers with good investment projects to acquire external funds. These firms may face finance constraints that make their investment sensitive to changes in internal finance.

Therefore, in table 4 we present results from equation (1) when firms are split into low *Q*, high *Q* and agency firms (top to bottom) and by dividend payouts (left to right). First, we examine the low *Q*, low-dividend firms. As we discussed above, the market evaluates these firms' investment opportunities as poor and table 1 indicates that these firms retain all of their internal finance. Are the managers wasting the retained internal finance on poor investment projects or do they face a finance constraint that forces them to

use internal finance to fund investment? The latter case suggests that firms are at a corner solution and will respond sharply to a relaxation of the finance constraint. The results in table 4 support that view. Low *Q*, low-dividend firms exhibit an extremely large long-term debt coefficient of 0.7289. In fact, we cannot reject the null hypothesis that the coefficient is equal to one. The positive sign and large magnitude of the coefficient on long-term debt is powerful evidence in support of these firms facing finance constraints rather than suffering from agency problems. We note that while the long-term debt coefficient for low *Q*, high-dividend firms is smaller than for the low *Q*, low-dividend firms, it is still economically important, positive, and significant. While these firms also have poor investment opportunities as measured by *Q*, their retention ratio indicates that they pay a substantial fraction of their earnings out as dividends (these firms have the lowest retention ratios in the sample). Even though they pay about 32 percent of their income out as dividends, they may still pursue poor investment projects with the remainder. If so, we should not expect the large and significant coefficient they exhibit for changes in long-term debt.

Next we examine the high *Q*, high-dividend firms. Because the market takes a favorable view of these firms projects, they may have easy access to external finance. These firms also pay a substantial fraction of their income as dividends (about 30 percent) which may indicate that they are able to finance their investments internally. Of the firms in the sample, this group of relatively large, high *Q*, high-dividend firms may face the lowest cost of external finance and have excellent access to the credit markets. We find evidence consistent with this view in the empirical results. The coefficient estimate for the change in long-term debt is small, 0.0375 and insignificant. If the high *Q*, high-dividend firms face no finance constraints, either because of the markets evaluation of their opportunities or because they can generate enough finance internally to pay for their investment then issuing new debt does not represent a relaxation of a constraint and their small response to new long-term debt is not surprising.

Agency Firms

While splitting the sample of firms based on Tobin's *Q* provides a means of separating over and under-investors, and allows us to test the impact of additional debt financing on capital expenditures, there

is a stronger test of the free cash flow theory based on a more selective set of firms. Jensen (1986, 1987) argues that the greatest reduction in the agency costs of free cash flow follows a leverage increasing transaction where the managers do not retain the proceeds of the issue. A financial transaction of this nature emphasizes the positive control features of debt. We briefly examined the behavior of these firms relative to low and high *Q* firms above. In this section we examine the agency firms in detail.

Table 3 shows that while the agency firms exhibit somewhat less sensitivity to changes in internal finance variables than low and high *Q* firms, their response to changes in long-term debt is economically important and significant (0.3046). When we break the agency firms into two dividend classes in table 4, we see that for the high-dividend firms, investment still exhibits a strong response to internal finance and to changes in long-term debt. In fact, the coefficients for the internal finance variables increase relative to the pooled agency firms, while the point estimate for the long-term debt coefficient remains essentially unchanged.

Examining the low-dividend agency firms, we note that they constitute a small minority of the total agency firms. For these firms, long-term debt is insignificant, evidence supporting free cash flow theory. However, no right hand side variable is significant individually, although the coefficients are jointly significant. Still, this is the first group of firms we have identified for which there is not a strong, positive influence of new long-term debt.

The fact that the agency firms restructure during the sample period provides us with the ability to perform an additional empirical test. If agency firms use the restructuring to improve managerial efficiency by pledging free cash flow to shareholders, then there should be a change in the underlying relationship between sources of finance and investment that will be reflected in the parameter estimates of equation (2). Furthermore, the restructuring activity itself provides us with the ability to identify the period that the "regime" change takes place.

Table 5 shows the change in the coefficients on each of the right hand side variables after the restructuring. Since the dummy variable D_{it} takes on a value of 1 beginning with the period of the restructuring and in all subsequent periods, the coefficient estimate for the product of a given right hand side variable and the dummy variable D_{it} represents the change in the coefficient estimate after the

restructuring takes place. There are three sets of results in table 5. From left to right, we examine the entire subset of agency firms as well as agency firms that pay more than five and fifteen percent of their income as dividends.

For each set of results we see that the effect of a restructuring seems to reduce the sensitivity of firms to changes in new long-term debt (the coefficient estimate on the product of the dummy variable and the change in long-term debt is negative). This indicates that after a restructuring, the response of agency firms investment to new long-term debt falls, evidence consistent with free cash flow theory. Furthermore, when we examine a subset of the agency firms that pay relatively high dividends, we find that for firms that pay more than five percent of income as dividends, investment becomes more responsive to investment opportunities (represented by *Q*) and less responsive to changes in internal finance and the change in working capital. Both results are consistent with a reduction in agency costs. While none of the coefficients on the interaction dummy variables is significant individually, F tests applied to each group of firms indicates that they cannot be rejected as a group (the value of the F statistic and its associated p-value are reported in the bottom two rows of table 5). Furthermore, an examination of the pattern of dummy variable coefficients across firms that pay five and fifteen percent of their income as dividends appears to indicate that the size of the change in the point estimates declines as dividend payouts increase. This may indicate that firms that pay high dividends, because they pay more free cash flow to shareholders, also have lower agency costs. Therefore, when these firms restructure, there are smaller changes in their coefficient estimates.

While evidence from the interaction dummy variable regressions is consistent with a restructuring reducing the agency costs associated with free cash flow, the evidence is more ambiguous. The empirical results indicate that even though the sensitivity of investment to changes in long-term debt fall after a restructuring, the firm still responds positively to new debt. The post-restructuring debt coefficients range from 0.19 to 0.27. While these coefficients are low relative to the other groups in the study, they still indicate an economically important response to new long-term debt.

6. Conclusion

Imperfections in the capital markets have important implications for the acquisition of funds to finance investment. However, recognizing that these imperfections exist tells us little about their impact on investment. Two strands of reasoning have emerged. First, that information asymmetries will lead firms to under-invest due to problems in credibly communicating the firm's prospects to outsiders. Second, these asymmetries will lead to over-investment as managers purchase investment projects that maximize their utility instead of the value of the firm.

Identifying the source of the financing hierarchy, and the reason for firms' preference for internal funds is important. Internal finance is a highly procyclical variable that has a close relationship with investment, the most volatile component of aggregate demand (see Carpenter, Fazzari, and Petersen, 1993). If firms "prefer" internal finance because finance constraints render external finance unavailable, the cyclical downturns in internal finance reduce welfare by reducing the accumulation of productive capital. Alternatively, if firms prefer internal funds because it allows them to escape the watchful eyes of external creditors, cyclical downturns of internal finance may not result in a net loss of welfare.

In this paper, we examined the relationship between external finance and investment spending for firms with different investment opportunities and financial behavior. Our principal findings may be summarized by the following: the source of the financing hierarchy may be found in both agency costs and finance constraints. However, the evidence supporting finance constraints is most dramatic. Our empirical evidence indicates that the investment of firms where the market rates their investment opportunities as poor, and who also pay low dividends, is very responsive to new long-term debt. Alternatively, firms least likely to face finance constraints, with good investment projects and plenty of internal finance exhibit investment that is relatively unresponsive to changes in financial variables. Each of these results are consistent with a financing hierarchy that stems from the existence of finance constraints.

On the other hand, when we examined agency firms, we found some evidence to suggest that some of firms may use debt to pledge free cash flow to shareholders. After these firms restructured their balance sheets by using new debt to purchase equity, our empirical tests indicated a reduction in the response of the

firms' investment to financial variables, including new long-term debt. Furthermore, the degree of their response seemed to be directly related to their retention of internal funds. While the interaction dummy variables were insignificant individually, their signs were consistent with a reduction in agency costs. However, even after the restructuring, the agency firms exhibited a strong positive response to new long-term debt, which may indicate that while efficiency was enhanced by the restructuring, the managers' ability to use free cash flow for poor investment projects was not eliminated.

While our results indicate that the source of the financing hierarchy may be found both in finance constraints and agency costs, the majority of our firms used new debt to increase investment, rather than as a device to monitor managers' behavior. Therefore, it may be appropriate to characterize finance constraints as the predominant consequence of capital market imperfections. To the extent that finance constraints play a more pervasive role in the capital markets imperfections than agency costs, it indicates that fluctuations in internal finance may have a major role in the cyclical fluctuation of investment.

References

Akerlof, George A. 1970. "The Market for 'Lemons': Qualitative Uncertainty and the Market Mechanism," *Quarterly Journal of Economics*, 84 (August), pp.488-500.

Baumol, William J. 1965. *The Stock Market and Economic Efficiency*, Forham University Press: New York.

Berle, Adolf A. and Gardiner Means. 1932. *The Modern Corporation and Private Property*, New York: Macmillan.

Bernanke, Ben S. 1983. "Nonmonetary Effects of the Financial Collapse in the Propagation of the Great Depression," *American Economic Review*, 73(3), June , pp. 257-276.

Blair, Margaret M. and Robert E. Litan. 1990. "Corporate Leverage and Leveraged Buyouts in the Eighties," in *Debt, Taxes, and Corporate Restructuring*, John B. Shoven and Joel Waldfogel, editors, Brookings, pp. 43-79.

Calomiris, Charles W. 1993. "Financial Factors in the Great Depression," Journal of Economic Perspectives, 7(2), Spring, pp. 61-85.

Carpenter, Robert E., Steven M. Fazzari, and Bruce C. Petersen. 1993 "Inventory (Dis)Investment, Internal Finance and the Business Cycle, mimeo, October.

Donaldson, Gordon. 1961. *Corporate Debt Capacity*, Harvard University, Boston, Mass.

Devereux, Michael and Fabio Schiantarelli. 1990. "Investment, Financial Factors, and Cash Flow: Evidence From U.K. Panel Data," in R. Glenn Hubbard, ed. *Asymmetric Information, Corporate Finance, and Investment*, Chicago: University of Chicago Press.

Fazzari, Steven M., R. Glenn Hubbard, and Bruce C. Petersen, "Financing Constraints and Corporate Investment," *Brookings Papers on Economic Activity*, 1:1988, pp.141-195.

Fazzari, Steven M. and Bruce C. Petersen. 1993. "Investment Smoothing with Working Capital: New Evidence on the Impact of Financial Constraints," *RAND Journal of Economics*, 24(3), Autumn , pp. 328-342.

Gertler, Mark. 1988. "Financial Structure and Aggregate Economic Activity: An Overview," *Journal of Money, Credit and Banking*, 20, pp. 559-596.

Gertler, Mark and Simon Gilchrist. 1993. "Monetary Policy, Business Cycles and the Behavior of Small Manufacturing Firms," Finance and Economics Discussion Series (93-4), Federal Reserve Board, February.

Greenwald, Bruce, Joseph E. Stiglitz and Andrew Weiss. 1984. "Informational Imperfections in the Capital Market and Macroeconomic Fluctuations," *American Economic Review*, 74(2), May.

Greenwald, Bruce and Joseph E. Stiglitz. 1993. "Financial Market Imperfections and Business Cycles," *Quarterly Journal of Economics* 108(1), February, pp.77-114.

Griffin, James M. 1988. "A Test of the Free Cash Flow Hypothesis: Results from the Petroleum Industry," *Review of Economics and Statistics*, 70(1), February, pp. 76-82

Griliches, Zvi and Jerry Hausman. 1986. "Errors in Variables in Panel Data," *Journal of Econometrics*, 31, pp. 93-118.

Hoshi, Takeo, Anil Kashyap, and David Scharfstein. 1991. "Corporate Structure and Investment: Evidence from Japanese Panel Data," *Quarterly Journal of Economics*, 105(1), February, pp. 33-60.

Jensen, Michael C. 1986. "Agency Costs of Free Cash Flow, Corporate Finance and Takeovers," *American Economic Review*, vol. 76, no. 2, pp.323-329.

Jensen, Michael C. 1987. "The Free Cash Flow Theory of Takeovers: A Financial Perspective on Mergers and Acquisitions and the Economy," in Lynne E. Browne and Eric S. Rosengren, eds., *The Merger Boom*, Conference Series No. 31, Boston: The Federal Reserve Bank of Boston, pp.102-143.

Jensen, Michael C. and William H. Meckling. 1976. "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure," *Journal of Financial Economics*, vol. 3 pp.305-360.

Joskow, Paul, Nancy Rose, and Andrea Shepard. 1993. "Regulatory Constraints on CEO Compensation," *Brookings Papers on Economic Activity* (Microeconomics), 1993. pp. 1-72.

Lang, Larry H.P. and Robert H. Litzenberger. 1989. "Dividend Announcements: Cash Flow Signaling vs. Free Cash Flow Hypothesis?" *Journal of Financial Economics*, vol. 24, pp.181-191.

Lang, Larry H.P., Rene M. Stulz and Ralph A. Walking. 1989. "Managerial Performance, Tobin's *Q*, and the Gains From Successful Tender Offers, *Journal of Financial Economics*, vol. 24 pp. 137-154

Lehn, Kenneth, and Annette Poulsen. 1989. "Free Cash Flow and Stockholder Gains in Going Private Transactions," *Journal of Finance*, 44(3), July, pp. 771-787.

Lindenberg, Eric B. and Stephen A. Ross. 1981. "Tobin's *Q* Ratio and Industrial Organization," *Journal of Business*, 54(1), pp. 1-32.

Meyer, J. and E. Kuh. 1957. *The Investment Decision*, Harvard University Press, Cambridge, Mass.

Minsky, Hyman P. 1975. *John Maynard Keynes*, Columbia University Press.

Murphy, Kevin J. 1985. "Corporate Performance and Managerial Remuneration: An Empirical Analysis," *Journal of Accounting and Economics* 7, April, pp. 11-42.

Myers, Stewart C. Nicholas S. Majluf. 1984. "Corporate Financing and Investment Decisions When Firms Have Information Investors Do Not Have," *Journal of Financial Economics*, vol. 13 (June), pp.187-221.

Salinger, Michael A. and Lawrence H. Summers. 1983. "Tax Reform and Corporate Investment: A Microeconometric Simulation Study," in Martin Feldstein ed., *Behavioral Simulation Methods in Tax Policy Analysis, Chicago*: University of Chicago Press.

Stiglitz, Joseph and Andrew Weiss. 1981. "Credit Rationing in Markets with Imperfect Information," *American Economic Review*, vol. 71 (June), pp.393-410.

Vogt, Stephen C. 1993. "Testing the Source of the Cash Flow/Investment Relationship: Evidence from a Panel of U.S. Manufacturing Firms," mimeo, DePaul University September.

Wojnilower, Albert. 1980. "The Central Role of Credit Crunches in Recent Financial History," *Brookings Papers on Economic Activity*, 2:1980, pp. 277-340.

Data Appendix:

Replacement Value Capital Stock: Constructing an estimate of the firm's replacement value capital stock is necessary to correct for the bias introduced by historical cost accounting. The technique that we use to construct this estimate is a modification of the method used in Salinger and Summers. Several assumptions are required to construct the series and are discussed in more detail in the Salinger and Summers paper. First, the equipment's fixed capital has a common useful life (L). Second, because COMPUSTAT does not report the method that firms use to depreciate their capital stock in any detail, all firms are assumed to use straight line methods for book depreciation. Third, actual depreciation is exponential with rate 2/L, equivalent to double-declining digits depreciation. Fourth, all investments are made at the beginning of the year, and all depreciation is taken at the end of the year. Last, the value of reported gross property, plant and equipment in the initial year that the firm appears in the sample is equal to its replacement value, thus functioning as a seed value for the Salinger and Summers algorithm.

The formula $L_t = (K_{t-1} + I_t) / DEP_t$ provides an estimate of the useful lifetime of fixed capital. K represents the book value of gross property, plant and equipment, I is capital expenditures, and DEP is book depreciation. Instead of allowing the estimated useful life to fluctuate from year to year, we use each the average of each firms L. In addition, if reported depreciation is small in any given year, L becomes implausibly large. We place an upper bound of forty years and a lower bound of three years on L. The Salinger-Summers algorithm uses a method similar to perpetual inventory methods to create the replacement cost estimate of K. The actual formula is: $K^*_{it} = (K^*_{it-1}(P_t / P_{t-1}) + I_{it})(1-(2 / L_i))$

Most studies of investment utilizing the COMPUSTAT database limit the sample by deleting firms who participate in mergers and acquisitions from the database. Some papers also eliminate firms that divest a portion of their capital from the data as well. Because the Salinger and Summers algorithm uses capital expenditures to measure the addition to the capital stock, this method will perform poorly after an acquisition or divestiture and misstate the replacement capital stock. In a modification of the Salinger and Summers algorithm, we retain these firms and adjust the procedure to account for both acquisitions and divestitures. If the firm undertakes a large acquisition relative to the size of its beginning of period capital stock, where the acquisition is measured by the change in gross property plant and equipment less capital expenditures, then instead of using capital expenditures as the increment to the capital stock during that period, we use the change in gross property, plant, and equipment plus retirements. If the firm divests a large proportion of its capital relative to the beginning of period capital stock, where the divestiture is measured by the change in gross property, plant and equipment , we use the change in net plant as the increment to the capital stock for that period.

Tobin's Q: represents the investment opportunities facing the firm. While the firm is really concerned with a projects marginal *Q*, measured as the marginal increase in the value of the firm resulting from the project divided by the projects marginal cost, we may only calculate average *Q*. Average *Q* is measured as $Q = (E + TDBT - INV) / PK$, where E represents the sum of the value of the firm's common and preferred stock. The value of common stock is equal to the closing stock price times outstanding shares; the value of preferred is measured by dividing preferred dividends by the *Standard and Poors* preferred stock yield. TDBT represents the total debt of the firm and INV is the value of the firm's inventories. PK is the replacement cost of the firms capital stock.

Cash Flow: We defined cash flow as income before extraordinary items, plus depreciation and amortization, equity in net loss, extra ordinary items and discontinued operations and deferred taxes.

Table 1

Sample Medians of Income Statement and Balance Sheet Variables

Sample Split by Tobin's Q and Retention Ratio

	Low Q Firms (Q<1)		*High Q Firms (Q>1)*		*Agency Firms*
	Low Dividend	High Dividend	Low Dividend	High Dividend	
Real Sales (Millions $87)	15 5.21	87 1.51	12 9.32	42 9.12	44 8.50
Total Assets (Millions $87)	11 8.79	73 2.47	12 6.17	34 7.39	44 5.20
Sales Growth (Millions $87)	-0.0100	-0.0023	0.0363	0.0373	-0.0016
Retention Ratio	1.0000	0.6800	1.0000	0.7031	0.7240
Debt-Equity Ratio	0.9056	0.5509	0.3840	0.2083	0.6268
Ratio of Cash and Equivalents to Fixed Capital	0.0437	0.0537	0.1395	0.1701	0.0457

Ratio of Cash Flow to Net Sources of Funds	0.8122	0.9358	0.8303	0.9600	0.9011
Ratio of New Long-Term Debt to Net Sources of Funds	0.0856	0.0103	0.0481	0.0000	0.0395
Ratio of Common Finance to Net Sources of Funds	0.0000	0.0128	0.0881	0.0981	0.0146
Number of Firms	67	148	80	41	66

Table 2

Sample Means and Standard Deviations of Regression Variables

Sample Split by Tobin's Q and Retention Ratio

	Low Q Firms (Q<1)		*High Q Firms (Q>1)*		*Agency Firms*
	Low Dividend	High Dividend	Low Dividend	High Dividend	
I/K	0.0989 (0.0744)	0.1310 (0.0751)	0.2167 (0.1753)	0.1924 (0.1117)	0.1204 (0.0742)
Q	0.5801 (0.3964)	0.6938 (0.3369)	2.2386 (2.2036)	2.4880 (1.9721)	0.6935 (0.3352)
CF/K	0.1056 (0.1267)	0.1546 (0.1024)	0.2824 (0.2728)	0.3518 (0.2094)	0.1399 (0.1004)
Δ *W/K*	0.0165 (0.1786)	0.0148 (0.1173)	0.1185 (0.4934)	0.0709 (0.2405)	0.0108 (0.1371)

Δ *LTD/K*	0.	0.	0.	0.	0.	
	0089	0188	0578	0414	0186	
	(0	(0	(0	(0	(0	
	.1252)	.1132)	.2773)	.2103)	.1197)	

Table 3

Fixed Investment Regressions: Split by Tobins Q

Dependent Variable I/K

	Low Q Firms			*High Q Firms*		
Agency Firms						
Q	0.03	(0.0	0.01	(0.0	0.05	(0.0
	32	049)	61	012)	50	084)
CF/	0.34	(0.0	0.27	(0.0	0.20	(0.0
K	69	256)	65	168)	75	408)
Δ	-	(0.0	-	(0.0	-	(0.0
W/K	0.3172	363)	0.1426	171)	0.1688	563)

	Δ	0.43	(0.0	0.15	(0.0	0.30	(0.0
LTD/K		97	654)	24	398)	46	764)
	Adj.	0.24		0.28		0.28	
R^2		05		02		97	

Sample period 1980-1991. Fixed firm and time effects not reported. Standard errors in parentheses.

Table 4

Fixed Investment Regressions: Split by Tobins Q and Retention Ratio

Dependent Variable I/K

Low Q Firms

	Low Dividend Firms		*High Dividend Firms*	
Q	0.0075	(0.0117)	0.0433	(0.0063)
CF/K	0.3543	(0.0457)	0.3788	(0.0412)
Δ *W/K*	-0.3125	(0.0537)	-0.3673	(0.0649)
Δ *LTD/K*	0.7289	(0.1686)	0.2679	(0.0729)
Adj. R^2	0.1477		0.2502	

High Q Firms

	Low Dividend Firms		*High Dividend Firms*	
Q	0.0244	(0.0048)	0.0137	(0.0012)
CF/K	0.3061	(0.0526)	0.2704	(0.0181)
Δ *W/K*	-0.1684	(0.0483)	-0.1256	(0.0186)
Δ *LTD/K*	0.3900	(0.0972)	0.0375	(0.0463)
Adj. R^2	0.2558		0.2726	

Agency Firms

		Low Dividend Firms		*High Dividend Firms*
Q	0.0161	(0.0517)	0.0641	(0.0091)
CF/K	0.1858	(0.2240)	0.2524	(0.0441)
Δ *W/K*	-0.1834	(0.1848)	-0.2157	(0.0756)
Δ *LTD/K*	0.2169	(0.3921)	0.2936	(0.0738)
Adj. R^2	0.2779		0.3037	

Sample period 1980-1991. Fixed firm and time effects not reported. Standard errors in parentheses.

Table 5

Fixed Investment Regressions With Interaction Dummy Variables:

Agency Firms

	Agency Firms		*Ave. Payout ≥ 0.05*		*Ave. Payout ≥ 0.15*	
Q	.0650	(0.0205)	0.05 57	(0.01 78)	0.09 74	(0.07 16)
*D*Q*	-0.0131	(0.0235)	0.00 91	(0.02 11)	-0.0599	(0.06 83)
CF/K	0.1627	(0.1011)	0.39 95	(0.11 70)	0.01 46	(0.30 50)
*D*CF/K*	0.0558	(0.1110)	-0.1609	(0.12 60)	0.04 47	(0.37 06)
Δ *W/K*	-0.1743	(0.1347)	-0.5159	(0.26 16)	-0.1558	(0.24 74)
*D** Δ *W/K*	0.0280	(0.1479)	0.29 70	(0.27 07)	0.19 62	(0.32 82)
Δ *LTD/K*	0.4388	(0.1467)	0.57 73	(0.17 18)	0.65 15	(0.24 86)
*D** Δ *LTD/K*	-0.2315	(0.1704)	-0.3880	(0.18 94)	-0.3858	(0.54 28)

Adj. R^2	0.2768	0.3407
F	5.49	5.25
p-value	15 (0.002)	17 (0.004)

Sample period 1980-1991. Fixed firm and time effects not reported. Standard errors in parentheses.