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# How Firms Make Capital Expenditure Decisions: Financial Signals, Internal Cash Flows, Income Taxes and the *Tax Reform Act of 1986*

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**Abstract.** This paper empirically assesses the determinants of future net capital expenditures for a broad cross-section of COMPUSTAT firms from 1973 to 1989. We explore three general categories of factors expected to affect investment: (1) external equity financing, (2) internally generated accounting information, and (3) tax incentives. We find that external financing and information plays a role in that both positive stock returns and equity issuances indicate future increases in investment. The results suggest that high stock prices not only lower the cost of capital, but also signal good investment opportunities. Accounting information about internal sources and uses of funds are also important in the investment decision. In particular, net income and depreciation are positive indicators of future investment while there is a tradeoff between the payment of dividends and investment. Further, positive changes in available cash liquidity also motivate future investment. While taxes are not important in the investment decision on average, we find that firms with previously higher income taxes invested substantially more in 1985 and 1986. This coincides with the repeal of the investment tax credit and the accelerated depreciation schedules in the *Tax Reform Act of 1986*. We view this as evidence that federal tax policy in the 1980's induced firms with high income tax obligations to accelerate capital expenditures just before the favorable tax treatment of capital expenditures was eliminated.

> Thus, well-developed securities markets tend to allocate scarce resources to enterprises that use them efficiently and away from inefficient enterprises (FASB Concepts Statement No. 1 [1988], p. 9).

**Key words:** capital expenditures, stock returns, earnings and income taxes

## 1. Introduction and motivation

The allocation of scarce resources in a market economy is perhaps the most fundamental concern of economists. For example, Copeland and Weston [1983, p. 12] states, "The importance of capital markets cannot be overstated. They allow the efficient transfer of funds between borrowers and lenders.… In this way, funds can be efficiently allocated from individuals with few productive opportunities and great wealth to individuals with many opportunities and insufficient wealth." Although numerous theories investigate the determinants of macroeconomic resource allocation, surprisingly little empirical research explores cross-sectional differences in resource allocation relating to investment decisions. The purpose of our paper is to empirically assess what fundamental factors are important in explaining investment decisions across firms. We examine factors related to three general areas: (1) external equity financing, (2) internal accounting information about sources and uses of funds, and (3) tax incentives brought about by exogenous shifts in the tax code. This empirical analysis provides new insights that cannot be obtained from previous macroeconomic research that theoretically analyses aggregate investment. In particular, we provide empirical evidence about how cross-sectional differences in firm-specific variables relate to future investment decisions while simultaneously controlling for other potential explanatory variables. Further, we are able to determine how the importance of some variables shift over time.

This paper also provides a methodological contribution to the literature by considering both time-series and cross-sectional effects. We use vector autoregressive models with the determinants lagged over four periods to document both the direct and indirect influence of these factors on capital expenditure decisions. The direct effect of an increase in a factor is calculated by multiplying the standard deviation of that factor by its pooled regression coefficient for a particular lag. For example, the one-year direct effect uses the one-year lagged regression coefficient, while the four-year direct effect uses the sum of the coefficients from one to four lags. Because investment is persistent over time, the impact of any variable that influences investment directly can also be amplified by an additional indirect effect. As documented in Table 3, the coefficient from regressing investment on one-year lagged investment is 33%, which suggests that a 1% increase in investment is likely to be followed by a 0.33% increase in investment the following year. The cumulative persistence in investment over four years, as measured by the sum of the coefficients for four lags, would be 0.62%, which translates into an "indirect" amplification factor of $1/(1 - 0.62) = 2.63$.[1] We multiply this amplification factor by the direct effect over four years to determine the total long-term effect of the factors examined.

Our first determinant of investment is the funding and information obtainable from external financial markets. A high stock price not only directly reduces the costs of equity financing by lowering the cost of capital, but it also signals expanded investment opportunities even when the manager does not choose to tap external equity markets. To distinguish between these two influences, our regressions include both stock returns and net stock issued. Holding a plethora of other variables constant, we find that one cross-sectional standard deviation more external equity financing (7.6%)[2] predicts a 0.2% higher investment the following year and a 0.73% higher investment over four years.[3] When one considers the long-term amplification factor described above, the total long-term effect of equity financing's 0.73% direct four-year effect is about 1.9%. Because the cross-sectional standard deviation in annual investment is 7.4%, we conclude that the direct net influx of equity capital is an important determinant of firms' investment decisions.

Past stock return performance appears to be even better at explaining a firm's investment decisions. Holding other variables and past investments constant, a firm with a one cross-sectional standard deviation higher stock return performance (37.5%) is likely to invest 0.85% more the following year. Over four years, this "direct" effect, although decreasing at a monotonic rate each year, adds up to 1.5%. Multiplying by the indirect amplification factor, we find a total long-term influence of a one cross-sectional standard deviation higher stock return performance is 3.9%. This number is not only economically significant, but also clearly indicates that stock returns provide managers with information about future investment opportunities after controlling for the associated lower cost of capital with the equity issuance variable.[4]

Our second major determinant of investment is internally generated accounting information about sources and uses of funds. Internal funds can explain investment for two important reasons. First, firms with unusually high internal net income or cash positions have more positive NPV projects and invest more. Second, firms with unusually high internal net income or large cash positions are reluctant to pay funds to shareholders. Instead, managers prefer either to build slack (e.g., Myers and Majluf [1984]) or spend their free cash flow (e.g., Jensen [1976]) by expanding their operations or consuming executive perks (e.g., Coase [1937]) and Jensen and Meckling [1976]). In other words, the availability of internal funds allows managers to escape both the discipline and the problems of external financing. Both these explanations suggest that available internal funds are positively related to investment.[5]

We investigate how various measures of internal performance and sources and uses of funds influence direct investment decisions. We expect that signals suggesting strong current operating performance or liquidity would lead to an increase in future investment. Of primary interest to us are net income, changes in cash and marketable securities on hand, inventory changes, depreciation, and dividend payouts. We find that net income is an excellent explanatory factor for investment. A firm with a one standard deviation higher net income (11%) is likely to have an immediate 1% higher investment the following year. The relationship is strong for virtually every year in the sample period. Dividends are a good substitute for investment. Firms that paid one standard deviation more dividends (6.6%) were likely to invest up to 0.3% less the following year, and 1% less over four years. This finding suggests that when internal funds are available firms will trade-off making investments versus paying dividends.

Although changes in firms' holdings of cash and short-term securities are helpful in explaining investment, a lag of up to one year is typical before a firm with unusually high cash holdings will follow up with unusual investment increases. A firm with one standard deviation more cash holdings typically has up to 0.1% higher investment two years later, adding up to 0.3% over four years. Depreciation, a component of free cash flow, is also positively related to investment. Over four years, the direct influence of a one-standard deviation higher depreciation indicates a 0.7% percent increase in investment. We also find that inventory changes are not highly related to investment. Thus, we can find little evidence that firms expand production capacity when inventories decline due to unusually high demand.

The third major factor we examine is the impact of tax policy shifts. During a substantial portion of the sample period, the tax code included *both* the investment tax credit *and* highly accelerated depreciation schedules called Accelerated Cost Recovery System

(ACRS).[6] From 1971 through 1975, the investment tax credit reduced the final tax bill 7% for qualified investments. This credit was increased to 10% or 11% in the *Tax Reduction Act of 1975*. The *Tax Reform Act of 1976* extended the credit through 1980, and the *Revenue Act of 1978* permanently extended the 10% credit. The *Economic Recovery Tax Act of 1981* (ERTA) replaced the useful life and Asset Depreciation Range systems of depreciating tangible property with new accelerated cost recovery system rules. Finally, the *Tax Reform Act of 1986* terminated the investment tax credit and lengthened the ACRS depreciation lives. Thus, the tax code allowed both the investment tax credit and significantly accelerated depreciation only in the relatively short 1981–1986 period. We find that although the average tax payments of firms did not increase substantially after 1986, firms that paid higher taxes from 1982–1984 invested substantially more than expected in both 1985 and 1986, just prior to the repeal of both the investment tax credit and accelerated depreciation schedules. A firm that paid one standard deviation higher taxes (4.3%) between 1982 and 1984 was likely to invest 0.5% more in 1985 and 1986. However, tax had an insignificant or negative influence in other years. Thus, we document that taxes can play an important role in the allocation of investment. **This result provides important evidence that the *1986 Tax Reform Act* had a real effect on the investment behavior of firms.**

Our paper now proceeds as follows. Section 2 discusses related literature. Section 3 explains our variables. Section 4 discusses our methodology. Section 5 describes our vector autoregressions, and Section 6 summarizes our findings.

## 2. Related literature

### *2.1. The literature on the cross-sectional determinants of investment decisions*

There are two influential studies that cross-sectionally examine the influence of financial signals on investments: Fazzari, Hubbard and Petersen (1988), henceforth FHP, and Morck, Shleiffer and Vishny (1990), henceforth MSV.[7] FHP find in a sample of 400 firms from 1970–1984 that investment levels are correlated with both contemporaneous and lagged Tobin's Q (which proxies for stock values) and, to a lesser extent, contemporaneous and lagged internal cash flow. They conclude that firms with low dividend payout ratios are most likely to base investment decisions on available cash flow. MSV examine changes in investment in a sample of approximately 27,000 observations. They assume that managers have perfect foresight of future "fundamental variables" so the change in current fundamentals are linked to the change in current investment. Further, managers do not have perfect foresight of abnormal stock returns so returns affect investment with a lag. These assumptions lead them to estimate regressions of the following form:

$$\Delta Investment_{i,t} = \beta_1 \Delta Fundamental\ Variables_{i,t} + \beta_2 Abnormal\ Stock\ \mathrm{Re}turns_{i,t-1}.$$

They measure the importance of stock returns by the percentage loss in $R^2$ when abnormal stock returns are omitted. MSV handicap the possible impact of stock returns in two ways. First, they measure abnormal stock returns earlier than fundamental variables. Second, they ask whether lagged stock returns have incremental explanatory power (as measured by $R^2$) for changes in investment after controlling for two contemporaneous fundamentals, sales and cash-flow. They find that 70% of the explanatory power of stock returns in their regressions disappears once they control for contemporaneous fundamental variables. This finding, together with the conjecture that including additional fundamental variables would further reduce the importance of past stock returns, leads them to conclude that stock returns are not important.

Our study differs from this previous research in a number of ways. First, our study is less optimistic about managers' abilities to forecast fundamental variables. Therefore, we examine the relationship between investment decisions and both past returns and fundamental variables. Furthermore, accounting procedures may induce mechanistic correlations among contemporaneous investment measures of operating cash flow and newly raised capital. By measuring fundamental variables earlier, we avoid any such problems. Second, we run a vector autoregressive model with yearly data over a more recent time period to disentangle the influence of fundamental variables and financial signals in different years while allowing factors to have both persistent and non-persistent effects.[8] This is asymptotically equivalent to establishing Granger-Simms temporal precedence. Third, we differ in a variety of details. For example, we use an investment measure that can assume negative values, normalize by firm size, explicitly adjust for heteroscedasticity, adjust for additional fundamental factors, include firms undergoing corporate control activity, and reject the use of incremental $R^2$ as an appropriate measure of the importance of stock returns. Fourth, our paper makes an important contribution by documenting the influence of tax code changes in the 80's on investment decisions.

It is important to mention that there are also other approaches to estimating cross-sectional investment models. For example, Chirinko [1993] summarizes the use of structural models estimating variants of the Q model. Chirinko explains that these Q models have performed very poorly empirically, rely on their own ad-hoc adjustments, and assume away other potentially influential economic factors by imposing such a strong structure. Alternatively, our approach avoids these problems by focusing on the explanatory ability of the factors considered. Because we concentrate on explaining future investment changes, we can include lagged variables that are themselves driven by lagged investment. This approach allows us to capture a more complex environment by including variables associated with multiple, economically plausible hypotheses. Furthermore, the variables are allowed to either positively or negatively influence investment.

### *2.2. The literature on the determinants of aggregate investment*

Tobin (1969) initiated an extensive macro-economic literature that analyzes and forecasts *aggregate* investments with "Tobin's Q," largely a measure of market value. Barro (1990) finds that stock returns perform better in explaining potential investment risk than does

Tobin's Q, indicating that Tobin's Q acts only as a rough proxy for the more important market signal. Our study differs primarily in explaining the *cross-sectional* variation in investment, not the time-series variation in aggregate investment. As MSV point out, financial signals can play a role in both the intertemporal substitution of investment and consumption and the cross-sectional substitution of investment flows.

## 3. Data and variable definitions

### *3.1. The data*

Table 1 describes the variables our study correlates with investment decisions, external funds and information, internal funds and information, and taxes. Our primary data source was the merged annual COMPUSTAT data tapes, supplemented with data from the CRSP tapes. Annual stock and firm performance measures are aligned by fiscal year-end for each company, and we exclude years in which firms switch fiscal year. The definitions of our variables (described below) effectively restrict us to the 17-year interval 1973 to 1989. Table 1 provides a convenient summary of the variable definitions as discussed in this section.

### *3.2. Investment definition*

A good measure of investment should capture both increases and decreases in a firm's capital, taking both economic depreciation and the sale of property, plant, and equipment into account.[9] While estimating economic depreciation is very difficult, subtracting sales of property, plant, and equipment from reported capital expenditures is straightforward. Thus, we define investment as net capital expenditures (ntcpxp):

$$\text{ntcpxp}[t] = (128[t] - 107[t])/\text{Sz}[t]$$

where the numbers refer to Compustat data item at time t. 128 is the capital expenditures from the statement of cashflows or funds flow statement, 107 is proceeds from sale of property, and Sz is total assets at time t as captured in Compustat data item 6[t]. All internal accounting variables are measured as a percentage of total assets. Table 2 shows that a small percentage of the variables were truncated because they fell outside of the range of +200% and −50% to prevent outliers from having excessive influence on the reported results.

Table 2 shows statistics for the data pooled across all firms and years. The table shows that the average firm in our sample invested an amount equal to 6.7% of assets in each year. Cross-sectionally, the standard deviation of this investment measure is 7.4%. 24 observations were truncated, and 92.5% of firm-years in our sample had positive net capital expenditures. Figure 1 graphs the time-series mean and standard deviation of net capital expenditures. There is a pronounced drop in 1983 in both the cross-sectional

*Table 1.* Variable Definitions

| Symbol | Name | Definition |
|---|---|---|
| | Panel A: Investment | |
| Symbol | Name | Definition |
| ntcpxp | Capital Expenditures minus Sales of Prop., Plant & Equip. | $(128_t - 107_t)/Sz_t$ |
| | Panel B: External Funds and Information | |
| Symbol | Name | Definition |
| ntissu | Net Equity Issuing Activity Minus Net Equity Purchasing Activity | $(108_t - 115_t)/Sz_t$ |
| return | Annual Stock Return | CRSP Continuously Compounded |
| | Panel C: Internal Funds and Information | |
| Symbol | Name | Definition |
| incom | Income before Extraordinary Items | $18_t/Sz_t$ |
| divid | Cash Dividends to Common | $21_t/Sz_t$ |
| Δcash | Change in Cash & Equivalents | $(1_t - 1_{t-1})/Sz_t$ |
| Δinvnt | Change in Inventories | $(3t - 3_{t-1})/Sz_t$ |
| deprec | Depreciation | (Operating Cash Flow† $- 18_t)/Sz_t$ |
| | Panel D: Taxes | |
| Symbol | Name | Definition |
| tax | Income Taxes Minus Deferred Taxes | $(16_t - 50_t)/Sz_t$ |
| | Panel E: Control Variables | |
| Symbol | Name | Definition |
| $sales_t$ | Sales | $12_t/Sz_t$ |
| $\Delta sales_t$ | Changes in Sales | $(12_t - 12_{t-1})/Sz_{t-1}$ |
| $\%\Delta size_t$ | Percentage Change in Assets | $(Sz_t - Sz_{t-1})/Sz_{t-1}$ |
| $size_t 10^{-3}$ | CPI-adjusted Assets | $Sz_t$ |
| $size^2_t 10^{-6}$ | CPI-adjusted Assets Squared | $Sz_t * Sz_t$ |
| lnd Dummy | 18 Dummies for 19 Industries | |
| $mktret_t$‡ | The Market's Stock Return | CRSP Continuously Compounded Ibbotson |
| $shtinterest_t$‡ | Return to Holding T-Bills | Continuously Compounded |
| $lnginterest_t$‡ | Return to Holding G-Bonds | Ibbotson Continuously Compounded |

The notation is $\#_t$ where # denotes the item number on the annual Compustat Tape.
$Sz_t$ denotes $(8_t)$ on Compustat, total property, plant, and equipment.
†: Operating cash flow is defined as 308[t] if the indirect method is used. Operating cash flow is defined as 110[t] − 236[t] if the direct method is used. Note that operating cash flow is not included in the regressions because net income and depreciation are included.
‡: Note that these variables are included only in the all-years regression.

average and the standard deviation of investment. Furthermore, average investment seems to be lower in the late 1980's than in the late 1970s. The repeal of the investment tax credit and accelerated depreciation schedule may have produced a short-lived increase in net

*Table 2.* Univariate Description

| Variable | Mean | Std. Dev | Min | Max | #Trunc | %Pos | $\rho_1$ | $\rho_2$ | $\rho_1$ |
|---|---|---|---|---|---|---|---|---|---|
| ntcpxp | 6.7 | 7.4 | −50.0 | 181.0 | 24 | 92.5 | 52.6 | 42.4 | 36.3 |
| ntissu | 0.9 | 7.6 | −50.0 | 200.0 | 14 | 46.1 | 30.3 | 28.0 | 20.9 |
| return | 14.0 | 37.5 | −50.0 | 200.0 | 2,800 | 65.1 | −3.6 | −5.0 | 0.1 |
| incom | 3.9 | 11.1 | −50.0 | 200.0 | 200 | 83.3 | 72.2 | 62.4 | 57.9 |
| divid | 1.7 | 6.6 | 0.0 | 200.0 | 22 | 66.3 | 80.5 | 77.4 | 78.8 |
| Δcash | 0.7 | 7.7 | −50.0 | 87.5 | 60 | 54.6 | −14.3 | −5.4 | −0.2 |
| Δinvnt | 1.1 | 6.9 | −50.0 | 87.5 | 40 | 58.8 | 8.1 | 3.3 | 3.7 |
| deprec | 4.3 | 13.3 | −50.0 | 200.0 | 45 | 71.6 | 21.5 | 17.8 | 14.3 |
| tax | 3.5 | 4.3 | −50.0 | 42.7 | 1 | 80.2 | 73.8 | 59.9 | 52.7 |
| $\text{sales}_t$ | 1.3 | 0.6 | −0.4 | 2.0 | | 99.9 | 94.4 | 90.8 | 87.9 |
| $\Delta\text{sales}_t$ | 15.8 | 31.8 | −50.0 | 200.0 | | 74.7 | 34.1 | 18.2 | 17.4 |
| $\%\Delta\text{size}_t$ | 11.7 | 25.9 | −50.0 | 200.0 | | 74.5 | 21.0 | 12.5 | 8.8 |
| $\text{size}_t 10^{-3}$ | 0.8 | 3.9 | 0.0 | 123.4 | | 100.0 | 97.7 | 95.9 | 93.9 |
| $\text{size}_t^2 10^{-6}$ | 0.2 | 2.9 | 0.0 | 152.2 | | 100.0 | 93.4 | 89.2 | 85.3 |
| $\text{mktret}_t$ | 19.9 | 16.6 | −17.7 | 68.2 | | 85.2 | −34.5 | −34.6 | −0.6 |
| $\text{shtinterest}_t$ | 7.9 | 2.5 | 4.7 | 14.2 | | 100.0 | 71.6 | 33.5 | 1.1 |
| $\text{lnginterest}_t$ | 8.6 | 12.4 | −18.8 | 43.5 | | 67.8 | 5.3 | −13.2 | 12.1 |

Note: The data summarized in this table stretches from 1973 to 1989 and encompasses the 28,299 firm-years used in subsequent analyses. ρ designates autocorrelations. % refers to the percentage of strictly positive values in the data. #Trunc is the approximate number of data points that were truncated to −50% or +200% to reduce the influence of outliers and possible data errors. All numbers, except $\text{size}_t 10^{-3}$ and $\text{size}_t^2 10^{-6}$, are in percent.

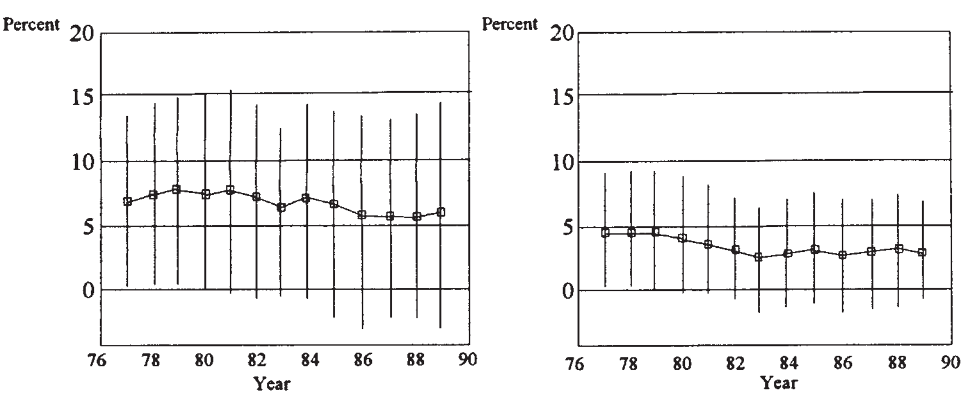


*Figure 1 and 2.* **Net Capital Expenditures and Taxes - Year by Year** The left figure shows year by year average net captial expenditures, and the right show taxes (both normalized by assets). The error bars describe the cross-sectional standard deviation. A typical year contains roughly 2,000 – 3,000 firm observations. The figures show that both net capital expenditures and taxes declined slowly throughout the sample period, with unusually large drop in 1983.

capital expenditures in 1984 and 1985 compared to net capital expenditures in 1983 and 1986 thru 1989, but this increase does not seem unusual when compared to investment at the 1977 or 1982 levels.

Table 3 shows that the average autocorrelation of net capital expenditures is about 53% for lag 1, 41% for lag 2, 35% for lag 3, and 32% for lag 4. This persistence shows up in the multivariate regressions too, where the sum of the coefficients from the four lags adds up to a 62% persistence. These results suggest that high fixed costs may induce firms to hold off making investments until they are sufficiently large to seem justified and then firms continue to make investments from that point forward. As mentioned in Section 1, this time-series behavior of investment accentuates the influence of any third variable. The influential variable can have both a direct effect on investment in the future periods as captured in its coefficients on the lagged variables and an indirect influence because of the 62% overall persistence in investment that translates into the 2.63 long-term amplification factor.

### 3.3. *External financial signals definitions*

One of our primary objectives is to investigate the relation between firm investment and externally generated financial funding and information. We predict that firms with high

*Table 3.* Year-by-year Influence of Lagged ntcpxp on $ntcpxp_0$

| Year | $ntcpxp_{-1}$ | *T*-stat | $ntcpxp_{-2}$ | *T*-stat | $ntcpxp_{-3}$ | *T*-stat | $ntcpxp_{-4}$ | *T*-stat | $ntcpxp_{-1:-4}$ | *T*-stat |
|---|---|---|---|---|---|---|---|---|---|---|
| 1977 | 37.16% | 5.36** | 14.05% | 3.02** | 10.51% | 2.51** | 5.78% | 1.41 | **67.50%** | **12.42**** |
| 1978 | 37.39% | 6.75** | 16.75% | 3.40** | 4.76% | 1.00 | 4.90% | 1.58 | **63.79%** | **10.54**** |
| 1979 | 39.30% | 8.40** | 4.54% | 1.05 | 11.11% | 3.21** | 11.80% | 3.21** | **66.76%** | **16.77**** |
| 1980 | 42.66% | 9.49** | 9.31% | 2.75** | 6.74% | 1.73** | 5.88% | 1.82** | **64.60%** | **16.10**** |
| 1981 | 45.85% | 12.60** | 2.19% | 0.56 | 9.30% | 2.22** | 2.95% | 0.77 | **60.29%** | **11.55**** |
| 1982 | 24.77% | 5.07** | 17.33% | 4.33* | 2.36% | 0.62 | 11.66% | 3.41** | **56.12%** | **12.82**** |
| 1983 | 26.20% | 6.20** | 11.66% | 3.18** | 10.98% | 3.07** | 4.90% | 1.43 | **53.74%** | **12.70**** |
| 1984 | 33.24% | 5.76** | 15.59% | 4.54** | 10.37% | 2.29** | 5.22% | 1.33 | **64.43%** | **11.69**** |
| 1985 | 20.35% | 3.99** | 22.57% | 4.58** | 11.66% | 2.33** | 7.20% | 1.63 | **61.78%** | **12.53**** |
| 1986 | 26.48% | 6.63** | 12.36% | 3.31** | 11.99% | 2.74** | 9.03% | 2.44** | **59.86%** | **12.83**** |
| 1987 | 26.56% | 6.09** | 12.54% | 2.20** | −0.86% | −0.16 | 6.74% | 1.98** | **44.99%** | **8.76**** |
| 1988 | 27.85% | 5.97** | 8.69% | 2.42** | 7.02% | 1.28 | 11.68% | 2.58** | **55.25%** | **11.20**** |
| 1989 | 38.42% | 6.40** | 8.61% | 1.54 | 9.77% | 2.40** | 4.88% | 1.16 | **61.68%** | **10.09**** |
| All | 33.21% | 22.50** | 12.97% | 9.87* | 7.74% | 5.60** | 7.94% | 6.97** | **61.86%** | **45.33**** |

Simple All-year Correlations with $ntcpxp_0$

| $ntcpxp_{-1}$ | *T*-stat | $ntcpxp_{-2}$ | *T*-stat | $ntcpxp_{-3}$ | *T*-stat | $ntcpxp_{-4}$ | *T*-stat |
|---|---|---|---|---|---|---|---|
| 52.646% | 104.164 | 40.892% | 75.377 | 35.339% | 63.546 | 31.612% | 56.051 |

Simple All-year Univariate Statistics ($n = 28{,}299$)

| μ | σ | μ | σ | μ | σ | μ | σ |
|---|---|---|---|---|---|---|---|
| 6.694% | 7.353% | 6.896% | 7.440% | 7.109% | 7.493% | 7.353% | 7.841% |

lagged equity financing and firm-specific returns will increase their investments.[10] We measure equity financing activity (ntissu) as new equity issuing activity (108) net of equity repurchasing activity (115):

$$\text{ntissu}[t] = (108[t] - 115[t])/Sz[t].$$

Table 2 shows that net issuing activity is an average 0.9% of firms' assets, has a cross-sectional standard deviation of 7.6%, and has a persistence of about 30%. Our measure of the firms' stock returns, return, is the continuously compounded annual firm return from CRSP aligned with the company's fiscal year end.[11] Table 2 shows that the average stock return in our sample is approximately 14%, with a cross-sectional standard deviation of 37%.

### *3.4. Internal accounting information*

We propose a number of proxies for the internal accounting information related to the investment decisions, income, dividends, changes in cash and short-term securities, changes in inventory, and depreciation. The first measure is net income (incom) measured as net income before extraordinary items (18):

$$\text{incom}[t] = 18[t]/Sz[t].$$

A positive relation between net income and investment may be the result of two alternative mechanisms. First, large net income may indicate economic rents that have been and will be earned by the firm. These opportunities may induce the firm to expand through investment to capture as much of this rent as possible. Second, firm profitability is generally the single most important source of internal funds. Firms with substantial net income will ultimately receive substantial inflows of cash through collection of accounts receivables.[12] According to the free cash flow hypothesis, managers may choose to expand operations because their incentives are not aligned with firm value maximization. Under either the economic rent seeking explanation or the free cash flow hypothesis, we predict that net income will be positively related to investment. Table 2 shows that firms earn an average of about 3.9% of their assets, with a cross-sectional standard deviation of 11.1%.

Our second internal information measure is dividends on common stock (21[t]):

$$\text{divid}[t] = 21[t]/Sz[t].$$

We investigate this variable to determine whether dividends are a complement or a substitute for investment. An observed positive (negative) relation between dividends and investment would indicate a complementary (substitutive) role. Firms with high levels of internally generated cash may undertake both dividends and investment due to the abundance of relatively low cost internally generated capital. Alternatively, firms facing limited investment opportunities may substitute dividends for investment. According to Table 2, firms in our sample paid about 1.7% of their assets in dividends, with a cross-sectional standard deviation of 6.6. About 2/3 of the firm-years in our sample paid cash dividends.

Our third internal information variable is the change in the balance of cash and cash equivalents (Δcash):

$$\Delta\text{cash}[t] = (1[t] - 1[t-1])/\text{Sz}[t].$$

Because investment requires liquidity, managers anticipating investments may rationally increase cash balances to reduce the transactions costs involved in the exchange. If changes in cash and short-term securities holdings explain increases in investments, we would favor hypotheses that argue managers either build slack to finance investments or use free cash for investment. Table 2 shows changes in cash holdings are on average a positive 0.7% of assets.

Changes in total inventories, which is 1.1% of assets on average according to Table 2, is our fourth variable:

$$\Delta\text{invnt}[t] = (3[t] - 3[t-1])/\text{Sz}[t].$$

Inventory changes can be inversely related to investment if firms respond to unusual increases in real demand (as evidenced by a decline in inventories) by increasing investment. Alternatively, managers could draw down inventories in anticipation of reduced real demand and a decrease in required production capacity, which would lead to a positive relation between inventory changes and investment.

Our fifth internal information variable is depreciation which is equivalent to the difference between operating cash flow (opercf) and net income (incom) after controlling for changes in working capital variables:

$$\text{deprec}[t] = \text{opercf}[t] - 18[t].$$

In our definition of investment, we note that we have difficulties adjusting for "economic" depreciation. Although including "accounting" depreciation as an independent variable might allow us to control for some of the relationship between economic depreciation and investment, it is a somewhat limited proxy because accounting depreciation is computed from historical cost in a purely mechanical fashion (e.g., with the straight-line method depreciation equals historical cost/expected useful life). Thus, depreciation may proxy simply for past investment. A second reason to include depreciation is to allow the reader to compute the influence of operating cash flow, which is the sum of net income, depreciation, and working capital changes. Table 2 shows that firms depreciated an average of 4.3% of their assets with a standard deviation of 13.3% and a persistence of about 21.5%.

In summary, these internal variables should cover the major components described in firms' accounting reports. Furthermore, familiar concepts, such as operating cash flow, can be obtained from linear combinations of these measures.

### *3.5. Income tax definition*

Finally, we measure the amount of taxes a firm pays (tax):

$$\text{tax}[t] = (16[t] - 50[t])/\text{Sz}[t]$$

which is total income taxes (16[t]) net of deferred income taxes (50[t]). On average, firms paid only 3.5% of their assets in taxes, with a typical cross-sectional standard deviation of 4.3%. 20% of firms in our sample paid no taxes at all. Furthermore, income tax payments were persistent, displaying a typical 74% first order autocorrelation. Because we are interested in correlations between taxes and investment in specific years, Figure 2 plots the year-by-year cross-sectional average and standard deviation for taxes. The figure shows that income taxes have been declining since 1977, reaching a low point in 1983. However, there is virtually no evidence that the firms in our sample faced significantly higher tax burdens when the investment tax credit and accelerated depreciation schedules were abolished in 1986. Our firms were apparently either failing to take advantage of these tax advantages before their repeal, or they were successful in substituting other tax reduction methods after 1986.

### *3.6. Other variables*

We include five different control variables all lagged over four periods to “hold everything else constant.” In particular, we include the following size-related variables: sales, change in sales, percentage change in assets, CPI-adjusted assets, and CPI-adjusted assets squared. We also include 18 dummy variables for the 19 industry classifications described in Table 12. Finally, we include the continuously compounded market return, the return on a treasury bill and the return on a long-term government bonds to replace traditional year dummies for the regressions pooled across all years.

## **4. Methodology**

Our regressions are specified as OLS vector autoregressions with White heteroscedasticity-adjusted standard errors. We estimate the influence of our included variables for lags from one to four years and believe this approach captures most of the direct influence of our variables because the coefficients decrease steadily to the fourth lag. We do not use an information criteria to choose our lag length because this approach pre-tests the data set. Further, we include the lagged values of the dependent variable, net capital expenditures, to capture indirect effects and permit longer-lagged influences to enter our regressions.

We run the following regression for all firms for each of the 13 years from 1977–1989:[13]

$$\begin{aligned} ntcpxp_t = {} & \beta_1 ntcpxp_{t-1} + \beta_2 ntcpxp_{t-2} + \beta_3 ntcpxp_{t-3} + \beta_4 ntcpxp_{t-4} \\ & \beta_5 ntissu_{t-1} + \beta_6 ntissu_{t-2} + \beta_7 ntissu_{t-3} + \beta_8 ntissu_{t-4} \\ & \beta_9 return_{t-1} + \beta_{10} return_{t-2} + \beta_{11} return_{t-3} + \beta_{12} return_{t-4} \\ & \beta_{13} incom_{t-1} + \beta_{14} incom_{t-2} + \beta_{15} incom_{t-3} + \beta_{16} incom_{t-4} \\ & \beta_{17} divid_{t-1} + \beta_{18} divid_{t-2} + \beta_{19} divid_{t-3} + \beta_{20} divid_{t-4} \\ & \beta_{21} \Delta cash_{t-1} + \beta_{22} \Delta cash_{t-2} + \beta_{23} \Delta cash_{t-3} + \beta_{24} \Delta cash_{t-4} \\ & \beta_{25} \Delta invnt_{t-1} + \beta_{26} \Delta invnt_{t-2} + \beta_{27} \Delta invnt_{t-3} + \beta_{28} \Delta invnt_{t-4} \\ & \beta_{29} deprec_{t-1} + \beta_{30} deprec_{t-2} + \beta_{31} deprec_{t-3} + \beta_{32} deprec_{t-4} \\ & \beta_{33} tax_{t-1} + \beta_{34} tax_{t-2} + \beta_{35} tax_{t-3} + \beta_{36} tax_{t-4} + \beta_{37\ldots76} Control + \varepsilon_t \end{aligned}$$

To allow the reader to easily gauge the overall determinants of investment, we group the results of the 13 individual year regressions into Tables 3 through 11, with each table displaying the influence of one particular variable. We also run and display "All" regression for the observations pooled across firms and years. We do not display the coefficients on the control variables. Each table also presents the overall simple correlations of each variable with net capital expenditures in year 0. If the partial correlation represented in the regression coefficient shows significance in one direction and the simple correlation shows significance in the opposite direction, the measured effect may be difficult to interpret given the multicollinearity in the accounting variables used. The mean and the standard deviation of each variable are also presented to allow the reader to compute the economic significance of the individual variables by multiplying the standard deviations by an estimated coefficient.

The reader must be warned that our cross-sectional and time-series vector autoregressions have unusual interpretations. In the cross-sectional autoregressions, the persistence of variables as measured by their autocorrelation and their cross-sectional standard deviation are very different. For example, we may describe the influence of a one standard deviation higher variable *X* leading to a *Y*% increase in net capital expenditures. However, variable *X* may have 90% persistence; thus, individual firms may never experience a one cross-sectional standard deviation change in the variable across time. Furthermore, if a variable is autocorrelated, an effect on only lag 1, but not lags 2–4, may persist because variable *X*'s deviation from the mean is likely to continue. Including various lags of a variable theoretically allows us to disentangle the temporal influence, but variables with high multicollinearity may pick up each other's significance in small samples. Thus, for correlated variables (e.g., dividends and net income), the reader may want to consider only the overall sum of coefficients on various lags.[14]

## 5. Results

### *5.1. Lagged net capital expenditures*

Table 3 shows that lagged net capital expenditures are positively autocorrelated. The typical yearly persistence is about 33%, with a four-year persistence of up to 62%. A similar pattern emerges from the simple correlations among net capital expenditures, where we observe a decline through time only slightly less than geometric. Notice that we do not report $R^2$ for our pooled regressions because it would primarily reflect the persistence of net capital expenditures.

### *5.2. Lagged equity financing and stock returns*

Table 4 shows that stock returns have a significantly positive partial correlation with net capital expenditure with a half-life of one year. Overall, if returns are higher by one cross-sectional standard deviation (37.4%) then investment is expected to be 0.8% (37.4%*2.2%) higher as a percentage of assets the following year. Two years later, the direct influence is still 0.4% (38.8%*1.0%). Over four years, the direct influence coeffi-

*Table 4.* Year-by-year Influence of Lagged return on $ntcpxp_0$

| Year | $return_{-1}$ | *T*-stat | $return_{-2}$ | *T*-stat | $return_{-3}$ | *T*-stat | $return_{-4}$ | *T*-stat | $return_{-1:-4}$ | *T*-stat |
|---|---|---|---|---|---|---|---|---|---|---|
| 1977 | 0.80% | 2.08** | 0.68% | 1.50 | −0.42% | −1.01 | −0.21% | −.42 | 0.84% | 0.84 |
| 1978 | 1.68% | 3.60** | 0.86% | 1.98** | −0.17% | −3.37** | 0.27% | .70 | 2.64% | 2.69** |
| 1979 | 1.49% | 2.78** | 0.52% | 0.95 | −0.31% | −0.73 | −0.07% | −0.18 | 1.63% | 1.51 |
| 1980 | 2.54% | 5.46** | 0.69% | 1.32 | −0.09% | −0.18 | −0.41% | −1.14 | 2.73% | 2.58** |
| 1981 | 1.72% | 3.18** | 1.02% | 1.80** | 0.54% | 1.10 | −0.44% | −0.94 | 2.83% | 2.47** |
| 1982 | 1.33% | 3.04** | 0.54% | 0.92 | 0.57% | 1.07 | 0.24% | 0.47 | 2.69% | 1.93** |
| 1983 | 2.43% | 5.83** | 0.44% | 1.08 | −0.12% | −0.20 | −0.32% | −0.76 | 2.44% | 2.50** |
| 1984 | 2.75% | 5.37** | 2.06% | 3.51** | 0.21% | 0.36 | 0.81% | 1.37 | 5.84% | 4.24** |
| 1985 | 0.79% | 1.35** | 0.49% | 0.78 | 0.87% | 1.51 | 0.44% | 0.87 | 2.59% | 1.77** |
| 1986 | 2.43% | 4.05** | 0.06% | 0.09 | 0.89% | 1.84** | 0.68% | 1.31 | 4.06% | 3.18** |
| 1987 | 1.90% | 2.88** | 2.28% | 3.56** | −0.15% | −0.23 | 0.39% | 0.86 | 4.43% | 3.48** |
| 1988 | 1.76% | 2.99** | 0.98% | 1.52 | 0.26% | 0.43 | 0.36% | 0.64 | 3.36% | 3.16** |
| 1989 | 2.52% | 2.56** | 0.32% | 0.48 | 1.50% | 1.45 | −0.95% | −1.23 | 3.38% | 1.85** |
| All | 2.27% | 14.44** | 1.01% | 6.43* | 0.51% | 3.09** | 0.16% | 1.20 | 3.95% | 11.65** |

Simple All-year Correlations with $ntcpxp_0$

| $return_{-1}$ | *T*-stat | $return_{-2}$ | *T*-stat | $return_{-3}$ | *T*-stat | $return_{-4}$ | *T*-stat |
|---|---|---|---|---|---|---|---|
| 14.353% | 24.397 | 13.794% | 23.428 | 9.152% | 15.461 | 5.163% | 8.697 |

Simple All-year Univariate Statistics ($n = 28{,}299$)

| $\mu$ | $\sigma$ | $\mu$ | $\sigma$ | $\mu$ | $\sigma$ | $\mu$ | $\sigma$ |
|---|---|---|---|---|---|---|---|
| 14.016% | 37.473% | 13.569% | 38.822% | 12.155% | 40.095% | 10.867% | 40.809% |

cients add up to 4.0%, indicating the direct influence of a 37% increase in stock returns to be a 1.5% increase in investment. When this influence is multiplied by the long-term investment persistence factor of 2.63, the total influence equals 4%. Thus, we believe that stock performance acts as an important economic determinant of subsequent, cross-sectional investment decisions. Returns can also absorb some of the explanatory power available in the accounting variables, and vice-versa. For example, managers may invest because of their superior stock market performance, which in turn may be determined by the outstanding past financial performance of the company.

This return relationship holds even though we have included net equity issuances. Consequently, it is unlikely that firms increase investment solely because issuing equity becomes cheaper when the stock price increases. The results in Table 5 demonstrate that the past issuance of equity leads to future investment increases of .73 directly over four years and 1.93 overall.[15]

### 5.3. Lagged internal accounting measures

Table 6 shows that immediately lagged income is an important determinant of investment. A one year cross-sectional standard deviation increase (11.1%) in income causes a 1.0%

*Table 5.* Year-by-year Influence of Lagged ntissu on $ntcpxp_0$

| Year | $ntissu_{-1}$ | *T*-stat | $ntissu_{-2}$ | *T*-stat | $ntissu_{-3}$ | *T*-stat | $ntissu_{-4}$ | *T*-stat | $ntissu_{-1:-4}$ | *T*-stat |
|---|---|---|---|---|---|---|---|---|---|---|
| 1977 | 14.86% | 3.20** | 3.97% | 1.02 | 4.63% | 0.62 | 3.34% | 0.83 | 26.80% | 2.72** |
| 1978 | 8.88% | 2.13** | −1.57% | −0.42 | 5.59% | 1.63 | 16.39% | 2.37** | 29.28% | 3.16** |
| 1979 | 20.35% | 4.36** | −0.82% | −0.18 | 2.58% | 0.66 | −0.93% | −0.23 | 21.18% | 3.19** |
| 1980 | 6.79% | 1.30 | 7.60% | 2.16** | 11.80% | 4.05** | 5.11% | 1.48 | 31.30% | 4.76** |
| 1981 | 3.89% | 1.02 | 3.04% | 0.77 | 10.65% | 1.62 | 8.96% | 1.76** | 26.53% | 3.11** |
| 1982 | 2.70% | 0.83 | 11.19% | 3.20** | −2.49% | −0.30 | 6.46% | 1.36 | 17.86% | 2.65** |
| 1983 | 7.11% | 2.64** | 9.32% | 2.61** | 1.47% | 0.51 | −2.48% | −0.56 | 15.43% | 3.44** |
| 1984 | 4.50% | 1.71** | 9.10% | 2.87** | 5.82% | 1.61 | 3.40% | 0.91 | 22.82% | 3.64** |
| 1985 | 3.18% | 0.91 | 3.18% | 1.19 | 1.06% | 0.35 | −1.56% | −0.62 | 5.85% | 1.13 |
| 1986 | 1.88% | 0.51 | 0.28% | 0.11 | 2.06% | 0.83 | 1.30% | 0.43 | 5.51% | 1.10 |
| 1987 | −0.10% | −0.05 | 4.83% | 2.10** | 4.19% | 1.50 | 0.65% | 0.26 | 9.57% | 2.94** |
| 1988 | 3.32% | 1.38 | 1.01% | 0.49 | 0.21% | 0.09 | −2.46% | −0.69 | 2.09% | 0.51 |
| 1989 | −1.35% | −0.71 | −0.03% | −0.01 | 3.33% | 1.29 | 3.36% | 1.93** | 5.31% | 1.70** |
| All | 2.74% | 2.71** | 3.30% | 3.63** | 2.20% | 2.23** | 1.36% | 1.47 | 9.60% | 6.45** |

Simple All-year Correlations with $ntcpxp_0$

| $ntissu_{-1}$ | *T*-stat | $ntissu_{-2}$ | *T*-stat | $ntissu_{-3}$ | *T*-stat | $ntissu_{-4}$ | *T*-stat |
|---|---|---|---|---|---|---|---|
| 4.589% | 7.727 | 3.712% | 6.248 | 1.763% | 2.966 | −0.438% | −0.737 |

Simple All-year Univariate Statistics ($n = 28{,}299$)

| $\mu$ | $\sigma$ | $\mu$ | $\sigma$ | $\mu$ | $\sigma$ | $\mu$ | $\sigma$ |
|---|---|---|---|---|---|---|---|
| 0.941% | 7.635% | 1.125% | 7.743% | 1.204% | 7.634% | 1.297% | 7.791% |

*Table 6.* Year-by-year Influence of Lagged incom on $ntcpxp_0$

| Year | $incom_{-1}$ | *T*-stat | $incom_{-2}$ | *T*-stat | $incom_{-3}$ | *T*-stat | $incom_{-4}$ | *T*-stat | $incom_{-1:-4}$ | *T*-stat |
|---|---|---|---|---|---|---|---|---|---|---|
| 1977 | 14.02% | 2.28** | 6.72% | 1.11 | 8.50% | 1.59 | 0.19% | 0.03 | 29.43% | 4.24** |
| 1978 | 19.37% | 2.52** | −0.65% | −0.12 | 6.00% | 1.22 | 8.23% | 1.62 | 32.94% | 3.57** |
| 1979 | 18.32% | 4.00** | 7.63% | 1.91** | −6.82% | −1.55 | 7.37% | 2.09** | 26.50% | 4.60** |
| 1980 | 8.28% | 1.73** | 13.92% | 2.79** | 3.61% | 0.79 | −0.64% | −0.16 | 25.17% | 4.56** |
| 1981 | 19.17% | 3.54** | 1.63% | 0.30 | −8.11% | −1.21 | 9.44% | 2.08** | 22.13% | 3.46** |
| 1982 | 13.88% | 2.67** | 5.43% | 1.21 | 4.01% | 0.92 | 2.54% | 0.51 | 25.87% | 3.98** |
| 1983 | 10.20% | 2.50** | 3.89% | 0.77 | 6.99% | 1.25 | 3.32% | 0.84 | 24.40% | 3.35** |
| 1984 | 10.47% | 2.07** | 9.00% | 1.94** | 10.53% | 1.34 | −11.45% | −1.80** | 18.55% | 2.05** |
| 1985 | 16.03% | 4.65** | −13.22% | −2.18** | 6.37% | 1.44 | −2.99% | −0.73 | 6.20% | 0.98 |
| 1986 | 6.06% | 1.82** | 4.30% | 1.23 | −2.17% | −0.46 | 0.32% | 0.06 | 8.52% | 1.72** |
| 1987 | 4.84% | 1.74** | 7.70% | 2.46** | 2.21% | 0.52 | 0.29% | 0.06 | 15.04% | 3.36** |
| 1988 | 6.89% | 2.73** | 0.46% | 0.16 | 2.54% | 0.88 | 2.15% | 0.68 | 12.04% | 3.01** |
| 1989 | 6.73% | 1.57 | 1.59% | 0.42 | −1.33% | −0.42 | 6.86% | 2.01** | 13.86% | 3.25** |
| All | 8.84% | 7.08** | 2.24% | 1.80* | 0.87% | 0.72 | 2.52% | 2.05** | 14.47% | 9.04** |

Simple All-year Correlations with $ntcpxp_0$

| $incom_{-1}$ | *T*-stat | $incom_{-2}$ | *T*-stat | $incom_{-3}$ | *T*-stat | $incom_{-4}$ | *T*-stat |
|---|---|---|---|---|---|---|---|
| 17.441% | 29.796 | 12.984% | 22.028 | 8.548% | 14.432 | 6.168% | 10.395 |

Simple All-year Univariate Statistics ($n = 28{,}299$)

| μ | σ | μ | σ | μ | σ | μ | σ |
|---|---|---|---|---|---|---|---|
| 3.920% | 11.100% | 4.412% | 10.650% | 4.776% | 10.483% | 5.216% | 10.288% |

difference in investment the following year. This amount is roughly equivalent to the immediate increase in investment due to an unusually high stock return. However, unlike the influence of stock returns (a non-persistent variable), the influence of income (a very persistent variable) is concentrated in the immediately preceding year. Furthermore, because stock returns are more likely to significantly shift from year to year, stock returns will have a greater long-term effect as well.

In contrast, Table 7 shows that dividends act as a substitute for future investment over the next 2 years. The economic significance of dividends as a determinant of net capital expenditures is considerably lower than that of income. A firm with a one-standard deviation higher dividend payout rate (6.6%) suggests an 0.3% higher investment rate the following year and the year after.

As Table 8 shows, changes in cash and short-term holdings can explain some investment, too. Investment changes are particularly powerful with a two year lag, with an overall coefficient of 1.6%. The overall 4-year direct impact of a one standard deviation higher cash increase (7.7%) is an 0.3% higher investment rate.

In contrast, Table 9 shows that changes in inventory were largely unimportant. Thus, we do not have good evidence that real demand changes have a strong immediate impact on investment. The exception is in 1984 and 1985 years when there is an unexplainable positively correlation between inventory and investment changes.

*Table 7.* Year-by-year Influence of Lagged divid on $ntcpxp_0$

| Year | $divid_{-1}$ | *T*-stat | $divid_{-2}$ | *T*-stat | $divid_{-3}$ | *T*-stat | $divid_{-4}$ | *T*-stat | $divid_{-1:-4}$ | *T*-stat |
|---|---|---|---|---|---|---|---|---|---|---|
| 1977 | −7.55% | −0.44 | −12.07% | −0.73 | 2.19% | 0.16 | −12.73% | −0.87 | −30.16% | −4.40** |
| 1978 | −17.72% | −0.77 | −6.26% | −0.16 | 5.99% | 0.28 | −15.37% | −1.17 | −33.36% | −3.61** |
| 1979 | −36.28% | −0.93 | 2.48% | 0.06 | 3.93% | 0.14 | 4.69% | 0.24 | −25.18% | −4.18** |
| 1980 | −4.40% | −1.04 | 2.06% | 0.18 | −6.39% | −0.23 | −14.54% | −0.60 | −23.25% | −4.04** |
| 1981 | −16.21% | −1.62 | 0.47% | 0.05 | 23.67% | 0.97 | −30.47% | −1.59 | −22.53% | −3.46** |
| 1982 | −17.29% | −1.85** | 2.96% | 0.30 | −3.99% | −0.28 | −11.10% | −0.78 | −29.42% | −4.48** |
| 1983 | 0.22% | 0.04 | −13.67% | −2.72** | −3.86% | −0.63 | −9.03% | −1.83** | −26.33% | −3.60** |
| 1984 | −7.18% | −1.52 | −9.34% | −0.88 | −17.66% | −2.58** | 14.43% | 1.52 | −19.76% | −2.20** |
| 1985 | 0.22% | 0.08 | −1.38% | −0.43 | −3.15% | −0.50 | −3.31% | −0.46 | −7.61% | −1.17 |
| 1986 | −8.56% | −3.00** | −1.54% | −0.45 | −0.21% | 0.06 | 0.11% | 0.02 | −9.77% | −1.96** |
| 1987 | 2.06% | 0.42 | −8.92% | −2.00** | −4.29% | −1.09 | −1.59% | −0.49 | −12.74% | −2.55** |
| 1988 | −7.23% | −2.54** | −5.82% | −1.48 | 1.34% | 0.37 | −1.58% | 0.60 | −13.29% | −3.07** |
| 1989 | −2.65% | −1.83** | −8.36% | −1.95** | 1.22% | 0.20 | −5.67% | −1.04 | −15.46% | −3.24** |
| All | −4.59% | −3.39** | −4.72% | −2.54** | −2.94% | −1.44 | −2.47% | −1.35 | −14.71% | −8.97** |

Simple All-year Correlations with $ntcpxp_0$

| $divid_{-1}$ | *T*-stat | $divid_{2}$ | *T*-stat | $divid_{-3}$ | *T*-stat | $divid_{-4}$ | *T*-stat |
|---|---|---|---|---|---|---|---|
| −1.965% | −3.306 | −2.317% | −3.899 | −2.377% | −4.000 | −2.602% | −4.378 |

Simple All-year Univariate Statistics ($n$ = 28,299)

| μ | σ | μ | σ | μ | σ | μ | σ |
|---|---|---|---|---|---|---|---|
| 1.722% | 6.585% | 1.698% | 6.442% | 1.684% | 6.487% | 1.681% | 6.656% |

Finally, Table 10 finds that depreciation, another component in the calculation of cash flows, is positively correlated with future investment. Since operating cash flows are predominantly net income and depreciation, the positive relation of both depreciation and net income with investment suggests that operating cash flows are strongly related to new investment. Thus, firms experiencing increased cash inflow are more likely to undertake new investment.

### *5.4. Income taxes*

Until the *Tax Reform Act of 1986*, the tax code offered two provisions that were likely to have significant influence on investments during the sample period, accelerated depreciation schedules and the investment tax credit. From 1981 through 1986, the tax code significantly accelerated depreciation schedules. Also, the investment tax credit was available from 1971–1986. Table 11 indicates a strong relation between investments and taxes for both 1985 and 1986 prior to the repeal of *both* the accelerated depreciation schedules and the investment tax credit. One can show using a reasonable set of assumptions that the t-statistics of 2.32 and 1.97 in these two years are significantly different from the other years. The average t-statistic for the years excluding 1985 and 1986 have a mean of −0.96

*Table 8.* Year-by-year Influence of Lagged Δcash on $ntcpxp_0$

| Year | $\Delta cash_{-1}$ | *T*-stat | $\Delta cash_{-2}$ | *T*-stat | $\Delta cash_{-3}$ | *T*-stat | $\Delta cash_{-4}$ | *T*-stat | $\Delta cash_{-1:-4}$ | *T*-stat |
|---|---|---|---|---|---|---|---|---|---|---|
| 1977 | 3.24% | 1.17 | 7.08% | 2.83** | 2.72% | 0.99 | 4.61% | 1.42 | 17.65% | 3.07** |
| 1978 | 5.93% | 1.74** | 9.71% | 3.46** | 0.28% | 0.10 | −0.19% | −0.06 | 15.73% | 2.16** |
| 1979 | 2.56% | 0.70 | 8.61% | 2.99** | 6.62% | 2.27** | 5.29% | 2.34** | 23.08% | 3.26** |
| 1980 | 7.87% | 2.82** | 4.97% | 1.94** | 7.90% | 3.11** | 3.24% | 1.39 | 23.97% | 4.27** |
| 1981 | 1.50% | 0.53 | 2.44% | 0.90 | −2.28% | −0.69 | 0.18% | 0.07 | 1.84% | 0.26 |
| 1982 | 8.16% | 2.52** | 4.31% | 1.37 | −0.04% | −0.01 | 10.44% | 3.48** | 22.87% | 2.88** |
| 1983 | −0.58% | −0.20 | 4.16% | 1.43 | −0.52% | −0.20 | 3.11% | 1.08 | 6.17% | 1.07 |
| 1984 | −1.39% | −0.49 | 3.52% | 1.18 | 5.97% | 1.87** | 8.65% | 2.65** | 16.75% | 2.84** |
| 1985 | 0.76% | 0.35 | 2.32% | 0.87 | 3.06% | 1.06 | −0.09% | −0.03 | 6.06% | 0.91 |
| 1986 | 0.67% | 0.25 | 3.89% | 1.46 | 1.92% | 0.81 | 2.73% | 0.90 | 9.21% | 1.31 |
| 1987 | 1.31% | 0.48 | −3.21% | −0.90 | −4.32% | −1.47 | 5.70% | 1.93** | −0.52% | −0.07 |
| 1988 | 3.63% | 1.36 | 2.01% | 0.97 | −1.82% | −0.82 | −3.03% | −1.41 | 0.80% | 0.17 |
| 1989 | −5.96% | −1.03 | −3.78% | −1.13 | −2.98% | −0.56 | −4.29% | −1.49 | −17.01% | −1.12 |
| All | 0.84% | 0.85 | 1.64% | 1.92** | 0.63% | 0.68 | 1.24% | 1.48 | 4.35% | 1.71** |

Simple All-year Correlations with $ntcpxp_0$

| $\Delta cash_{-1}$ | *T*-stat | $\Delta cash_{-2}$ | *T*-stat | $\Delta cash_{-3}$ | *T*-stat | $\Delta cash_{-4}$ | *T*-stat |
|---|---|---|---|---|---|---|---|
| 3.395% | 5.714 | 4.524% | 7.618 | 1.537% | 2.586 | 0.263% | 0.443 |

Simple All-year Univariate Statistics ($n = 28{,}299$)

| μ | σ | μ | σ | μ | σ | μ | σ |
|---|---|---|---|---|---|---|---|
| 0.701% | 7.740% | 0.907% | 7.759% | 0.958% | 7.715% | 0.814% | 8.055% |

with a standard deviation of 0.91. Under the admittedly mistaken assumption that the t-statistics are normally distributed and independent, the probability of observing a 2.32 or a 1.97 t-statistic is far below the 1% significance level. This can be seen graphically in Figure 3. There was also a significant negative relationship between investment and taxes in 1977 and 1978. The *Tax Reform Act of 1976* extended the investment tax credit through 1980, and the *Revenue Act of 1978* permanently extended the 10% tax credit. Thus, the significant negative coefficients on the tax variables in 1977 and 1978 are consistent with the interpretation that changes in the tax code caused firms to believe they could delay investment until future periods and still take advantage of the tax credit.

### *5.5. Industry dummy coefficients*

Finally, Table 12 describes the industry dummy definitions used in all regressions and the simple and partial correlations with net capital expenditures. Although these coefficients must be interpreted relative to the service industry which is captured by the overall intercept, we find that firms in real-estate, financial services and insurance invested less than suggested by our model. Firms in both the oil and gas industry and the services sector invested more than expected. Table 13 contains the number of observations in these

*Table 9.* Year-by-year Influence of Lagged Δinvnt on $ntcpxp_0$

| Year | $\Delta invnt_{-1}$ | *T*-stat | $\Delta invnt_{-2}$ | *T*-stat | $\Delta invnt_{-3}$ | *T*-stat | $\Delta invnt_{-4}$ | *T*-stat | $\Delta invnt_{-1:-4}$ | *T*-stat |
|---|---|---|---|---|---|---|---|---|---|---|
| 1977 | −0.30% | −0.09 | 3.99% | 1.74** | 2.53% | 1.25 | −0.85% | −0.25 | 5.36% | 0.96 |
| 1978 | −4.66% | −1.33 | 6.72% | 2.48** | 4.70% | 1.93** | −0.24% | −0.11 | 6.52% | 1.00 |
| 1979 | −4.20% | −1.66** | 5.50% | 2.57** | 3.19% | 1.21 | 6.71% | 2.97** | 11.21% | 2.19** |
| 1980 | 0.47% | 0.15 | −0.79% | −0.33 | 4.79% | 2.15** | 3.08% | 1.34 | 7.55% | 1.55 |
| 1981 | −1.65% | −0.62 | 2.75% | 1.18 | 1.95% | 0.75 | 2.85% | 1.29 | 5.90% | 1.06 |
| 1982 | 1.34% | 0.38 | −0.96% | −0.32 | 1.80% | 0.70 | −0.40% | −0.14 | 1.79% | 0.30 |
| 1983 | −3.39% | −1.17 | −2.21% | −0.89 | −1.66% | −0.58 | 4.42% | 1.69** | −2.85% | −0.51 |
| 1984 | −3.38% | −0.90 | 2.52% | 0.81 | 6.46% | 1.68** | 12.42% | 3.47** | 18.03% | 2.32** |
| 1985 | 10.10% | 2.75** | 1.59% | 0.47 | −0.08% | −0.03 | 5.34% | 1.84** | 16.95% | 2.24** |
| 1986 | 2.47% | 0.76 | 0.85% | 0.26 | 4.30% | 1.40 | 3.61% | 1.23 | 11.24% | 1.53 |
| 1987 | 0.45% | 0.15 | 0.38% | 0.13 | −4.12% | −1.25 | 9.85% | 2.81** | 6.55% | 0.91 |
| 1988 | 1.86% | 0.47 | −1.43% | −0.54 | −2.03% | −0.74 | 0.11% | 0.04 | −1.48% | −0.26 |
| 1989 | 0.45% | 0.09 | −5.40% | −1.87** | −0.61% | −0.23 | −4.03% | −1.46 | −9.59% | −1.54 |
| All | −0.69% | −0.74 | −0.46% | −0.61 | 0.82% | 1.09 | 1.99% | 2.69** | 1.66% | 0.94 |

Simple All-year Correlations with $ntcpxp_0$

| $\Delta invnt_{-1}$ | *T*-stat | $\Delta invnt_{-2}$ | *T*-stat | $\Delta invnt_{-3}$ | *T*-stat | $\Delta invnt_{-4}$ | *T*-stat |
|---|---|---|---|---|---|---|---|
| 10.208% | 17.262 | 3.333% | 5.610 | 0.862% | 1.451 | −0.416% | −0.700 |

Simple All-year Univariate Statistics ($n = 28{,}299$)

| μ | σ | μ | σ | μ | σ | μ | σ |
|---|---|---|---|---|---|---|---|
| 1.121% | 6.925% | 1.408% | 6.826% | 1.694% | 6.876% | 2.058% | 6.889% |

regressions as well as the $R^2$, which is primarily a function of the persistence of net capital expenditures. Overall, the explanatory power of our regressions has been declining throughout the sample period.

## 6. Summary

This paper has examined the cross-sectional determinants of future investment activities among a sample of COMPUSTAT firms. We found that:

1. Both high net equity financing activity and high stock returns are important in explaining high future net capital expenditures. We view this as evidence that stock markets can provide not only low cost sources of equity funding, but also important signals about investment opportunities.
2. High net income is an important factor in explaining future net capital expenditures, as are low dividend payouts, high cash and short-term securities increases, and high depreciation. Accordingly, internal information and sources of funds appear to play an important role in a firm's investment policy.

*Table 10.* Year-by-year Influence of Lagged deprec on $ntcpxp_0$

| Year | $deprec_{-1}$ | *T*-stat | $deprec_{-2}$ | *T*-stat | $deprec_{-3}$ | *T*-stat | $deprec_{-4}$ | *T*-stat | $deprec_{-1:-4}$ | *T*-stat |
|---|---|---|---|---|---|---|---|---|---|---|
| 1977 | 4.04% | 2.06** | 4.21% | 2.07** | 3.77% | 1.96** | 4.44% | 2.07** | 16.46% | 4.23** |
| 1978 | 7.67% | 2.40** | 4.60% | 1.63 | 3.24% | 1.43 | 2.88% | 1.37 | 18.39% | 3.74** |
| 1979 | 6.83% | 2.62** | 1.74% | 0.98 | 1.46% | −0.79 | 1.98% | 1.04 | 9.09% | 2.58** |
| 1980 | 1.41% | 0.47 | 4.41% | 2.10** | 3.02% | 1.69** | 2.09% | 1.05 | 10.93% | 2.90** |
| 1981 | 1.41% | 0.63 | 3.16% | 1.08 | 4.12% | 1.65** | 6.47% | 2.23** | 15.16% | 3.41** |
| 1982 | 2.18% | 0.90 | 4.48% | 2.06** | 0.89% | 0.38 | 6.46% | 2.21** | 14.01% | 3.08** |
| 1983 | 0.68% | 0.35 | 3.19% | 1.35 | 1.09% | 0.64 | −1.41% | −0.65 | 3.55% | 1.00 |
| 1984 | −0.99% | −0.32 | 2.70% | 1.33 | 5.67% | 1.97** | 6.40% | 2.59** | 13.77% | 2.86** |
| 1985 | 11.11% | 3.80** | −2.33% | −0.78 | 0.38% | 0.21 | −1.41% | −0.64 | 7.74% | 1.65** |
| 1986 | −2.52% | −1.69** | 1.15% | 0.70 | 2.78% | 1.40 | 1.90% | 1.17 | 3.32% | 1.21 |
| 1987 | 1.41% | 1.07 | 5.41% | 3.31** | 0.87% | 0.44 | −1.41% | −0.47 | 6.28% | 1.81** |
| 1988 | −1.50% | −0.84 | −1.62% | −0.75 | 1.90% | 0.87 | 1.16% | 0.74 | −0.06% | −0.02 |
| 1989 | 3.26% | 1.11 | −0.83% | −0.48 | 2.74% | 1.88** | −0.81% | −0.35 | 4.37% | 1.27 |
| All | 1.43% | 2.27** | 1.11% | 1.78* | 1.49% | 2.81** | 0.91% | 1.36 | 4.95% | 4.38** |

Simple All-year Correlations with $ntcpxp_0$

| $deprec_{-1}$ | *T*-stat | $deprec_{-2}$ | *T*-stat | $deprec_{-3}$ | *T*-stat | $deprec_{-4}$ | *T*-stat |
|---|---|---|---|---|---|---|---|
| 92.080% | 3.500 | 95.716% | 9.631 | 98.802% | 14.864 | 99.985% | 16.880 |

Simple All-year Univariate Statistics ($n$ = 28,299)

| μ | σ | μ | σ | μ | σ | μ | σ |
|---|---|---|---|---|---|---|---|
| 4.223% | 13.296% | 3.590% | 11.849% | 3.156% | 11.453% | 2.575% | 11.028% |

3. Changes in inventories are not significantly related to future net capital expenditures. This suggests that short-term fluctuations in real demand are dominated by the influence of other variables.
4. Prior to 1985, firms with high income tax payments tended to invest less than equivalent firms. However, the *Tax Reform Act of 1986* significantly altered firms' investment behavior. Firms with high income taxes rushed to take advantage of the investment tax credit and the accelerated depreciation schedules in 1985 and 1986, just as they were in the process of being eliminated. We view this as evidence that tax code changes in the 1980's significantly influenced firms' investment policies. **This finding provides important evidence that the *1986 Tax Reform Act* had a real effect on the investment behavior of firms.**
5. Firms in real-estate, financial services and insurance prominently invested less than suggested by our model. Firms in both the oil and gas industry and the services sector invested more than predicted.

While this paper provides the important insights described above, we want to recognize the limitations of the analysis. First, in an empirical exercise such as ours, the variables included reflect our own "priors" of what constructs are most important. Second, while our empirical methodology minimizes the risk of bias from correlated omitted variables,

*Table 11.* Year-by-year Influence of Lagged tax on $ntcpxp_0$

| Year | $tax_{-1}$ | *T*-stat | $tax_{-2}$ | *T*-stat | $tax_{-3}$ | *T*-stat | $tax_{-4}$ | *T*-stat | $tax_{-1:-4}$ | *T*-stat |
|---|---|---|---|---|---|---|---|---|---|---|
| 1977 | 0.91% | 0.02 | −4.81% | −0.54 | −5.41% | −0.74 | −1.13% | −0.16 | −11.16% | −2.50** |
| 1978 | −3.26% | −0.38 | 8.01% | 1.14 | −8.81% | −0.99 | −6.89% | −1.15 | −10.95% | −2.21** |
| 1979 | −9.47% | −0.98 | 6.53% | 0.78 | 11.74% | 1.68** | −12.85% | −2.27** | −4.04% | −0.95 |
| 1980 | 9.69% | 1.59 | −9.62% | −1.26 | −0.47% | −0.06 | 0.44% | 0.07 | 0.04% | 0.01 |
| 1981 | 6.32% | 0.98 | −5.62% | −0.79 | 5.96% | 0.71 | −8.31% | −1.33 | −1.66% | −0.36 |
| 1982 | 1.04% | 0.15 | 3.12% | 0.42 | −11.04% | −1.66** | 0.98% | 0.16 | −5.89% | −1.38 |
| 1983 | −0.33% | −0.06 | 0.38% | 0.05 | −5.54% | −0.71 | −2.73% | −0.44 | −8.22% | −1.57 |
| 1984 | 0.82% | 0.08 | −5.03% | −0.66 | −8.93% | −0.92 | 10.52% | 1.19 | −2.62% | −0.41 |
| 1985 | 1.08% | 0.17 | 21.39% | 2.45** | −10.02% | −1.38 | 0.32% | 0.05 | 12.77% | 2.32** |
| 1986 | 3.02% | 0.45 | 5.20% | 0.71 | −1.03% | −0.12 | 3.77% | 0.56 | 10.96% | 1.97** |
| 1987 | 1.32% | 0.22 | −9.27% | −1.46 | 4.73% | 0.65 | −3.89% | −0.52 | −7.11% | −1.30 |
| 1988 | −0.68% | −0.13 | 4.46% | 0.76 | 5.25% | 0.79 | −8.82% | −1.49 | 0.21% | 0.04 |
| 1989 | 2.85% | 0.33 | 5.24% | 0.63 | −4.87% | −0.75 | −2.60% | −0.49 | 0.62% | 0.09 |
| All | 2.84% | 1.37 | 2.12% | 0.98 | −0.61% | −0.30 | −3.95% | −2.20** | 0.40% | 0.28 |

Simple All-year Correlations with $ntcpxp_0$

| $tax_{-1}$ | *T*-stat | $tax_{-2}$ | *T*-stat | $tax_{-3}$ | *T*-stat | $tax_{-4}$ | *T*-stat |
|---|---|---|---|---|---|---|---|
| 12.542% | 21.266 | 11.499% | 19.473 | 8.276% | 13.970 | 5.308% | 8.942 |

Simple All-year Univariate Statistics ($n$ = 28,299)

| μ | σ | μ | σ | μ | σ | μ | σ |
|---|---|---|---|---|---|---|---|
| 3.481% | 4.304% | 3.667% | 4.470% | 3.825% | 4.549% | 4.036% | 4.627% |

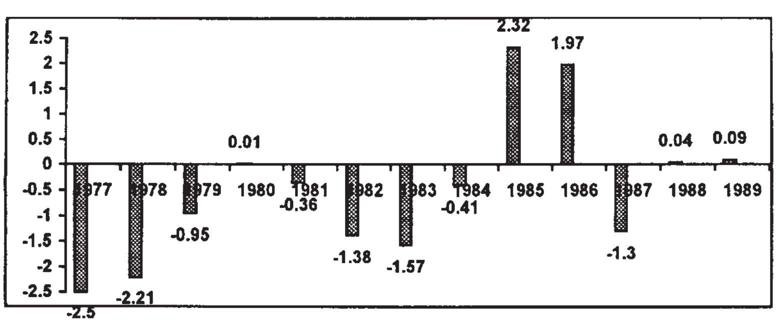


*Figure 3.* **Sum of Lagged Income Tax Coefficient T-Statistics Predicting Net Captial Expenditures - Year by Year** In years before 1985 and 1986, there is a weak evidence for a negative coefficient: the firms experiencing the highest income tax burden (holding cash flow constant) increased thir capital expenditures less than low income tax firms. However, in 1985 and 986, the same firms increased their capital expenditures more than other firms.

*Table 12.* Industry Dummies

| Industry | Definitions | Mean | Correlation Simple | Correlation Partial |
|---|---|---|---|---|
| Agriculture & Fishing | 0***, 515* | 0.459 | 0.533 | 0.08 |
| Mining | 10**, 11**, 12**, 14**, 6795 | 1.608 | 2.816 | 0.38 |
| Oil and Gas | 13**, 291*, 6792, 492*, 517* | 6.728 | 19.718 | 1.09 |
| Real Estate & Construction | 15**, 16**, 17**, 65**, 6798 (5271) | 4.806 | −13.430 | −1.96 |
| Food & Tobacco | 20**, 514**, 54**, 581*, 21** | 7.859 | 6.450 | 0.06 |
| Textiles | 22**, 23**, 513*, 56** | 4.739 | −5.611 | −1.01 |
| Aircraft | 372*, 376* | 1.385 | −1.247 | −.79 |
| Cars & Boats | 37**, 3751, 3730, 55**, 75** | 0.463 | 2.470 | −0.10 |
| Medical | 6324, 80** | 0.929 | 1.384 | −0.25 |
| Optical/Medical Equipment | 381*, 382*, 383*, 384*, 3851 | 4.961 | −2.740 | −0.53 |
| Drugs | 283*, 6794, 873*, 5122, 5912 | 3.081 | −2.410 | −0.81 |
| Financial Services | 60**, 61**, 62**, 6799, 7389, 8741, 8742 | 2.756 | −8.216 | −1.39 |
| Insurance | 63**, 64** [include 6324] | 0.410 | −2.760 | −1.51 |
| Computers | 357*, 367*, 737*, 5045, 5734 | 6.566 | 3.202 | −0.04 |
| Communications | 366*, 481*, 482*, 4899 | 2.318 | 1.486 | −0.04 |
| Other Manufacturing | 2***, 3***† | 32.810 | −5.652 | −0.50 |
| Transportation | 4***† | 4.417 | 10.196 | 0.57 |
| Retail & Wholesale | 5***† | 7.071 | −6.299 | −0.75 |
| Services/Constant | 7***, 8***† | — | — | 3.57 |

†except where otherwise included
*indicates numbers allowed to vary within the SIC code range defined. For example, 515* means SIC codes between 5150 to 5159 are included in this category.

*Table 13.* Cross-sectional Predictability and Number of Observations

| Year | n | $R^2$ | $\bar{R}^2$ |
|---|---|---|---|
| 1977 | 2,076 | 53.17 | 51.44 |
| 1978 | 2,245 | 52.27 | 50.64 |
| 1979 | 2,315 | 48.19 | 46.48 |
| 1980 | 2,296 | 52.14 | 50.55 |
| 1981 | 2,218 | 51.80 | 50.14 |
| 1982 | 2,134 | 44.57 | 42.58 |
| 1983 | 2,087 | 38.70 | 36.45 |
| 1984 | 1,973 | 35.73 | 33.22 |
| 1985 | 1,956 | 33.87 | 31.27 |
| 1986 | 1,953 | 27.53 | 24.68 |
| 1987 | 1,856 | 26.37 | 23.31 |
| 1988 | 1,922 | 29.69 | 26.88 |
| 1989 | 1,820 | 30.10 | 27.14 |
| All | 28,299 | 37.13 | 36.94 |

there is a possibility that multicollinearity may be affecting our analysis. Third, dealing with endogeneity inherent in the chosen variables relating to investment is an intriguing and important issue that remains an open question for future research.

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## Notes

1. This indirect influence is based on an amplification factor used commonly in the macro-economic literature, 1/(1-coefficient on lagged variable). To illustrate the intuition, consider a dependent variable *Y* that follows a random walk (i.e., the coefficient on its own lagged variable is 1). Thus, if a third variable causes a 1% change in *Y*, this variable would cause a 1% change forever or a long-term effect of infinity. If *Y* is a stationary variable (i.e., the coefficient on its own lagged variable is 0), the third variable would cause only a one-time change of 1% or a long-term effect of 1%.
2. All financial statement variables are expressed as a percentage of assets. See Table 1 for the variable definitions. For example, if a $200M firm invested $25M in 1989, then 1989 investment is computed as 12.5%.
3. For example, .2% is calculated as the 7.6% standard deviation times the 2.74% one year lag coefficient for the pooled regression reported in Table 5. .73% is calculated as 7.6% times 9.6%, which is the sum of the four lagged coefficients in the pooled regression.
4. The significance of stock returns does not diminish when lagged equity issuing activity is not included as a predictor.
5. Note that a positive correlation between investment and free cash flow (or related variables) is not inconsistent with Modigliani-Miller. Firms with free cash flow may have better investment opportunities or may increase cash holdings in anticipation of a large investment.
6. See Williamson and Pijor [1990] for a detailed discussion of the tax code in the 1980's.
7. A number of other papers examine investment decisions cross-sectionally but do not focus on the influence of financial markets. For example, Foresi and Mei (1991) find industry effects that can be interpreted as cascading behavior (see Bikhchandhani, Hirshleifer and Welch [1991]). Bar-Yosef, Callen and Livnat (1987) find that earnings are good predictors of investment, but they do not find evidence that investment is a good predictor of earnings.
8. Unlike MSV, we do not find that when we use yearly data, the only variables showing significance in regressions predicting investment are industry intercepts.
9. We will use the casual notation "n[t]" to refer to data item n on the COMPUSTAT tapes. For example, 128[t] refers to capital expenditures, which is item 128 on the Compustat tapes in year t.
10. Our finding is consistent with the hypothesis that stock returns signal improved investment opportunities. Of course, in some firms, increases in stock values might have been caused by increases in market power and capacity reduction. On average, our evidence rejects this hypothesis.
11. Unlike most other variables, the return measure is not standardized for size because returns are standardized by definition.
12. This assertion can be verified by noting that the difference between cash flow from operations and net income is merely the difference in inventory, accounts receivable, accounts payable, and depreciation levels. The cash flow statement makes this point clear.
13. The 38 control variables (from $\beta_{37}$ to $\beta_{76}$) are the 4 lags of the 5 size variables plus the 18 industry dummies.

14. To make sure that our results are not driven by programming errors, we asked two different research assistants to confirm the reported results.
15. We do not report the regression results when including contemporaneous equity issuances. Although our results remain the same with this approach, our regressions would no longer be purely predictive.

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