POLICY ON THE MARGIN: EVALUATING THE IMPACT OF MARGIN DEBT REQUIREMENTS ON STOCK VALUATIONS

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ABSTRACT

Rapidly rising stock prices in the 1990s raised worries about potential inflationary or destabilizing effects. The use of initial margin debt requirements by the Federal Reserve was proposed to reduce the run-up in stock prices. This paper evaluates the likely impact of margin debt requirements on stock valuations. The results suggest that higher margin requirements would have had no impact on stock market valuations in the 1990s, Moreover, other forms of consumer credit are relatively more important in determining household equity positions than margin debt, making the control of margin debt not an obvious public policy choice.

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Introduction

Since the stock market reached a low point in 1982 it climbed throughout the end of 1999. Total equity valuation reached 200% of GDP by the end of 1999, after the market had weathered a sharp downturn in October 1987 and a lull in 1994.

The rapid increases in stock prices led to increasing worries about potential inflationary effects. Some observers argued that asset price increases are indicators of future consumer price increases (Goodhart 1995; Shibuya 1992). However, Filardo (2000) found this argument to bear little empirical importance for the U.S..

Moreover, the rapid increase in stock prices gave rise to fears over increased financial and economic instabilities in the event of rapidly deflating stock valuations. Some researchers argued that the increases in stock prices brought stock valuations to levels that appeared unsustainable, making a substantial decline in stock valuations more likely (Diamond 1999; Shiller 2000). Aside from the possibility of an increase in stock price volatility, the increase in stock prices has had an ambiguous effect on overall economic activity. In particular, higher stock market wealth resulted in increased consumption (Poterba 2000), but they also led to the growing use of corporate resources for share repurchases to limit share price dilution from stock options and stock grants, possibly to the detriment of physical investments (Liang and Sharpe 1999).

Amid rapidly rising stock prices in the late 1990s, some observers called for policies to reduce stock price gains, despite the ambiguous evidence speaking in favor of such a policy. This paper looks at the question whether the policies that were proposed to control stock prices would have actually lowered stock price increases. More specifically, one possible policy tool already exists, the Federal Reserve Bank's ability to set initial margin debt requirement. Congress included provisions in the Securities Exchange Act of 1934 that allowed the Federal Reserve Bank to set initial margin requirements to limit debt financing of stock market speculation. Higher initial margin requirements reduce the amount individual investors can borrow from their brokers to buy stocks, thus lowering demand for stocks and potentially reducing increases in stock prices. While the economic impact of the run-up in stock prices in the late 1990s is being studied, the need for stock market regulation and possibly appropriate tools for such regulation has to be considered. Otherwise, decisions on the use of specific policy tools may be made without a clear understanding of their potential impact.

Background

Growth of stock valuations has been particularly pronounced in the late 1990s. Between 1995 and 1999, the market value of outstanding corporate equities grew by 127% from $8.3 trillion to $18.9 trillion (table 1). In comparison, real GDP increased by 23% from $7.5 trillion to $9.3 trillion during the same period.

Even though households remain the largest group of direct stock market investors, their importance has declined over time. Insurance companies, pension funds and mutual funds held 48.6% of corporate equities in 1999, up from 11.7% in 1960. Households owned 41.5% of direct equity holdings in 1999, down from 85.6% in 1960 (table 2).

TABLE 1
EQUITY HOLDINGS AND EQUITY FLOWS IN THE US ECONOMY, 1960 TO 1999

Time	GDP ($ billions)	Equity Holdings at Market Value ($ billions)					Annual Net Equities Issues to Nonfinancial Nonfarm Corporate Business Sector ($ billions)
		Total	Household Sector	Insurance Companies	Pension Funds	Mutual Funds	
Dec. 1960	524.60	420.27	359.72	12.44	17.15	19.77	0.245
Dec. 1965	748.70	734.92	616.10	21.01	43.25	36.43	-0.315
Dec. 1970	1054.20	841.42	572.47	27.77	77.19	43.98	2.076
Dec. 1975	1710.50	845.72	499.02	41.65	132.30	39.48	3.039
Dec. 1980	2918.80	1513.84	894.32	78.57	276.35	47.36	5.625
Dec. 1985	4319.30	2318.98	1106.71	130.96	635.83	117.93	-25.750
Dec. 1990	5847.30	3536.66	1975.56	161.87	865.69	249.43	-15.250
Dec. 1995	7529.30	8331.34	3957.25	449.51	2029.47	1062.92	-14.600
Dec. 1999	9256.10	18876.68	7829.40	1174.70	4548.20	3458.40	-48.500

Notes: Sources are Board of Governors, Federal Reserve System, Flow of Funds; Bureau of Economic Analysis, Department of Commerce, National Income and Products Account.

TABLE 2
HOUSEHOLD PORTFOLIO ALLOCATION (SHARES OF TOTAL FINANCIAL ASSETS)

	Deposits	Credit market instruments	Corporate equities	Mutual fund shares	Security credit	Life insurance reserves	Pension fund reserves	Equity in noncorporate business
1960 to 1969	18.78	9.49	28.59	1.62	0.14	5.61	8.10	26.18
1970 to 1973	21.32	7.37	22.19	1.53	0.16	4.80	10.31	25.78
1974 to 1980	24.42	6.96	13.15	0.84	0.15	4.26	12.80	31.82
1981 to 1990	23.86	7.75	11.54	1.93	0.29	2.83	19.00	27.72
1991 to 1999	16.35	8.44	17.78	5.91	0.62	2.54	26.39	17.05
1996 to 1999	13.82	7.03	20.26	7.53	0.78	2.42	28.54	15.07

Notes: Source: Board of Governors, Federal Reserve System, Flow of Funds Accounts, June 2000

Because of the size of their direct equity holdings, households may be able to influence stock prices. Further, initial margin debt requirements may be able to affect the way households allocate their funds. Margin debt is debt to finance the purchase of securities including equities borrowed from brokers. It has to be secured with at least $2000 in cash or securities. Under the Fed's Regulation T, investors can finance a share of their stock purchases through margin debt. Margin debt requirements set the share of an initial investment that a buyer cannot finance through debt. Since 1974, the ratio of any new purchases that can be financed by borrowing on margin has been set at 50%.

After equities are purchased on margin, brokers can set their own margin requirements for their customers. If a customer becomes too leveraged, a broker can request debt repayment by issuing a margin call. New York Stock Exchange firms tend to issue margin calls, when borrowers' investments fall below 75% their initial value.

Over the decades, the Federal Reserve Bank has lowered or raised the initial margin requirement. Introduced in 1934, the Fed initially required that the market value of stocks covered 25-45% of an investor's margin debt. The margin requirement was subsequently raised to 100% in 1946, before the Fed adjusted it over the years. The 1950s were the decade with the most margin requirement adjustments, while the 1980s and 1990s have seen no adjustments.

The basic argument in favor of higher margin requirements is that it reduces the ability of households to purchase stocks. With higher margin requirements, households can borrow less to finance stock purchases, thereby lowering the demand for stocks, and hence reducing the level and growth of stock valuations.

During the 1990s, households increased the share of direct holdings of corporate equities (table 2). In the 1980s, only 11.5% of all financial assets were direct holdings of corporate equities, while corporate equities were the second largest category of financial assets held by the households with 20.3% between 1996 and 1999. While households are holding more equities indirectly through their claims on mutual funds and pension funds, margin requirements, however, will only affect direct corporate equity holdings, and thus not all stocks owned by households.

It is important to note that the outright ownership of shares is dispersed across income groups. Households who had incomes above $250,000 in 1998 owned 48.1% of all publicly traded stocks owned by all households combined. Those households with incomes above $100,000, but below $250,000 owned another 24.7%. In other words, almost three-quarters of direct equity holdings by households were owned by households with more than $100,000 annual income. These households, though, represented only 8.5% of all U.S. households in 1985. The bottom 2/3 of households – those making less than $50,000 annually in 1998 – owned only 10.6% of all directly owned shares by households (Mishel et al. 2001).

Margin debt owed by households has risen dramatically in absolute terms, but it remained comparatively small. By the end of 1999, total margin debt amounted to $222.4 billion, up from $25.8 billion at the end of 1982. This was equivalent to 3.3% of personal disposable income or 2.8% of corporate equities directly held by households. During the late 1990s, margin debt amounted on average to more than 2% of personal disposable income – its highest point during the post-war era. Overall, margin debt appears to be too small to make a difference in the valuation of stocks.

Because direct stock ownership was highly concentrated among top income earners, higher margin debt requirements may impact stock holdings if higher income households depend more heavily on margin debt than others. Out of all households that held any debt 14.8% were households with more than $100,000 annual income in 1998 (Kennickel et al. 2000). Among households that held any debt, those with more than $100,000 in income in 1998 were 60% more likely to owe "other forms of debt", including margin debt, than average households. Also, the amount of "other debt" owed by these households was three times as much as for the average family.

An obvious difference between the majority of studies and this one is the choice of dependent variable. In particular, most studies focus on the effect of initial margin requirements on the volatility of the stock market. Stock market volatility serves as an indicator for financial stability. The lower the volatility of real stock returns is, the more stable the stock market is presumed to be. However, because of the larger increases in stock prices during the latter part of the 1990s, my focus is on the change in stock valuations, and not on stock price volatility.

The view that higher margin requirements help to stabilize stock markets is based on a pyramiding-depyramiding rationale. Overly optimistic investors borrow additional funds to purchase more equities, thus helping to inflate stock prices, which leads to more margin debt. If expectations and realizations grow apart and stock prices fall, leveraged investors face margin calls that force them to sell-off their assets, thereby lower prices even further.

In contrast to the pyramiding-depyramiding argument, Goldberg (1985) argued that margin requirements and stock return volatility are positively related. Higher margin requirements lower the leverage of households, thereby providing incentives for more corporate leverage, which may ultimately result in increased stock valuations.

Finally, Kupiec and Sharpe (1991) argued that positive or negative connections between margin requirements and stock return volatility are possible. Higher margin requirements constrain rational investors when stock prices are experiencing an adverse downward shock, because they are prohibited from purchasing fundamentally undervalued stocks, thereby raising price volatility. If higher margin requirements constrain the liquidity of irrationally optimistic investors, higher margin requirements can help to lower stock return volatility.

The likelihood of irrationally optimistic traders is accepted. The noise trader literature is based on two different classes of traders of which one is overly confident in their own investment ability and consistently underestimates the risks associated with the stock market (DeLong et al. 1990; Campbell and Kyle 1992). In an extension of the noise trader literature, Dupont (1998) argued that institutional investors are fundamental traders and naïve household investors are noise traders. By extension, if households are active in the market, higher margin requirements could potentially reduce the increase in stock market valuations.

Some research found that margin requirements are an effective tool to lower stock market volatility, while others found little evidence for a connection between margin requirements and stock market volatility. Hardouvelis (1990) found that an increase in initial margin requirements lowered stock return volatility, thus fulfilling their stated objective. The results, though, did not seem to be robust with respect to the time period chosen (Salinger 1989). Also, a number of studies found that margin requirements have no significant impact on stock price volatility (Moore 1966; Ferris and Chance 1988; Schwert 1989; Salinger 1989; Kupiec 1989; Hsieh and Miller 1991).

There seems to be more consistent evidence on the impact of margin requirements on stock prices. Grube et al. (1979) found that lower margin requirements are linked to higher aggregate prices, but that there was no correlation between higher margin requirements and prices. Further, Luckett (1982) examined the impact of margin requirements on equity holdings and found that margin requirements are an effective regulatory tool as higher margin requirements reduce equity holdings.

There does not seem to be any evidence, however, that suggests that margin requirements are positively related to stock price valuations, thereby lacking support for Goldberg's (1985) argument.

Empirical Analysis

My analysis focuses on the issue whether the stock price increases in the late 1990s could have been reduced through the use of higher margin requirements. I focus on the impact that margin requirements have on household equity holdings and thus on stock valuations[2]. Since the analysis attempts to study a counterfactual situation, my results cannot be an accurate depiction of the world that could have been. But they nevertheless could provide some general sense of the potential impact of margin requirements on stock prices.

Earlier studies have tried to estimate a direct link between margin requirements and stock prices. Since margin requirements impact only household margin debt positions, it seems reasonable to start with a link between these two variables. Thus, my study allows for a more detailed analysis of the channels through which changes in margin requirements could affect stock prices.

To see the direct impact of margin requirements on stock valuations I proceed by first connecting margin requirements to household margin debt. Margin requirements are only a minimum regulatory standard. Brokers can set margin requirements higher, and households can decide not to borrow on margin. The summary statistics in table 3 indicate no clear correlation between changes of margin debt relative to personal disposable income (PDI) and margin requirements.

[2]Changes in margin requirements are a way for the Fed to communicate its view on stock market valuations to the market. However, the Fed appears to have taken to directly letting the markets know of their assessment of the market ("irrational exuberance"). Thus, it is not clear how effective changes in margin requirements would be as a means for the Federal Reserve to communicate its evaluation of the stock market. This is also supported by findings by Grube et al. (1979) who find that margin requirement reductions are anticipated and lead to price and volume increases in the stock market, whereas increases in margin requirements appear to have no impact.

TABLE 3
SUMMARY STATISTICS

	Level of initial margin requirement…								
	50%	55%	60%	65%	70%	75%	80%	90%	Total
No. of Obs.	123	4	1	7	38	4	8	7	192
ln(HHMD/PDI)	0.14	0.31	0.06	-0.01	0.09	-0.53	0.33	0.03	0.12
	(0.34)	(0.12)		(0.18)	(0.12)	(0.01)	(0.21)	(0.07)	(0.30)
ln(HHEqty/PDI)	2.69	3.13	3.07	3.10	3.30	2.93	3.30	3.27	2.89
	(0.28)	(0.01)		(0.08)	(0.10)	(0.03)	(0.13)	(0.02)	(0.36)
ln(Eqty/GDP)	4.19	4.46	4.05	4.38	4.39	3.88	4.53	4.34	4.25
	(0.42)	(0.02)		(0.12)	(0.16)	(0.05)	(0.09)	(0.03)	(0.36)

Correlation coefficients

	MR	ln(MDHH/PDI)	ln(HHEqty/FAHH)
ln(HHMD/PDI)	-0.10		
ln(HHEqty/PDI)	0.69	0.18	
ln(Eqty/GDP)	0.21	0.73	0.65

Notes: Averages are in percent. Standard deviations are reported in brackets. Sources are BEA, NIPA; Standard&Poor's S&P500; Board of Governors, Federal Reserve System, Flow of Funds Accounts of the United States.

Further, margin debt may impact changes in the equity allocation of households. It is possible that, even though households borrow more on margin because of a lower margin requirement, they may not necessarily increase their overall equity holdings. In other words, margin debt may substitute for other sources to finance equity purchases. The summary statistics presented in table 3 again suggest no clear correlation between margin debt and equity holdings by households. Also, the level of equity holdings relative to PDI seems to be unaffected by the level of margin requirements.

Finally, the relative equity holdings in household portfolios may impact stock prices. The summary statistics of table 3 suggest a positive correlation between stock prices and household equity holdings. But there is no indication that higher margin requirements are associated with lower levels of stock market valuations relative to GDP.

To control for the joint effect of different variables, I estimate the following system of equations:

$$\ln \frac{HHMD}{PDI}_t = b_1 \ln \frac{PDI}{CPI}_t + b_2 \ln Risk_{t-1} + b_3 \frac{SP500}{CPI}_{t-1} + b_4 MR_t + b_5 \ln \frac{FAHH}{CPI}_t + b_6 \ln \frac{CMIHH}{FAHH}_t + e_t \tag{1}$$

$$\ln \frac{HHEqty}{FAHH}_t = b_7 \ln \frac{HHMD}{PDI}_t + b_8 Risk_{t-1} + b_9 \ln \frac{SP500}{CPI}_{t-1} + b_{10} \ln \frac{PDI}{CPI}_t + b_{11} \ln \frac{CMIHH}{FAHH}_t + e_t \tag{2}$$

$$\ln \frac{Eqty}{GDP}_t = b_{12} \ln \frac{HHEqty}{FAHH}_t + b_{13} \ln \frac{IIEqty}{IIASSETS}_t + b_{14} \ln \frac{Dividend}{CPI}_t + e_t \tag{3}$$

HHMD is household margin debt, PDI the personal disposable income, CPI the consumer price index, Risk is the standard deviation of the daily growth rate in the S&P500 in each quarter, realS&P500 is the inflation adjusted S&P 500 Index, MR is the margin requirement set by the Fed, HHEqty are the direct holdings of households, *HHASSETS* are the total financial assets of households, Eqty is the nominal value of all stock holdings, GDP is the nominal GDP, IIEqty are the equity holdings of institutional investors (pension funds, mutual funds, life insurance funds, other insurance companies, closed end funds, and security dealers and brokers), *IIASSETS* are the total financial assets of institutional investors. and realDividend is the inflation adjusted corporate dividends paid out each quarter. All variables are expressed in logarithmic form, which allows for each estimated coefficient to be interpreted as elasticity.

Equation 1 links margin requirements to margin debt owed by households. To control for income effects, margin debt relative to PDI is used as dependent variable. Further, since margin requirements influence the flow of new debt, rather than the stock, it is reasonable to use the level of margin requirements rather than the change of margin requirements. Aside from margin requirements, households' decisions to borrow more on margin are also expected to be positively related to the past real stock market index (here the S&P 500)[3], and negatively related to risk and to the consumer credit burden. Following earlier work, risk is measured as the difference between the yields on Moody's Baa- and Aaa- rated bonds (Luckett 1982). Finally, the effects of real income and households wealth are ambiguous. Higher income and assets provide households with more collateral to borrow against, while it makes borrowing less necessary.

Equation 2 relates household margin debt borrowing to household equity holdings. Margin debt borrowing should be positively related to equity holdings of households. Aside from margin debt, households' equity holdings are expected to be positively determined by real income growth, the last quarter real value of the stock market, and the level of consumer credit, and negatively correlated with risk.

Finally, equation 3 links household equity holdings to the stock market valuation relative to GDP. To control for the effect of the real economy, I use the total equity valuation relative to GDP as the dependent variable. The value of the stock market relative to GDP is assumed to be positively related to increases in the direct equity holdings in the portfolios of either households or institutional investors as shares of their

[3]It is generally accepted that higher stock prices can result in higher margin requirements (Salinger 1989). The fact that the real stock market index is entered with a lag accounts for this.

respective portfolios, following the suggestions of recent research that institutional investors have become large market drivers (Goetzmann and Massa 1998; Gompers and Metrick 1998). Further, real dividends are included in the equation as the main positive determinant of stock valuation.

Often, stock price volatility is considered as the dependent variable, rather than stock prices. The main rationale is that the price fluctuations signal the incorporation of new information. Empirical evidence, though, suggests that price fluctuations are too large to be explained by new relevant information (Shiller 1981; Cutler et al. 1989). Instead, demand for stocks by institutional investors appears to have led to material and sustained increases in stock prices (Goetzmann and Massa 1998; Gompers and Metrick 1998). Thus, I follow the more recent developments by using stock prices as dependent variable. This also appears to be the more relevant policy variable since stock prices increased above average without increasing risk in the late 1990s.

The data are compiled from three sources. Data for the CPI, PDI, and GDP are taken from the Commerce Department's Bureau of Economic Analysis's NIPA tables. Financial data, except for the S&P 500 Index, are taken from the Board of Governors of the Federal Reserve System, Flow of Funds Accounts for the United States, and the daily S&P 500 is provided by Standard&Poor's. The data are 192 quarterly observations, starting with the first quarter of 1952 and ending with the last quarter of 1999.

Due to the time series nature of the data, the error terms of the three estimation equations are, not surprisingly, serially correlated[4]. To correct for autocorrelation, I use a Prais-Winsten regression estimator.

Table 4 presents the regression results for the period from 1952 to 1999. The results indicate that stock market valuations are influenced by the relative equity position of households, which in turn are determined by the level of margin debt owed by households. However, there is no statistically significant indication that margin debt requirements have an effect on household margin debt.

Regression (1) shows that margin debt requirements are determined by the risk and return of the stock market, by real income and by real assets. All variables, with the exception of risk, have the expected sign. While real income has a substitution effect, real assets seem to serve as collateral. An increase of 1% in real assets, for instance, results in a 1.8% increase in margin debt relative to disposable income. The results also show that there is a weak positive correlation between risk and margin debt, which may suggest that households are borrowing more to compensate for the greater risks they are facing.

The economic significance of margin debt requirements, as indicated by the standardized beta coefficients, is slightly larger than their statistical significance. In particular, the relative importance of margin debt requirements in explaining household margin debt is larger than the real level of the stock market, than financial market risk or the relative consumer debt burden, but it is substantially smaller than the importance of real income or real assets.

Furthermore, regression (2) shows that households increase their relative equity position in response to lower risk or to lower incomes, but that they increase it when margin debt relative to disposable income rises. A 1% increase in the ratio of margin debt to disposable increase leads to a 0.4% rise in the relative equity position of households.

The standardized beta coefficients, though, reveal that factors other than margin debt are substantially more relevant in determining households' equity position. In particular, financial market risk is about four times as important and real income about eight times as important as margin debt in determining households' equity position.

Finally, stock prices are largely determined by the relative equity position of households and institutional investors as regression (3) shows. Real dividends play no significant role in determining stock prices.

The dependent variable used here may inadequately capture the trend in stock prices. In particular, it does not directly control for corporate performance. Consequently, I re-estimate the system of equations using the logarithmic of the price-earnings ratio as the dependent variable, which may be a better measure of changes in the valuation of stocks since it incorporates a measure of corporate performance. The results remain robust as the relative equity position of households and institutional investors stays the same as regression (3)' shows.

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[4]Each variable is stationary. Risk, consumer credit, real income, and margin requirements are stationary with a trend, and are adjusted by using a Hodrick-Prescott filter.

TABLE 4
THE IMPACT OF MARGIN REQUIREMENTS ON STOCK MARKET VALUATIONS, 1952 TO 1999

	(1) ln(HHMD/PDI)		(2) ln(HHEqty/FAHH)		(3) ln(Eqty/GDP)		(3)' ln(PE)	
	Coefficient estimates	Std. Beta Coefficient	Coefficient estimates	Std. Beta Coefficient	Coefficient estimates	Std. Beta Coefficient	Coefficient estimates	Std. Beta Coefficient
$\ln(SP/CPI)_{t-1}$	0.133**	0.032	0.069	0.011				
	(0.074)		(0.057)					
$\ln Risk_{t-1}$	0.276**	0.137	-0.432*	-0.200				
	(0.152)		(0.166)					
$\ln(PDI/CPI)_t$	-1.553*	-2.312	-0.540**	-0.391				
	(0.453)		(0.259)					
$\ln MR_t$	0.332	0.479						
	(0.441)							
$\ln(FAHH/CPI)_t$	1.797*	1.414						
	(0.240)							
$\ln(CMIHH/FAHH)_t$	0.010	0.017	0.274	0.396				
	(0.507)		(0.516)					
ln(HHMD/PDI)			0.365*	0.052				
			(0.051)					
ln(HHEqty/FAHH)					0.769*	0.070	0.460*	0.113
					(0.033)		(0.085)	
ln(IIEqty/IIAssets)					0.552*	0.060	0.717*	0.200
					(0.039)		(0.096)	
ln(Dividend/CPI)					-0.004	0.001	0.002	0.002
					(0.014)		(0.040)	
Constant	-6.035**	-45.817	5.740*	16.825	0.361	0.295	-1.097	-1.384
	(2.717)		(1.049)		(0.297)		(0.436)	
N	191		191		192		192	
Adj. R-squared	0.385		0.610		0.961		0.725	
Durbin-Watson	1.865		2.056		1.851		1.16	

Notes: Standard deviations in parentheses. ** indicates significance at the 10%-level and *indicates significance at the 1%-level.

Margin requirements have been steady since 1974. To see whether their effect was significantly different during a time when they were used, I estimate the regression for the first half of the sample from 1952 to 1975. During this time, the Federal Reserve changed margin requirements a total of fourteen times in 24 years. Thus, I obtain an estimate for the effectiveness of margin requirements during a time period when the Federal Reserve Bank used this regulatory tool more actively.

Table 5 shows the results for the period from 1952 to 1975. The results are similar to those of the entire sample. Thus, the critique of earlier findings that supported a link between margin requirements and stock prices that they were sensitive to the chosen sample period (Salinger, 1989), does not hold here. However, the relative importance of margin requirements, although still statistically insignificant, increases slightly relative to the impact of real income or real assets. Moreover, the relative importance of margin debt in determining households' asset position remains well below that of other forms of consumer debt, suggesting that the regulatory tool of the Federal Reserve Bank may have targeted an inappropriate variable if its goal was to reduce the relative equity exposure of households.

Equation 2 raises issues about the direction of causality. In particular, does more margin debt cause households to increase their equity holdings, or do increases in direct equity holdings lead confident private investors to increase their borrowing on margin?

Granger causality tests reveal no clear causal relationship for the entire sample, but a weak causal relationship from margin debt to households' equity position for the period from 1952 to 1975. Table 6 shows the Granger causality test results for two through six lags, respectively. Since Granger causality tests are generally sensitive to the lag structure selected, I have selected a reasonable range of lag structures. For the entire period, in no single case does the F-statistic (or Wald statistic) suggest that the null hypothesis can be rejected that all lagged values of margin debt in determining equity holdings and vice versa are simultaneously zero. Moreover, for the period 1952 to 1975, all lag structures, except two lags, show a significant causal relationship from margin debt to household equity positions, but not the other way around. Thus, the causal relationship chosen in the structural regression analysis appears to be the correct one.

One additional concern needs to be addressed. The results may be sensitive to the functional specification chosen here. To demonstrate the robustness of the results with respect to the chosen specification, I re-estimate the results using a linear specification, which is not as intuitive in its interpretation as the logarithmic specification. Table 7 shows the results for the linear specification. The results are largely robust. Most importantly, margin debt requirements remain statistically insignificant as determinant of household margin debt.

TABLE 5
THE IMPACT OF MARGIN REQUIREMENTS ON STOCK MARKET VALUATIONS, 1952 TO 1975

	(1) ln(HHMD/PDI)		(2) ln(HHEqty/FAHH)		(3) ln(Eqty/GDP)		(3)' ln(PE)	
	Coefficient estimates	Std. Beta Coefficient	Coefficient estimates	Std. Beta Coefficient	Coefficient estimates	Std. Beta Coefficient	Coefficient estimates	Std. Beta Coefficient
$\ln(SP/CPI)_{t-1}$	0.144	0.050	0.303*	0.097				
	(0.091)		(0.073)					
$\ln Risk_{t-1}$	0.021	0.020	-0.269*	-0.099				
	(0.244)		(0.084)					
$\ln(PDI/CPI)_t$	-1.555*	-3.721	-0.524*	-0.370				
	(0.605)		(0.161)					
$\ln MR_t$	0.523	0.904						
	(0.437)							
$\ln(FAHH/CPI)_t$	1.534*	1.766						
	(0.291)							
$\ln(CMIHH/FAHH)_t$	0.556	1.685	0.468**	0.575				
	(0.766)		(0.280)					
ln(HHMD/PDI)			0.421*	0.126				
			(0.068)					
ln(HHEqty/FAHH)					0.901*	0.119	0.520*	0.230
					(0.033)		(0.107)	
ln(IIEqty/IIAssets)					0.398*	0.052	0.625*	0.295
					(0.033)		(0.114)	
ln(Dividend/CPI)					-0.042**	0.032	0.057	0.011
					(0.019)		(0.047)	
Constant	-0.6231**	-7.879	4.002*	11.513	0.546*	0.392	-1.474*	-2.950
	(3.197)		(0.656)		(0.180)		(0.484)	
N	95		95		96		96	
Adj. R-squared	0.373		0.870		0.989		0.820	
Durbin-Watson	1.864		1.882		1.646		1.322	

Notes: Standard deviations in parentheses. ** indicates significance at the 10%-level and * indicates significance at the 1%-level.

TABLE 6
GRANGER CAUSALITY TESTS BETWEEN MARGIN DEBT AND HOUSEHOLD EQUITY HOLDINGS, 1952 TO 1999

	1952 to 1999		1952 to 1975	
No. of lags for each independent variable	$\ln(HHMD/PDI)_t$	$\ln(HHEqty/FAHH)_t$	$\ln(HHMD/PDI)_t$	$\ln(HHEqty/FAHH)_t$
2 lags	0.169	1.764	2.194	0.924
3 lags	1.045	2.012	2.045	2.321**
4 lags	0.803	1.941	1.800	2.126**
5 lags	0.667	1.716	1.654	2.070**
6 lags	0.577	1.467	1.409	2.230**

Notes: All numbers reported are F-statistics for the null hypothesis that all lags of the independent variable are simultaneously equal to zero. ** indicates significance at the 10%-level and * indicates significance at the 1%-level.

TABLE 7

THE IMPACT OF MARGIN REQUIREMENTS ON STOCK MARKET VALUATIONS, LIN. SPECIFICATION, 1952 TO 1999

	(1) (HHMD/PDI)		(2) (HHEqty/FAHH)		(3) (Eqty/GDP)		(3)' (PE)	
	1952 to 1999	1952 to 1975	1952 to 1999	1952 to 1975	1952 to 1999	1952 to 1975	1952 to 1999	1952 to 1975
$(SP/CPI)_{t-1}$	0.001*	0.001*	-0.004	0.029*				
	(0.000)	(0.001)	(0.004)	(0.008)				
$Risk_{t-1}$	0.388**	0.187	-5.657	-9.475*				
	(0.175)	(0.324)	(4.271)	(2.701)				
$(PDI/CPI)_t$	-0.001*	-0.001*	0.002	-0.008				
	(0.000)	(0.000)	(0.003)	(0.002)				
MR_t	0.005	0.003						
	(0.008)	(0.007)						
$(FAHH/CPI)_t$	0.0002*	0.0003*						
	(0.000)	(0.000)						
$(CMIHH/FAHH)_t$	0.027	0.024	-0.457	1.271*				
	(0.032)	(0.040)	(0.712)	(0.338)				
(HHMD/PDI)			4.845*	8.346*				
			(0.726)	(1.306)				
(HHEqty/FAHH)					3.712*	3.717*	0.647*	0.594*
					(0.084)	(0.102)	(0.051)	(0.047)
(IIEqty/IIAssets)					0.024*	0.049*	0.002*	0.008**
					(0.001)	(0.007)	(0.000)	(0.004)
(Dividend/CPI)					-0.0001	-0.0003**	-0.0001**	0.000
					(0.0001)	(0.0002)	(0.0001)	(0.000)
Constant	-0.142	0.092	20.027**	9.508*	-8.492	-26.244*	-0.009	-2.096
	(0.699)	(0.524)	(12.396)	(2.758)	(5.678)	(3.624)	(1.674)	(1.848)
N	191	95	191	95	192	96	192	96
Adj. R-squared	0.502	0.392	0.211	0.786	0.954	0.937	0.553	0.655
Durbin-Watson	1.827	1.686	1.963	1.918	1.766	1.765	1.205	1.436

Notes: Standard deviations in parentheses. ** indicates significance at the 10%-level and * indicates significance at the 1%-level.

Conclusion

This paper studies the question whether initial margin debt requirements can have an impact on stock market valuations. Even though the Federal Reserve has had the authority to change margin requirements since 1934, and has used this authority several times until 1974, it has left margin requirements unchanged since then. Leaving the question aside whether the Fed should regulate the stock market or not, the results of this paper show that initial margin debt requirements are an ineffective tool to lower stock market valuations (or to increase stock valuations, when they are deemed too low).

Previous research on the effects of margin requirements is inconclusive. My study extends prior research by estimating the impact of margin requirements on the change in stock market valuation relative to GDP, rather than on price fluctuations per se. This is of particular importance, since the public policy concerns in the late 1990s centered on the increase in prices, not on higher volatility of stock prices. Further, my research separates the impact of margin requirements on margin debt from the impact of margin debt on household equity holdings and ultimately from the effect on stock market valuations. In comparison, previous studies studied a direct connection between margin debt requirements and stock price valuations that is not supported by theory.

The estimation results suggest that higher margin requirements had no significant impact on margin debt. However, margin debt had a significant impact on the portfolio allocation of households as credit constraints are reduced. But estimates for the period from 1952 to 1975, when the Fed actually used initial margin debt requirements as a policy tool, suggest that other forms of consumer debt played a relatively more important role in determining households' equity position than margin debt. Put differently, if the goal of the Fed was to reduce the relative equity exposure of households through the use of margin debt requirements, it may have used an inappropriate tool. This is especially true since changes in the portfolio allocation of households have a significant positive impact on the valuation of outstanding equity. In fact they are as important or more important the portfolio allocation of institutional investors in determining stock valuations. Thus, not only are margin debt requirements ineffective tools to impact stock prices, but factors other than household margin debt may play a substantially more significant role in determining household equity positions. Consequently, just like calls for the Fed to intervene in the stock market should lead to a careful examination of the underlying rationale for stock market regulation, the effectiveness of the available tools to achieve the desired goals should be considered.

TABLE A.1
DEFINITIONS OF VARIABLES

Name of variable	Definition	Source
ln(HHMD/PDI)	The ratio of household margin debt to personal disposable income; logarithmic value	Board of Governors, Release Z.1, Flow of Funds Accounts of the United States
ln(HHEqty/PDI)	The ratio of directly held corporate equities to personal disposable income; logarithmic value	Board of Governors, Release Z.1, Flow of Funds Accounts of the United States
ln(Eqty/GDP)	The ratio of the value of outstanding equities to GDP; logarithmic value	Board of Governors, Release Z.1, Flow of Funds Accounts of the United States
ln(PDI/CPI)	The logarithmic value of the real personal disposable income	Board of Governors, Release Z. 1 Flow of Funds Accounts of the United States; Bureau of Labor Statistics, Consumer Price Index
lnRisk	The logarithmic value of risk measured as the difference between Moody's Baa- and Aaa-rated corporate bonds	Board of Governors, Release H.15 Selected Interest Rates
ln(SP500/CPI)	The logarithmic value of the real S&P500 index.	Standard and Poor's; Bureau of Labor Statistics, Consumer Price Index
lnMR	Logarithmic value of the initial margin debt requirement	Financial Markets Center, Philomont, VA, FOMC Alert, August 24, 1999.
ln(FAHH/CPI)	Logarithmic value of the real value of total financial assets held by households	Board of Governors, Release Z.1, Flow of Funds Accounts of the United States
ln(CMIHH/FAHH)	The logarithmic value of the ratio of credit owed by households relative to total financial assets owned by households.	Board of Governors, Release Z.1, Flow of Funds Accounts of the United States
ln(HHEqty/FAHH)	The logarithmic value of the ratio of direct corporate equity holdings by households relative to total financial assets of households	Board of Governors, Release Z.1, Flow of Funds Accounts of the United States
ln(IIEqty/IIASSETS)	The logarithmic value of the ratio of corporate equities directly held by institutional investors to total financial assets owned by institutional investors	Board of Governors, Release Z.1, Flow of Funds Accounts of the United States
ln(Dividend/CPI)	The logarithmic value of real corporate dividend payments	Board of Governors, Release Z.1, Flow of Funds Accounts of the United States; Bureau of Labor Statistics, Consumer Price Index

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