Who Holds Cash? And Why?

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The existing literature on investment and cash flow has tended to take the financial characteristics of firms as exogenously given, and then relate these characteristics to firm investment behavior. We turn this approach on its head and take real characteristics of the firm as given and examine patterns of cash holdings using firm-level data on nonfinancial firms from COMPUSTAT. First we establish stylized facts about cash holdings, then investigate possible motivations for firm behavior.

Cash holdings range widely, and are systematically related to firm size, industry and whether or not the firm has borrowed in the public bond market. Cross-sectional regressions indicate that cash holdings are positively correlated with proxies for agency problems, suggesting that firms that cannot borrow easily due to these agency problems hold greater cash stocks--perhaps as a cushion to prevent shortfalls in cash flow from impinging on investment.

While at first glance this may appear to support the argument that credit market frictions are responsible for the high correlation between cash flow and investment, the data on cash holdings prove useful in focussing more closely on firms likely to become constrained. Previous research has identified firms without access to public bond markets as those most likely to face cash flow constraints; this group makes up about 85 percent of the COMPUSTAT universe. However, cash holdings appear to be correlated with agency proxies only for the very high cash holding firms, especially small firms. The group of afflicted firms appears to be far smaller than suggested by other studies, less than one-quarter of the COMPUSTAT firms.

Introduction

Why do firms hold stocks of liquid assets? Firms that invest in cash (including bank accounts) and securities while they have outstanding short-term debt incur a substantial cost, as the spread between the interest they pay on their own borrowings and the rate they receive on investments can be quite large. This paper examines holdings of cash and securities ("cash" for short) by nonfinancial firms. Previous research on the demand for liquid assets by nonfinancial firms has been almost exclusively related to monetary aggregates, using aggregate data to investigate money demand functions (see Barr and Cuthbertson (1992) for an example and further references). In contrast, we are concerned with cross-sectional variation in the demand for liquid asset holdings by nonfinancial firms.

The literature on investment and cash flow has tended to take the financial characteristics of firms as exogenously given, and then relate these characteristics to firm investment behavior. We turn this approach on its head and take real characteristics of the firm as given and examine patterns of cash holdings using firm-level data on nonfinancial firms from COMPUSTAT. First we establish stylized facts about cash holdings, then investigate possible motivations for firm behavior.

Cash holdings range widely, and are systematically related to firm size, industry, and whether or not the firm has borrowed in the public bond market. Cross-sectional regression analysis indicates that cash holdings are positively correlated with proxies for agency problems, and suggests that firms that cannot borrow easily due to these agency problems hold greater cash stocks--perhaps as a cushion to prevent shortfalls in cash flow from impinging on investment.

This finding links this paper with the literature on the relationship between cash flow and investment (for example, Fazzari, Hubbard and Petersen (1988); Hoshi, Kashyap and Scharfstein (1991); Cummins, Hassett and Oliner (1997)). While at first glance our results may appear to support the argument that credit market frictions are responsible for the high correlation between cash flow and investment, the data on cash holdings prove useful in focussing more closely on firms likely to become financially constrained. Some researchers have identified firms without access to public bond markets as those most likely to face cash flow constraints (Whited (1992); Gilchrist and Himmelberg (1995)); this group makes up about 85 percent of the COMPUSTAT universe. However, the correlation between cash holdings and agency proxies is driven by a subset of firms with very high cash holdings, which exceed one quarter or even one half of the firm's total assets. The group of afflicted firms appears to be a far smaller subset of the total than suggested by previous research, corresponding to between 10 and 25 percent of all COMPUSTAT firms.

This paper is organized as follows: the next section presents basic descriptive statistics on cash holdings, and relates them to other characteristics of the firm, including size and whether the firm has issued public bond debt. Section II develops a model of a firm's choice of cash holdings, given a (firm-specific) probability of being credit constrained at some date in the future. Section III presents regression results of cash holdings of manufacturing firms. Section IV concludes.

I. Who holds cash?

Table 1 presents the basic pattern of cash holdings among nonfinancial firms listed in

COMPUSTAT.[1] The vast majority of the firms in this sample are relatively small, with total assets below $250 million. The median firm in this bottom size group holds cash equal to 10 percent of its total assets. The distribution of cash holdings has a huge upper tail, however: the firm at the 90 percentile holds cash comprising 60 percent of total assets. These small firms have relatively low leverage, with stockholders' equity exceeding half of total assets for the median firm.

Better access to credit markets, economies of scale in cash management, less volatile cash flows and other factors contribute to a strong size effect in cash ratios. Cash stocks relative to total assets decline for larger firms, falling to 4 percent for the median firm in the $250 million to $500 million asset class, to as low as 2 percent or below for median firms in the top size groups. The upper tail also diminishes as one moves to larger size groups. Cash ratios at the 90th percentile drop sharply, to the 20 percent range for firms up to $1 billion in assets, and around 10 percent for median firms in the largest size groups. However, the distribution remains rather skewed even for the biggest firms, with firms at the 90th percentile of the top size group having a cash ratio more than five times as large as that of the median firm. Chart 1 graphs cash ratios for firms, by size deciles.

Cash holdings show a similar pattern when firms are grouped by bond rating, shown in the lower panel of Table 1. Firms without a rating--which are mainly firms in the smaller two size categories in the top panel--have relatively high cash ratios, 8 percent of assets at the median and 55 percent at the 90th percentile. The median firm with debt rated below

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[1] Data are very similar if we restrict the sample to manufacturing firms only.

investment grade has a 4 percent ratio (19 percent at the 90th percentile), while the median investment grade firm has a 2 percent ratio (11 percent at the 90th percentile).

Examining the composition of cash holdings--bank deposits versus holdings of liquid securities--may shed some light on the firm's motive for holding cash. For example, firms may meet the need for transactions demand (payments on the short-term horizon) through deposits, but may "park" the proceeds of a stock offering in liquid securities that mature as cash is needed for investment. Conversely, firms likely to face borrowing constraints in the credit markets may hold securities for longer periods as a precautionary cushion against shortfalls in cash flow.

Table 2 and Charts 2 and 3 display statistics on deposits and securities for firms grouped by size decile (1st being smallest, 10th largest) and whether of not they have publicly rated bonds outstanding. Among firms without rated debt, deposit ratios for the median and 90th percentile firm decline monotonically. The median firm in each size decile holds no securities. However, holdings at the 90th percentile display an interesting pattern: rising from 11 percent of assets in the smallest size decile to a peak of 31 percent of assets in the 5th decile, then declining again to less than half that ratio in the largest size groups. This pattern is consistent with the following scenario: The smallest firms lack sophisticated treasury operations, and "park" precautionary holdings in deposits. Larger companies are able to reduce the opportunity cost of such holdings by investing in securities that earn a higher return; deposit ratios fall sharply in the middle size deciles. As firms get larger still, their access to credit markets improves and the need for precautionary balances falls, leading to the

drop in securities holdings relative to total assets.[2]

There are no firms with public debt ratings in the bottom half of the sample, and very few in the 5th (4 firms) or 6th (14 firms) size deciles (middle and bottom of Table 2, and Charts 4 and 5). The ratio of deposits to assets declines only slightly for median firms in larger groups. Furthermore, firms with rated debt have far lower securities holdings relative to total assets than do unrated firms. At the 90th percentile, these holdings are 5 percent of assets or less (both investment grade and junk-rated firms), compared with double-digit holdings at the upper tail of unrated firms. This corroborates the observation that unrated firms may use securities as a precautionary balance to insure against credit constraints that may become binding in the future. Firms that have accessed public debt markets in the past are less likely to face such constraints, and therefore have less need to hold securities.[3]

To explore one possible explanation of the upper tail of firms with very high cash holdings, Table 3 shows stock issuance in the current and previous year[4] as a percent of total assets, for firms ranked by liquidity decile. In the groups of firms with low cash holdings, very few had any stock issuance at all: in each of the bottom 6 groups, 75 percent or more of

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[2] It is interesting to note that there are a number of firms (100) in the largest size decile, with total assets greater than $1.5 billion, that do not have public debt outstanding.

[3] The unusually large tail in Chart 5, deciles 5 and 6, results from there being very few firms with public debt in these size categories. These may be firms that have recently issued debt and are parking the proceeds in securities.

[4] I examine two years of stock issuance because firms tend to maintain high cash balances for a number of years after a major stock offering. Data for current-year issuance only show a similar pattern but lower totals; including more years has little effect on the data.

firms reported figures of 3 percent of total assets or less.[5]

Stock proceeds become a more important source of cash for those firms with large holdings of liquid assets. Two-year issuance as a percentage of assets jumps in the final two groups, to 15 and 52 percent, respectively, at the 75th percentile. Stock issuance appears to account for a substantial fraction of firms with very liquid balance sheets. However, this explains only a portion of the large upper tail of cash holdings, as these firms represent perhaps five percent of the total sample (25 percent of the top liquidity decile equals 2.5 percent of the total sample). One possible explanation is that these are precautionary cash balances held by firms that may face borrowing constraints if cash flow should falter. The next section develops a simple model of a firm that chooses its level of cash holdings based on the probability that it will be unable to borrow in the future.

II. A simple model of demand for cash holdings.

Let us consider a simple two-period model of a firm with an investment project, which requires an investment at time $t=1$; has uncertain cash flows at $t=1$; and a (known) probability that it may be unable to borrow if cash flow is less than that required to complete the investment project. Cash flows at $t=1$ are assumed to be drawn from a uniform distribution between a lower limit, CF_L, and an upper limit, CF_H.

The project is always worth undertaking; however, the firm may not be able to reveal to lenders that this is the case, and will be forced to forego a positive net present value project

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[5] The COMPUSTAT variable, "Sale of Common and Preferred Stock", includes the exercise of executive stock options. Many of these very small positive figures, therefore, may not represent any source of cash to the firm, but rather the exercise of such options.

if it does not have sufficient cash resources and it is unable to borrow. To avoid this outcome, the firm may borrow at t=0 and hold a precautionary balance of cash to fund investment at t=1. However, it earns zero interest on cash holdings (this is a simplification for expositional purposes; all that is necessary is for there to be an opportunity cost of holding cash-- a spread between the rate the firm pays on its debt and what it earns on its investments). The notation used is as follows:

C = cash stocks held by the firm at t=0, borrowed long-term

r = interest rate paid on debt

CF = cash flow at t=1. CF ~ $U[CF_L, CF_H]$

I = investment required at t=1

Y = payoff of project at t=2 if firm makes investment I at t=1

P = Pr{firm is unable to borrow at t=1)

To summarize the time line:

t=0: the firm may borrow long-term (due at t=2) at an interest rate r. There are no restrictions on borrowing at t=0; that is, the firm could borrow up to the entire amount I needed for investment at t=1.

t=1: the firm realizes cash flow CF ~ $U[CF_H, CF_L]$. There are three possible outcomes:

(1) If C + CF > I, then the firm makes investment I out of cash on hand.

(2) If C + CF < I, then the firm may borrow additional funds, I-C-CF. However,

(3) there is a chance P that the firm will be unable to borrow, even though the project has a strictly positive net present value. In this case, the firm must abandon the project.

t=2: repay debt; if the firm made investment I at t=1, receive project payoff Y. The firm may or may not have cash balances remaining from the cash flow at t=1.

The value to the firm from outcome (1) is

1. $V_1 = Y + C + CF - I - C*(1+r)^2$

The firm receives the project's value, plus what remains of the cash holdings and cash flow after having made investment I. Of course, it must repay what it borrowed, plus interest for two periods. The probability of this outcome occurring is a function of the distribution of cash flows, which are distributed uniformly:

2. $Pr_1 = Pr\{CF > I - C\} = (CF_H - (I-C))/(CF_H - CF_L)$.

Similarly, for outcome (2),

3. $V_2 = Y - C*(1+r)^2 - (I - CF - C)*(1+r)$

The firm receives the project's payoff, but no cash remains on its books. In addition to repaying C borrowed at t=0, it must also repay the additional (I - CF - C) that it borrowed at t=1. (I have assumed for simplicity that it can borrow at the same interest rate). Outcome (2) occurs with probability

4. $Pr_2 = Pr\{CF < I - C \text{ and not constrained}\} = (1-P)*(I - C - CF_L)/(CF_H - CF_L)$

Finally, the payoff and probability of being constrained at t=1:

5. $V_3 = CF + C - C*(1+r)^2$

The firm does not get the project's final payoff, as it was unable to fund investment I. However, it still has the cash from t=0 and the cash flow from t=1, minus the repayment of debt. The chance of this outcome occurring is

6. $Pr_3 = Pr\{CF < I - C \text{ and constrained}\} = P*(I - C - CF_L)/(CF_H - CF_L)$

Note that holding more cash increases Pr_1, the chance that resources on hand will be sufficient to complete investment I, and reduces Pr_2 (and Pr_3), the likelihood that the firm will need to borrow (but may be unable to do so). This shifts probability mass toward the higher-payoff outcome and reduces the risk of being forced to abandon the project. However, higher cash holdings reduce all values in each state by increasing interest expenses. The tradeoff between these two forces leads to an optimal level of cash holdings, which will be derived below.

The expected value of the project, V, is

7. $V = V_1*Pr_1 + V_2*Pr_2 + V_3*Pr_3$

where expectations are taken conditional on cash flow being above or below the amount needed to complete the investment:

8. $E\{CF|\ CF + C > I\} = (CF_H + (I - C))/2$

9. $E\{CF|\ CF + C < I\} = ((I - C) + CF_L)/2$

Taking expectations and rearranging, we get

10. $V = C*(½ - (1+r)^2) + (CF_L + I)/2$

$$+ (Y - I + (CF_H - CF_L)/2)*Pr_1$$

$$+ (Y - I + r*(C + CF_L - I)/2)*Pr_2$$

It is straightforward (but tedious) to differentiate and solve for the optimal cash holdings to maximize the expected value of the project:

11. $C^* = [(CF_H - CF_L)*(1 - (1+r)^2) + P*(Y - I) - r*(CF_L - I)*(1 - P)]/(r*(1-P)$

The optimal cash holdings behave as one might expect. The derivative with respect to P is positive, indicating that cash holdings will be higher the more likely the firm will be

unable to borrow at t=1.[6] The intuition behind this result is simple: the greater the risk a firm will miss out on a valuable project because it is unable to borrow, the more cash it will hold to ensure that it will not *need* to borrow (outcome 1). Furthermore, desired cash holdings fall as the interest rate r (and thus the opportunity cost of holding cash) rises. In addition, other things held equal, cash holdings will be higher the greater the payoff Y of the project, as the firm does not want to forego a profitable project.

III. Regression results

Table 4 presents cross section regressions of the ratio of cash and securities holdings to total assets of manufacturing firms. All regressions include dummy variables for 2-digit SIC industries; the industry dummies are significantly different from zero and explain quite a bit of the cross sectional pattern of cash ratios. Industries with low cash holdings include textiles, lumber and wood products, primary metals and fabricated metals (SIC industries 22, 24, 33 and 34); high cash holders tend to be from high-tech sectors, like manufacturers of industrial and commercial machinery, computer equipment, electronic and other electrical equipment, measuring instruments and photographic goods and, especially, chemicals and allied products (SIC industries 35, 36, 38 and 28).

Column 1 reports a regression of cash ratio on size[7] and a dummy for whether the firm has publicly rated debt. As might be expected from the previous tables, both have negative

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[6] The sign may reverse in the perverse case where r approaches 1 and profitability of the project is low relative to the range of cash flows.

[7] These regressions use log(assets), as the size effect is nonlinear: a $10 million increase in total assets tends to have a much larger effect on cash ratios of a $100 million firm than on a $1 billion firm. Regressions using linear assets produce a similar but somewhat weaker result.

coefficients--cash ratios are lower for larger firms, and those with access to public debt markets, although the coefficient on public debt is not very precisely estimated (t = -1.27).

Capital expenditures and research and development have often been used as proxies for asymmetric information and agency problems. Firms with high capital expenditures may be thought to be involved in clearly defined projects that outside investors can easily verify, reducing information asymmetries and project-switching risks (see Myers and Majluf (1984) for a discussion of the possible effects of asymmetric information and project switching risk). In contrast, R&D-intensive projects almost by definition generate information asymmetries, as it is difficult to verify progress, and the act of revealing information to the market may benefit the firm's competitors and reduce the value of the project. The probability of being credit constrained is negatively related to capital expenditures and positively related to R&D expenditures.

Column 2 provides support for the precautionary balance model of liquid asset holdings. The coefficients on capital expenditures and R&D have the expected signs, and are statistically different from zero. Moreover, the effect is economically important: all else equal, $100 dollar increase in capital expenditures would be associated with $62 less cash holdings, and a similar increase in R&D expenditures would boost cash holdings by $62. Note also that the coefficient on public debt is now statistically significant, and the size of the coefficient--having issued public debt reduces the cash ratio by 4 percent of total assets--is in line with the data presented in table 1.

The regression in Column 3 includes stock issuance. As may have been anticipated from table 3, stock issuance boosts cash holdings, but has little effect on the other coefficients.

For some firms in the sample, acquisitions are a major use of cash, and firms perhaps build cash stockpiles in anticipation of making future acquisitions. Column 4 provides support for this notion, as the coefficient on acquisitions is economically significant (cash holdings are $36 lower for every $100 of acquisition expenditure) and statistically significant.

Given the large upper tail in the distribution of cash holdings, it is natural to wonder how much these results in support of the precautionary balance hypothesis are influenced by the outliers in the upper tail of the liquidity distribution. Table 5 repeats the previous set of regressions, but includes variables interacted with a dummy that takes on a value of 1 if cash holdings exceed 25 percent of total assets, and zero otherwise.[8, 9]

Across all regressions, the size effect derives entirely from the high-cash firms. That is, after controlling for having borrowed in public debt markets, there is little discernible size effect for most firms, except for the disappearance of the upper tail of high-cash holders as firm size increases. Furthermore, capital expenditures appear to have no effect on liquid asset holdings of low-cash firms (the coefficient is the wrong sign and is not statistically different

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[8] Table 6 repeats this exercise with a higher threshold of 40 percent, with very similar results.

[9] Note that there may be a sample selection problem with these regressions if positive errors in a firm's cash holdings make it more likely to be classified as "high cash", inducing a correlation between the dummy variable and the errors. This would cause an upward bias in the intercept*HI term, and slope coefficients would be biased toward zero. However, alternative criteria for splitting the sample--size, industry, public debt issuance, or fitted values of cash holdings from the regressions in Table 4--provide another means of testing the precautionary balance hypothesis without inducing such a correlation. Results of regressions based on these sample splits are quite similar to those presented in Tables 5 and 6, suggesting that the selection problem described above is not severe, and that the precautionary balance results are robust to alternative specifications.

from zero). However, the coefficient on capital expenditures of high-cash holders is twice as large as in previous regressions, with t-statistics in excess of 10.

These results are consistent with the following scenario: while there is quite a bit of cross-sectional variation of capital expenditures, it only "matters" for firms with a fairly high probability of being unable to borrow. These firms can be identified by their high (precautionary) cash balances. Within the group of firms facing potential borrowing constraints, higher capital expenditures are correlated with a significant reduction in cash balances. That is, moral hazard proxies obtain all of their effect in the cross sectional regressions on the full set of firms mainly by the extreme effects of a few outliers, the high-cash firms.

There is a similar effect with R&D expenditures. The coefficient on R&D is still positive and is significantly different from zero. However, the additional effect of high-cash holders is much larger, suggesting that R&D has an influence two to three times as strong on the high-cash holders as on the rest of the sample ($.19 + .11 = .30 \approx 3 \times .11$). Likewise, the coefficients on stock issuance and acquisitions are much greater, and statistically significant, for the high cash firms.

IV. Conclusion

Cash and securities holdings of nonfinancial firms range widely, and are systematically related to firm size, industry and to whether or not the firm has borrowed in the public bond market. Liquid asset holdings are also positively related to certain sources and uses of funds, in particular, stock issuance (source, positively) and acquisitions expenditures (use, negatively). Furthermore, cash holdings are positively correlated with proxies for agency problems,

suggesting that firms that cannot borrow easily due to these agency problems hold greater cash stocks--perhaps as a cushion to prevent shortfalls in cash flow from impinging on investment.

While at first glance this may appear to support the argument that credit market frictions are responsible for the high correlation between cash flow and investment, the data on cash holdings prove useful in focussing more closely on firms likely to become constrained. Previous research has identified firms without access to public bond markets as those most likely to face cash flow constraints; this group makes up about 85 percent of the COMPUSTAT universe. However, cash holdings appear to be correlated with agency proxies only for the very high cash holding firms, especially small firms. The group of afflicted firms appears to be far smaller than suggested by other studies, less than one-quarter of the COMPUSTAT firms.

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Table 1

All nonfinancial firms, 1995
Basic Statistics on the sample

By Size

Total Assets	Number of Firms	Cash/ Total Assets (%) median	Cash/ Total Assets (%) 90th P	Equity/ Total Assets (%) median
< 250 M	4708	10	60	55
250 M - 500 M	612	4	27	42
500 M - 1 B	484	3	21	40
1 B - 5 B	631	2	15	38
5 B - 10 B	126	1	10	33
> 10 B	136	2	11	32

By Bond Rating

Rating	Number of Firms	Total Assets median ($ million)	Cash/ Total Assets (%) median	Cash/ Total Assets (%) 90th P	Equity/ Total Assets (%) median
Not Rated	5501	45	8	55	53
Junk bond	530	602	4	19	25
Inv. Grade	666	2752	2	11	37

Table 2
By Size and Rating

No Rated Bonds Outstanding

Size Decile	Cash/TA		Deposits/TA		Securities/TA	
	med	P90	med	P90	med	P90
Smallest	12	69	10	57	0	11
2	11	64	8	48	0	23
3	11	63	8	43	0	24
4	14	69	8	41	0	30
5	9	64	6	35	0	31
6	6	46	5	28	0	22
7	6	38	4	24	0	16
8	5	30	4	21	0	12
9	3	23	3	17	0	8
Largest	2	25	2	13	0	14

Below-investment Grade Bond Rating

Decile	Cash/TA		Deposits/TA		Securities/TA	
	med	P90	med	P90	med	P90
7	6	27	4	22	0	9
8	3	21	3	16	0	3
9	4	17	3	15	0	5
Largest	4	16	3	14	0	5

Investment Grade Bond Rating

Decile	Cash/TA		Deposits/TA		Securities/TA	
	med	P90	med	P90	med	P90
7	3	25	3	19	3	5
8	3	20	2	10	0	3
9	2	10	2	9	0	1
Largest	2	10	2	8	0	2

Table 3

Stock Issuance as a percentage of total assets

Two-year cumulative stock issuance divided by total assets, ranked by deciles of cash/total assets.

Liquidity Decile	25th Percentile	Median	75th Percentile	90th Percentile
Lowest cash holdings	0	0	2	13
2	0	0	3	11
3	0	0	3	14
4	0	0	2	10
5	0	0	2	20
6	0	1	3	22
7	0	1	6	21
8	0	1	6	32
9	0	2	15	44
Highest cash holdings	1	7	52	100

Table 4

Cross section regression results
Manufacturing firms only, 1995 data

Dependent variable is holdings of cash and securities, scaled by total assets of the firm. All regressions include 2-digit SIC dummies. Public debt is a dummy equal to 1 if the firm has publicly-rated debt. Capital expenditures, R&D, proceeds of stock issuance and acquisitions are all scaled by the firm's total assets. T-statistics are shown in parentheses.

	(1)	(2)	(3)	(4)
Intercept	.25 *(9.89)*	.23 *(7.00)*	.18 *(5.96)*	.18 *(6.01)*
Log(assets)	-.03 *(-9.36)*	-.02 *(-4.82)*	-.01 *(-2.79)*	-.01 *(-2.28)*
Public debt	-.02 *(-1.27)*	-.04 *(-2.19)*	-.04 *(-2.33)*	-.04 *(-2.54)*
Capital expenditures		-.62 *(-6.77)*	-.64 *(-7.78)*	-.68 *(-8.31)*
R&D expenditures		.62 *(16.34)*	.39 *(11.26)*	.39 *(11.07)*
Stock Issuance			.41 *(22.48)*	.42 *(22.79)*
Acquisitions				-.36 *(-5.16)*
R^2	.22	.33	.47	.48
N	2718	1910	1910	1910

Table 5

Cross section regression results
Manufacturing firms only, 1995 data

Variables are the same as in the previous table, except the inclusion of regressors interacted with a dummy = 1 if the firm's cash holdings exceed 25 percent of total assets. T-statistics are shown in parentheses.

	(1)	(2)	(3)	(4)
Intercept	.06 *(4.40)*	.04 *(2.20)*	.04 *(2.36)*	.05 *(2.45)*
Intercept*HI	.57 *(33.84)*	.52 *(24.41)*	.42 *(20.71)*	.42 *(20.85)*
Log(assets)	-.001 *(-0.79)*	-.001 *(-0.47)*	.001 *(0.48)*	.001 *(0.63)*
Log(assets)*HI	-.04 *(-9.74)*	-.02 *(-4.05)*	-.004 *(-1.06)*	-.004 *(-0.86)*
Public debt	-.02 *(-2.07)*	-.03 *(-2.50)*	-.02 *(-2.42)*	-.02 *(-2.43)*
Capital expenditures		.11 *(1.87)*	.10 *(1.79)*	.09 *(1.58)*
Capital expenditures*HI		-1.20 *(-10.17)*	-1.27 *(-11.70)*	-1.30 *(-11.97)*
R&D expenditures		.11 *(2.95)*	.10 *(2.79)*	.10 *(2.81)*
R&D expenditures*HI		.19 *(4.15)*	.11 *(2.64)*	.10 *(2.36)*
Stock Issuance			.05 *(2.13)*	.06 *(2.23)*
Stock Issuance*HI			.18 *(6.48)*	.19 *(6.57)*
Acquisitions				-.08 *(-1.66)*
Acquisitions*HI				-.29 *(-3.00)*
R^2	.76	.79	.82	.82
N	2718	1910	1910	1910

Table 6

Cross section regression results
Manufacturing firms only, 1995 data

Variables are the same as in the previous table, except the inclusion of regressors interacted with a dummy = 1 if the firm's cash holdings exceed 40 percent of total assets. T-statistics are shown in parentheses.

	(1)	(2)	(3)	(4)
Intercept	.11 *(7.46)*	.09 *(4.67)*	.09 *(4.71)*	.09 *(4.78)*
Intercept*HI	.64 *(27.61)*	.58 *(20.44)*	.48 *(16.51)*	.49 *(16.69)*
Log(assets)	-.005 *(-2.68)*	-.003 *(-1.35)*	-.002 *(-1.13)*	-.002 *(-0.82)*
Log(assets)*HI	-.03 *(-6.11)*	-.01 *(-2.23)*	-.0001 *(-0.23)*	-.002 *(-0.31)*
Public debt	-.02 *(-2.92)*	-.03 *(-2.92)*	-.03 *(-2.79)*	-.03 *(-2.91)*
Capital expenditures		.02 *(0.36)*	-.01 *(-0.20)*	-.03 *(-0.54)*
Capital expenditures*HI		-1.21 *(-7.27)*	-1.27 *(-7.88)*	-1.27 *(-7.92)*
R&D expenditures		.20 *(6.68)*	.15 *(5.09)*	.15 *(4.92)*
R&D expenditures*HI		.02 *(0.46)*	.05 *(1.06)*	.05 *(1.15)*
Stock Issuance			.11 *(5.55)*	.11 *(5.80)*
Stock Issuance*HI			.05 *(2.02)*	.05 *(1.94)*
Acquisitions				-.13 *(-2.85)*
Acquisitions*HI				-.45 *(-3.01)*
R^2	.75	.79	.81	.81
N	2718	1910	1910	1910

Chart 1

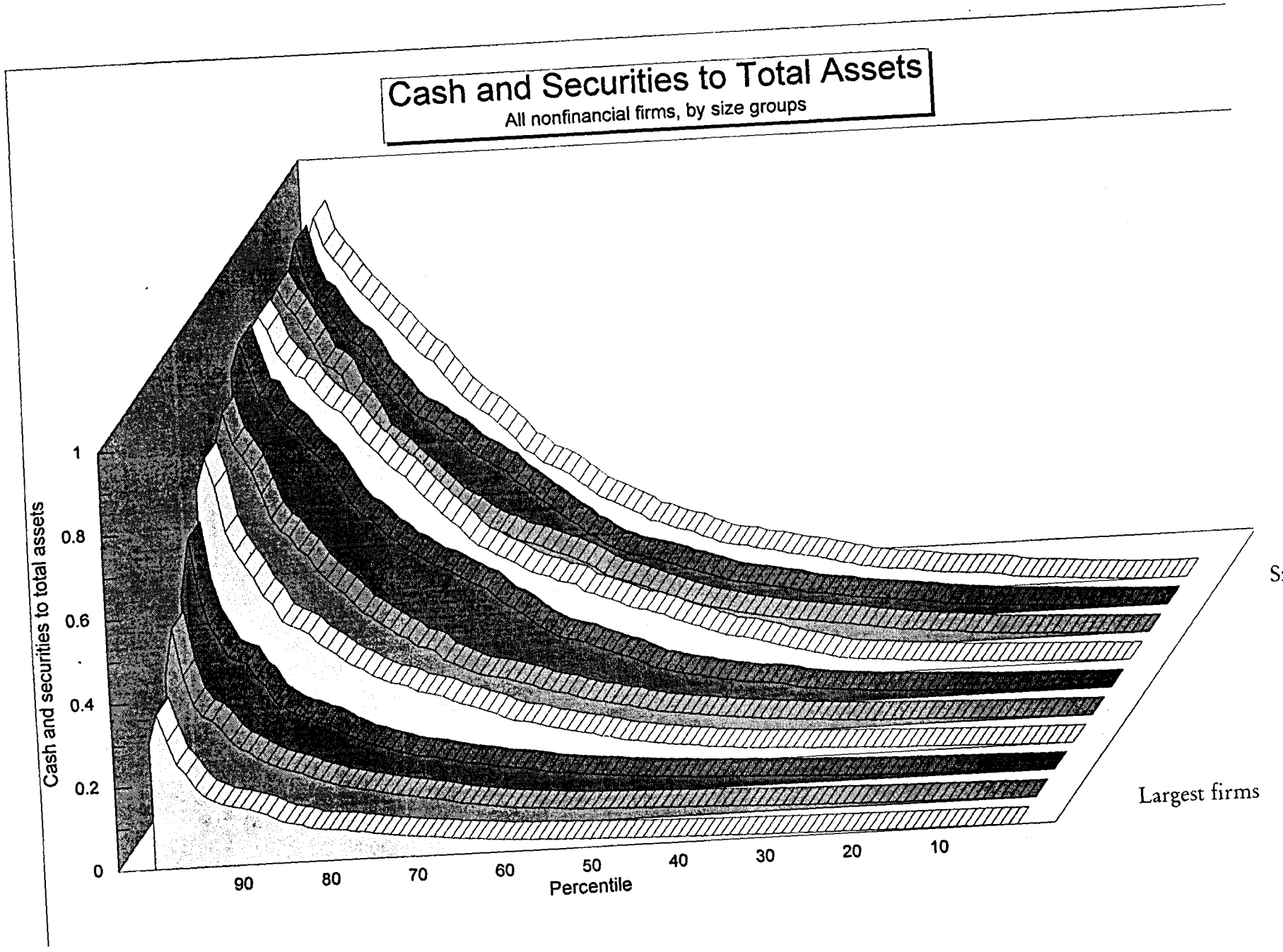

Cash and Securities to Total Assets
All nonfinancial firms, by size groups
Cash and securities to total assets
1
0.8
0.6
0.4
0.2
0
90
80
70
60
50
40
30
20
10
Percentile
Sm
Largest firms

Chart 2

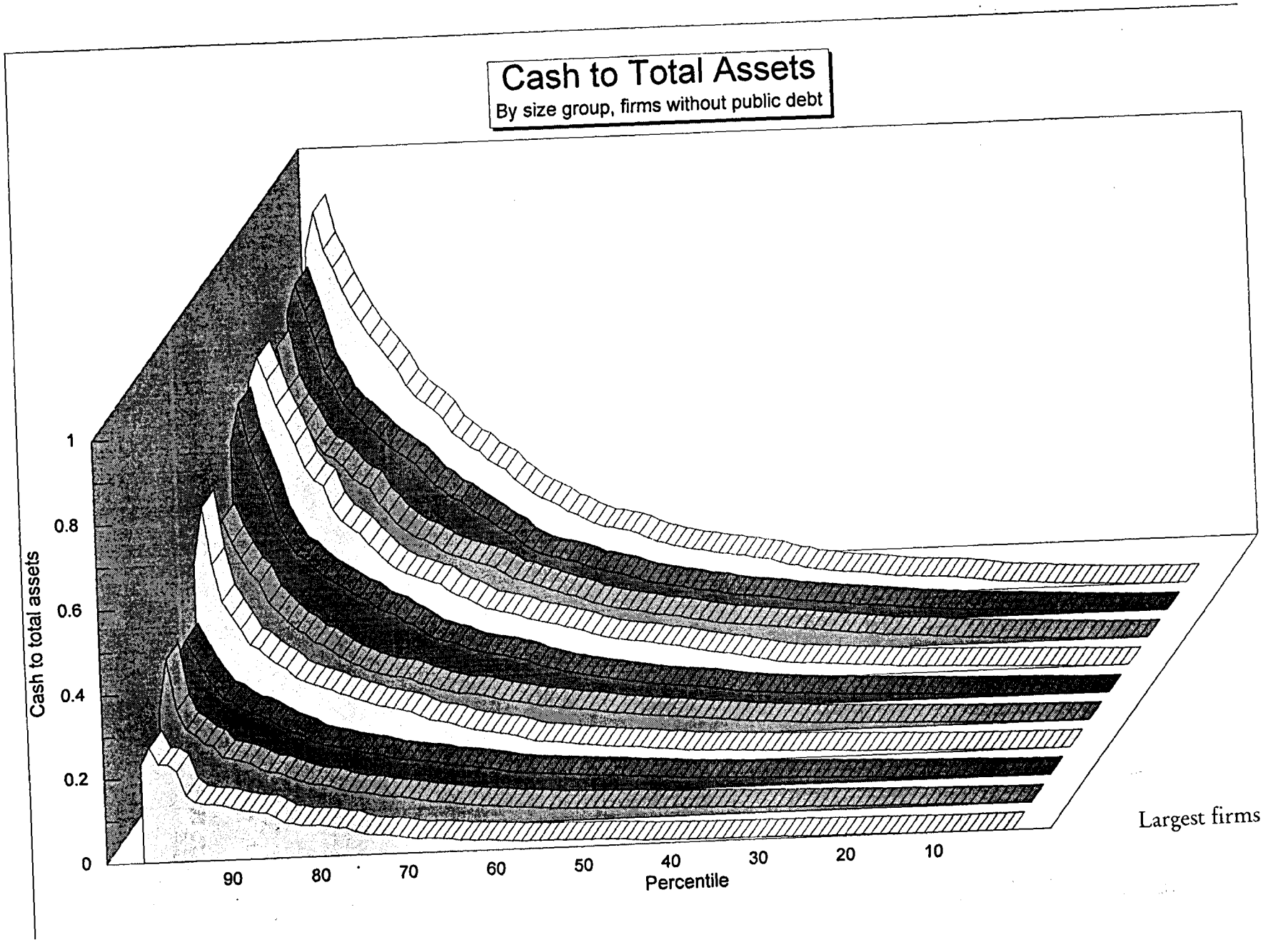

Cash to Total Assets
By size group, firms without public debt
Cash to total assets
1
0.8
0.6
0.4
0.2
0
90
80
70
60
50
40
30
20
10
Percentile
Sm
Largest firms

Chart 3

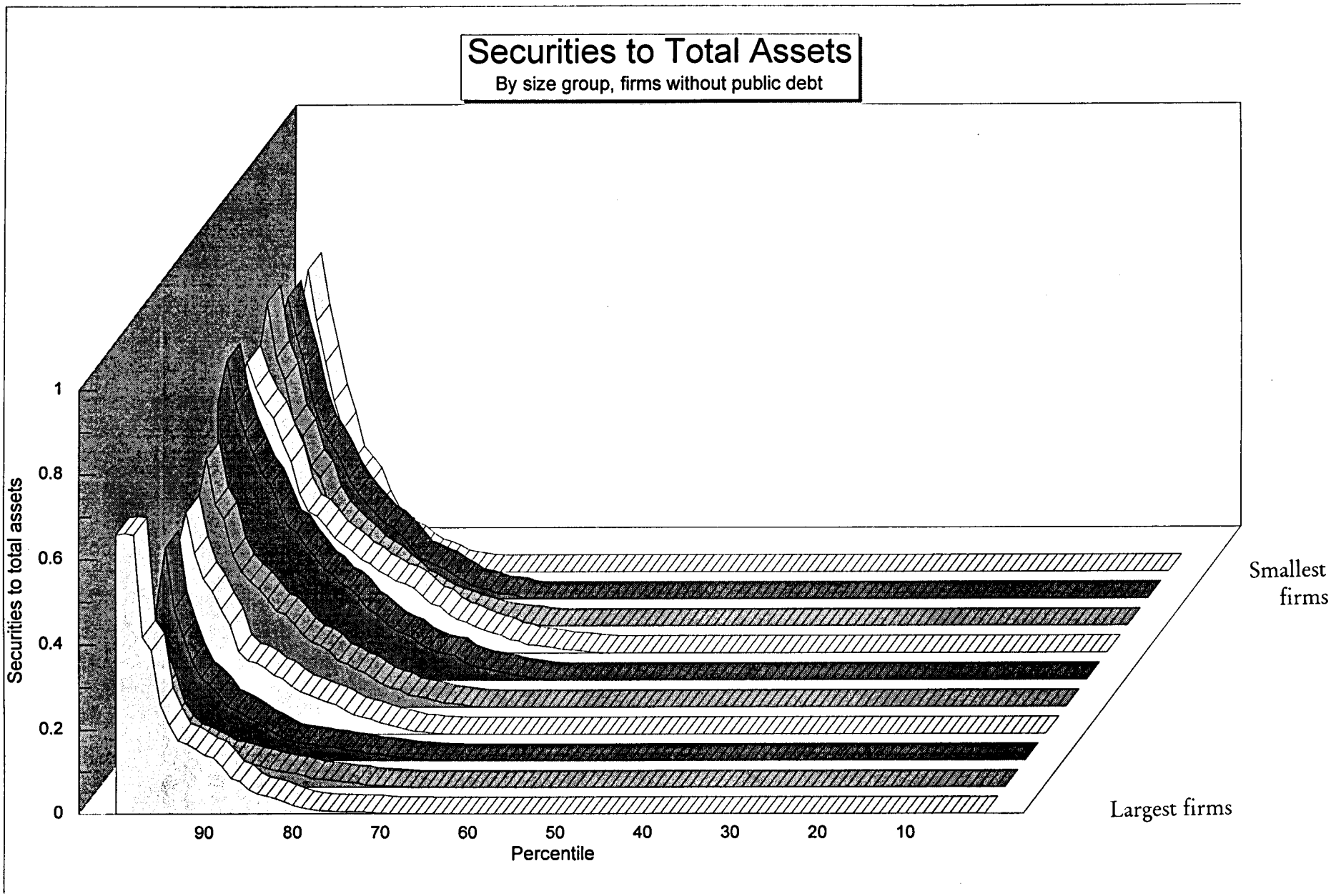

Securities to Total Assets
By size group, firms without public debt
Securities to total assets
1
0.8
0.6
0.4
0.2
0
90
80
70
60
50
40
30
20
10
Percentile
Smallest firms
Largest firms

Chart 4

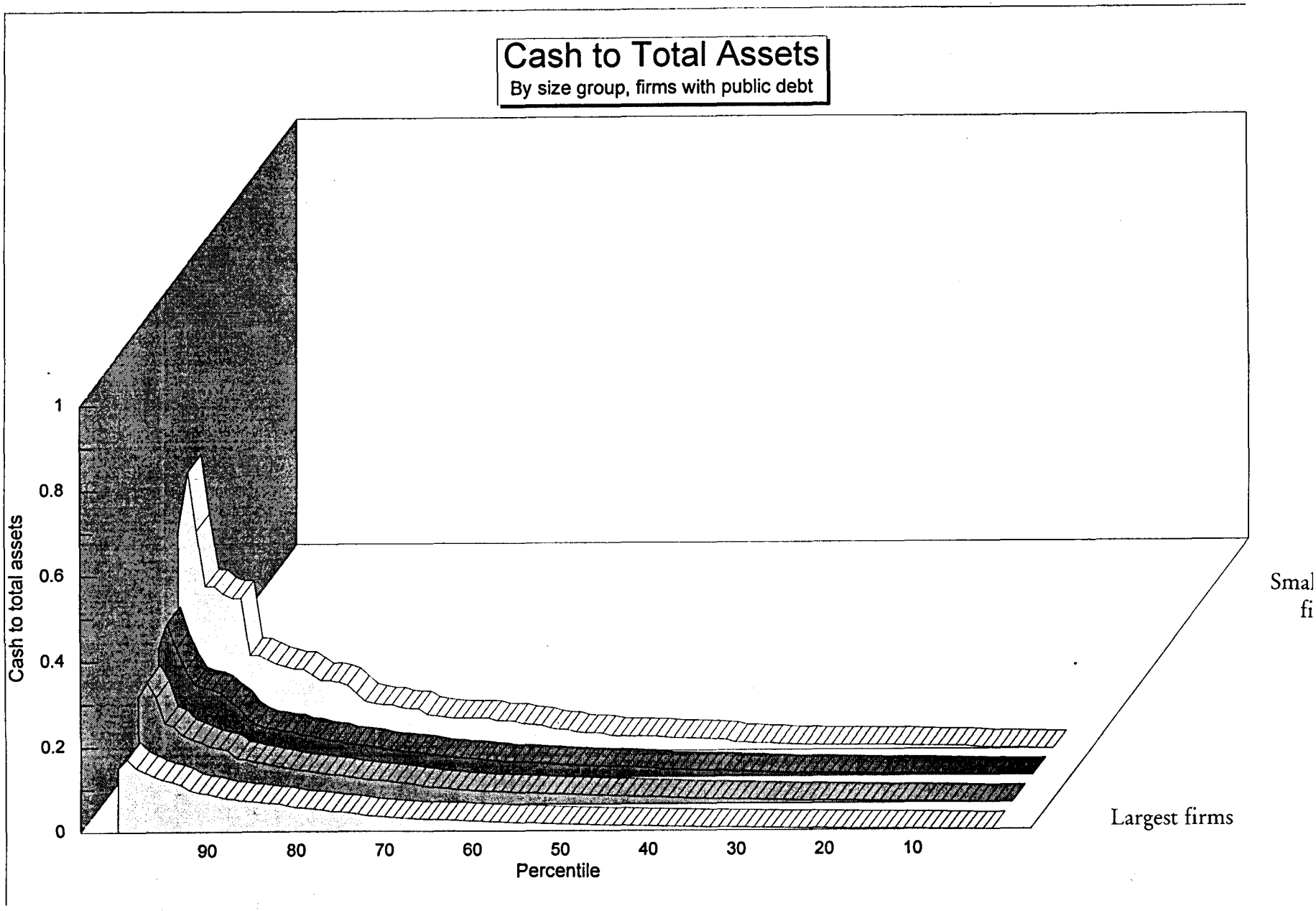
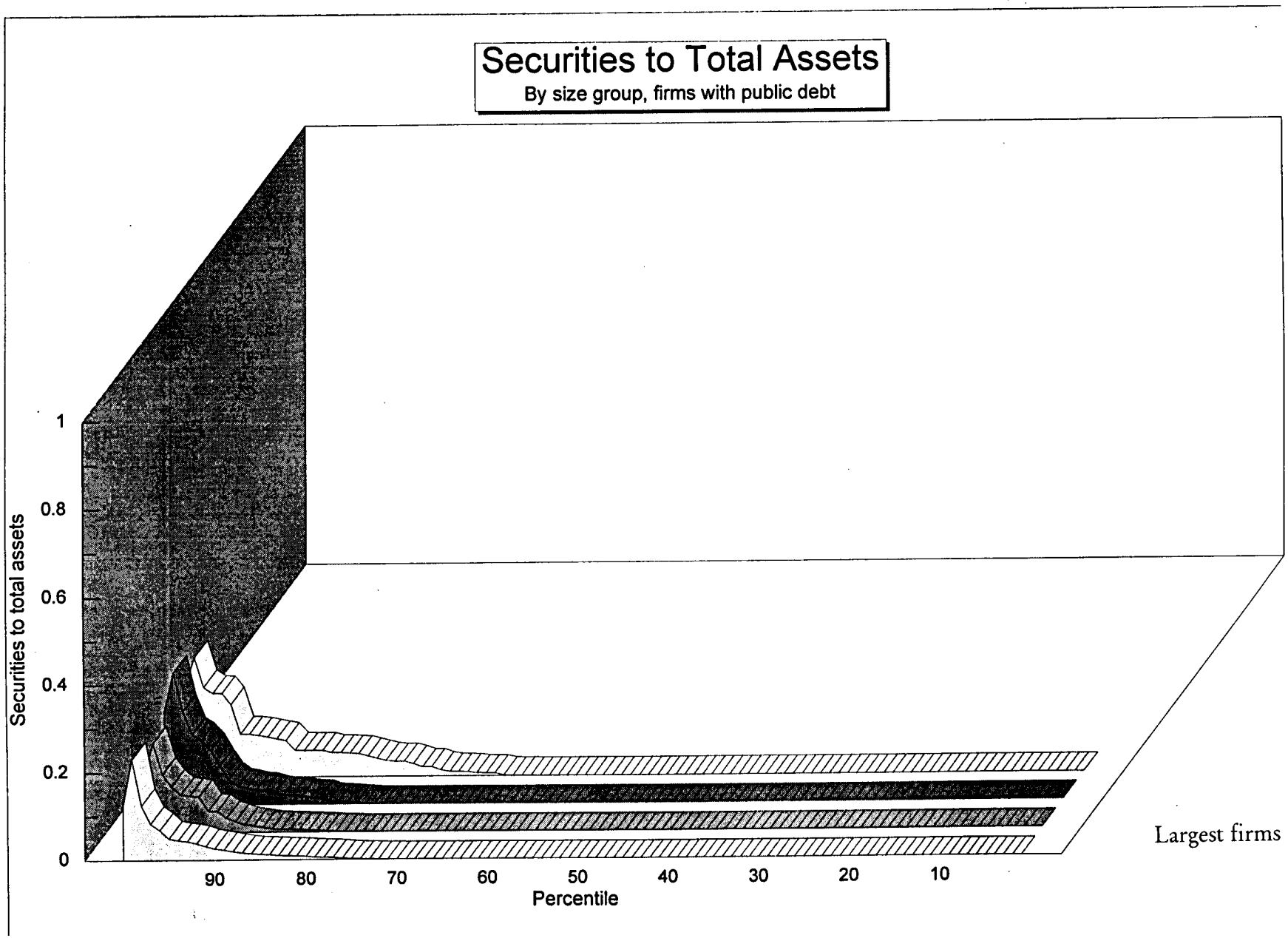

Cash to Total Assets
By size group, firms with public debt
Cash to total assets
1
0.8
0.6
0.4
0.2
0
90
80
70
60
50
40
30
20
10
Percentile
Smal
fi
Largest firms

Chart 5


Securities to Total Assets
By size group, firms with public debt
Securities to total assets
1
0.8
0.6
0.4
0.2
0
90
80
70
60
50
40
30
20
10
Percentile
Smallest firms
Largest firms