

# The Stock Market Boom and Manufacturing Investment

Christian E. Weller  
*Economic Policy Institute*

## Abstract

This paper analyzes the link between the run-up on the stock market and fixed investments in manufacturing during the late 1990s. The stock market run-up may have led lenders to invest primarily in companies that have seen large stock price gains, possibly raising financial constraints for many manufacturing firms. Further, large stock market gains made investments in fixed assets less attractive, thereby offering corporate decision makers incentives to use corporate resources to support share prices through dividend payouts and share repurchases. I found that investment in manufacturing was impeded by the developments of the stock market. The re-orientation of investment priorities in the face of rising stock prices is a consistent determinant of investment in manufacturing. The policy focus should be on offering incentives for corporate decision makers to prioritize productive investments over other uses of funds instead of means to entice lenders to increase lending to manufacturing firms.

Underlying the economic and stock market strength of the 1990s was accelerated productivity growth. Most of this growth originated in the manufacturing sector. But while the economy and the stock market boomed, manufacturing declined after 1998. The stock market run-up and manufacturing's decline, though, may be related. The bull market may have led lenders to focus on companies that saw large stock price gains, thus raising financial constraints for firms with smaller stock price gains, such as manufacturing. Also, stock market gains may have made financial investments more attractive than fixed investments, inducing corporate decision makers to use corporate resources to support share prices through dividend payouts and share repurchases.

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Author's address: Economic Policy Institute, 1660 L Street NW, Suite 1200, Washington, DC 20036

## Finance and Investment

Growth ultimately depends on physical capital accumulation that leads to quantitative and qualitative improvements. Investment is determined by the cost of capital, by investor expectations regarding prices and future sales, and by access to financing, but firms may not always get the financing they desire, since external financing is more expensive than internal financing because of informational costs in financial markets. Moreover, external shocks, such as tighter monetary policy or large increases in stock prices, may affect the availability of financing for physical capital accumulation.

The literature points to two channels by which the bull market may have affected investment financing in manufacturing (Weller and Helppie 2002). Lenders may have been reluctant to lend to manufacturing, because profit opportunities loomed larger elsewhere, and corporate decision makers may have desired to allocate corporate resources to supporting share prices through dividend payouts and share repurchases, thus leaving fewer internal resources for fixed investments.

In the 1990s the stock market continued its prolonged run-up that began in 1983 at an accelerated pace. The stock market grew by a real rate of 9 percent during the last business cycle, up from 5.7 percent during the previous one. Investment, however, although rising, remained below optimal levels. Gross investment relative to GDP remained below the levels last seen during the early 1980s, and for the entire business cycle, investment relative to GDP averaged 11.4 percent—below the levels of the 1980s and the late 1970s. Further, net investment relative to GDP averaged a mere 2.9 percent for the 1990s, its lowest level since the 1950s. Consequently, the capital stock eroded as nonresidential fixed assets relative to GDP were at their lowest level since the early 1970s. This decline was even more pronounced in manufacturing, especially outside of electronics and equipment manufacturing, as its share of total assets declined to a historic low of 17.8 percent in the 1990s.

An analysis of the Federal Reserve's *Flow of Funds Accounts* suggests that there is a link between the stock market run-up and declining investment for nonfinancial corporations. In particular, share repurchases were on average larger than new share issues, resulting in a drain on corporate resources equivalent to 9 percent of capital expenditures for the entire 1990s (Weller and Helppie 2002). Further, corporations paid out a record 50 percent of their earnings in dividends at the same time. Had corporate financing stayed the same in the late 1990s as in the early 1990s, investment could have been 5 percent higher, and had it remained the same as in the 1980s, it could have been 2 percent higher.

To analyze the link between the stock market and investment in manufac-

turing, we use the Census Bureau's *Quarterly Financial Report* (QFR), which includes income statement and balance sheet data for all manufacturing corporations with assets over \$250,000 and of retail and wholesale trade corporations with assets over \$50 million.

At face value, there is little evidence, though, that manufacturing firms faced rising financial constraints in response to stock market increase. The only exception may have been small manufacturing firms that increased their investments faster than other manufacturing firms but that also appeared to have more restricted access to long-term financing (Weller and Helppie 2002). Using a univariate analysis, however, does not allow for controls of the effects of a number of influences on investment in order to isolate the impact of the stock market on investment. Instead, using a multivariate analysis allows for an analysis of the joint effects of financial market changes and other factors on investment. Gertler and Gilchrist's (1994) analysis is adapted here to include stock market changes:

$$(1) \Delta I_t = \beta_1(ES_{t-1} - Inv_{t-1}) + \beta_2 i_{t-1} + \beta_3 CR_{t-1} + \beta_4 B_{t-1} + \beta_5 \Delta I_{t-1} + \beta_6 \Delta S_{t-1} + \beta_8 CR_{t-1} + \beta_9 \Delta B_{t-1} + \varepsilon_t$$

Fixed capital growth,  $\Delta I$ , is determined by the difference between expected sales,  $ES$  and inventory,  $Inv$ , by the short-term interest rate,  $i$ , by the coverage ratio,  $CR$ , by a measure for the stock market bubble,  $B$ , and by the changes of fixed capital, sales, the coverage ratio, and the bubble measure during the previous quarter. Expected sales are defined as actual sales in the previous quarter extended by the average growth rate of the prior four quarters. (Details on each variable are included in Table A-1.)

I am particularly interested in the effects of financial variables on investment in manufacturing. In particular, there are two possible channels by which the run-up of the stock market may have impacted investment by manufacturing firms. First, external financial constraints may have grown as lenders turned away from manufacturing in the second part of the 1990s to pursue investments elsewhere. Hence, I expect that the coverage ratio will have a stronger effect on investment in the late 1990s than in the early 1990s. On the basis of standard findings for manufacturing firms, I also expect that this effect varies by firm size, such that small firms are more impacted than larger firms. Second, corporate decision makers may decide to allocate internal resources to uses other than fixed investments as the stock market increases. This possibility is captured by including a measure for the stock market bubble in the regression. In particular, Chirinko and Schaller's (1996) measure for the

difference between fundamental and observed price is added, such that a greater stock market bubble should reduce investment growth.

The first regression in Table 1 presents the baseline model, estimating equation (1) for all firms for the entire business cycle. All variables have the correct sign or are insignificant. Faster sales growth results in more physical capital formation, and more investment in the last quarter results in less in-

TABLE 1  
Regression Results for Determinants of Investment in Manufacturing, 1990–2001

Explanatory Variables	Full Sample, 1990–2001	Partial Sample, 1990–1995	Partial Sample, 1995–2001
$ES_{t-1}-Inv_{t-1}$	0.018 (0.106)	-0.135 (0.129)	0.244 (0.170)
$i_{t-1}$	0.004 (0.009)	-0.002 (0.011)	0.049 (0.039)
$CR_{t-1}$	0.017 (0.015)	0.001 (0.014)	0.161*** (0.053)
$B_{t-1}$	-0.016* (0.009)	-0.053 (0.034)	0.017 (0.030)
$\Delta I_{t-1}$	-0.350*** (0.027)	-0.265*** (0.038)	-0.389*** (0.038)
$\Delta S_{t-1}$	0.055*** (0.021)	0.085*** (0.026)	0.016 (0.033)
$\Delta i_{t-1}$	-0.003 (0.030)	0.049 (0.038)	-0.077 (0.086)
$\Delta CR_{t-1}$	0.004 (0.008)	0.004 (0.007)	0.125 (0.100)
$\Delta B_{t-1}$	-0.059* (0.036)	-0.501** (0.248)	-0.072* (0.040)
Constant	6.302*** (0.293)	8.886*** (1.732)	4.960*** (1.028)
$N$	1594	758	836
Wald $\chi^2$	191.18	56.76	145.82
$p$ value	0.000	0.000	0.000

Note: All variables are measured in natural logs, except for  $ES_{t-1}-Inv_{t-1}$ , which is measured by  $100 \cdot \log$ .

\*Significant at the 10% level.

\*\*Significant at the 5% level.

\*\*\* Significant at the 1% level.

vestment in the current quarter. In comparison, a stock market bubble has an overall negative impact, but the coverage ratio has no discernible effect. Hence, although there are no signs of financial constraints, there is an indication that the stock market run-up may have helped to attract funds away from manufacturing investment.

The early 1990s may have been different from the late 1990s, because the late 1990s were marked by a sharp increase in stock market growth. The next two columns present separate estimates for the early and late 1990s. Stock market bubbles had a significant negative impact on investment in the early part of the 1990s, while other financial variables did not. In comparison, financial constraints arise for all manufacturing firms in the late 1990s as the coverage ratio has a strong positive effect on investment. But the stock market has a substantially smaller effect on investment in the latter part of the decade than during the early 1990s. The results indicate that investment was hindered by financial profit opportunities that attracted funds that would have otherwise gone to fund physical capital in the early 1990s and by financial constraints arising from lenders' reluctance to give money to manufacturing in the late 1990s.

The descriptive statistics indicated that especially small manufacturing firms may have experienced financial constraint. Thus, a dummy is added that takes on the value of 1 for small firms and 0 otherwise. In addition, an interactive term between the coverage ratio and stock market bubble and firm size is included (Table 2). The coverage ratio has a strong significant effect for small firms, but not for large firms, which suggests that small firms faced more financial constraints than larger firms. Moreover, this effect is three times as great in the late 1990s as it is in the early 1990s, which suggests that small firms faced increasing financial constraints when the stock market experienced increasing growth rates. Moreover, investment by small firms is adversely affected by a stock market bubble in the late 1990s, which suggests that the reorientation of investment away from productive investments especially affected small firms. Overall, the results confirm that financial market changes in the late 1990s resulted in less investment than would have occurred otherwise by small manufacturing firms.

Finally, it is generally accepted that investment decisions vary by product type. Thus, a dummy is added that takes on the value of one for durable goods-producing firms and zero otherwise. The estimates in Table 3 suggest that investment by durable goods-producing firms was more heavily impacted by the reorientation away from productive investments than nondurable goods-producing firms. Hence, investment by both types of manufacturing firms was less than desired, because of the run-up on the stock market, with a stronger effect on durable goods-producing firms than nondurable goods-producing

TABLE 2

Regression Results for Determinants of Investment Growth in Small and Large Manufacturing Firms, 1990–2001

Explanatory Variables	All Firms with Size Controls, 1990–2001	All Firms with Size Controls, 1990–1995	All Firms with Size Controls, 1996–2001
$ES_{t-1} - Inv_{t-1}$	-0.313** (0.154)	-0.472** (0.192)	-0.079 (0.247)
$i_{t-1}$	0.010 (0.009)	0.001 (0.011)	0.055 (0.039)
$CR_{t-1}$	0.010 (0.016)	0.003 (0.015)	0.110 (0.085)
Small firms * $CR_{t-1}$	0.117*** (0.016)	0.031 (0.052)	0.172 (0.111)
$B_{t-1}$	-0.016 (0.013)	-0.055 (0.043)	-0.008 (0.042)
Small firms * $B_{t-1}$	0.002 (0.017)	0.018 (0.051)	0.053 (0.058)
$\Delta I_{t-1}$	-0.352*** (0.027)	-0.275*** (0.038)	-0.386*** (0.038)
$\Delta S_{t-1}$	0.040* (0.021)	0.078*** (0.027)	0.001 (0.034)
$\Delta i_{t-1}$	-0.003 (0.029)	0.047 (0.038)	-0.080 (0.086)
$\Delta CR_{t-1}$	0.002 (0.008)	0.003 (0.007)	0.056 (0.248)
Small firms * $\Delta CR_{t-1}$	0.228*** (0.084)	0.374*** (0.135)	0.068 (0.272)
$\Delta B_{t-1}$	-0.009 (0.050)	-0.434 (0.308)	-0.002 (0.056)
Small firms * $\Delta B_{t-1}$	-0.123* (0.070)	-0.096 (0.366)	-0.156** (0.080)
Small firms	-1.872*** (0.951)	-3.109 (2.884)	-0.364 (0.268)
Constant	6.111*** (0.382)	8.550*** (2.160)	5.474** (2.436)
$N$	1594	758	836
Wald $\chi^2$	217.85	70.83	157.31
$p$ value	0.000	0.000	0.000

Note: All variables are measured in natural logs, except for  $ES_{t-1} - Inv_{t-1}$ , which is measured by  $100 \cdot \log$ .

\*Significant at the 10% level.

\*\*Significant at the 5% level.

\*\*\*Significant at the 1% level.

TABLE 3

Regression Results for Determinants of Investment Growth in Durable and Nondurable Goods-Producing Firms, 1990-2001

Explanatory Variables	All Firms with Size Controls, 1990-2001	All Firms with Size Controls, 1990-1995	All Firms with Size Controls, 1996-2001
$ES_{t-1} - Inv_{t-1}$	0.046 (0.001)	-0.010 (0.133)	0.238 (0.172)
$i_{t-1}$	0.005 (0.009)	-0.003 (0.011)	0.047 (0.039)
$CR_{t-1}$	0.078* (0.045)	0.032 (0.048)	0.165** (0.080)
Durable goods * $CR_{t-1}$	-0.071 (0.047)	-0.038 (0.050)	-0.022 (1.03)
$B_{t-1}$	-0.028** (0.013)	-0.072* (0.044)	0.096** (0.045)
Durable goods * $B_{t-1}$	0.021 (0.018)	0.023 (0.051)	-0.132** (0.058)
$\Delta I_{t-1}$	-0.354*** (0.027)	-0.267*** (0.038)	-0.394*** (0.038)
$\Delta S_{t-1}$	0.053*** (0.021)	0.084*** (0.026)	0.016 (0.033)
$\Delta i_{t-1}$	-0.001 (0.029)	0.056 (0.038)	-0.074 (0.086)
$\Delta CR_{t-1}$	0.258** (0.110)	0.100 (0.141)	0.371** (0.167)
Durable goods * $\Delta CR_{t-1}$	-0.255** (0.111)	-0.097 (0.141)	-0.393* (0.207)
$\Delta B_{t-1}$	-0.103** (0.051)	-0.470 (0.313)	-0.142** (0.058)
Durable goods * $\Delta B_{t-1}$	0.076 (0.071)	-0.156 (0.366)	0.128 (0.080)
Durable goods	2.237* (1.176)	2.184 (2.959)	3.104 (2.081)
Constant	3.903*** (1.125)	7.603*** (2.610)	3.014* (1.668)
$N$	1594	758	836
Wald $\chi^2$	204.62	62.36	158.00
$p$ value	0.000	0.000	0.000

Note: All variables are measured in natural logs, except for  $ES_{t-1} - Inv_{t-1}$ , which is measured by  $100 \cdot \log$ .

\*Significant at the 10% level.

\*\*Significant at the 5% level.

\*\*\*Significance at the 1% level.

firms. The mechanism by which investment was lowered was a reorientation by corporate decision makers away from productive capacity at the firm levels toward other investments rather than a reluctance on the part of lenders to lend to manufacturing.

## Conclusion

In this paper, I studied the connection between the run-up on the stock market and fixed investments. The results show that investment in manufacturing was impeded by the developments of the stock market. Although increased financial constraints and reorientation of investment priorities seem to have impacted investment, the reorientation of investment priorities in the face of rising stock prices is a more consistent factor. Especially, investments by small manufacturing firms and by durable goods-producing firms were adversely affected by the rise on the stock market in the late 1990s.

The results suggest that the run-up of the stock market impeded investment, particularly in the manufacturing sector, more because of changes in investment priorities by corporate decision makers than because of a reluctance on the part of lenders. Hence, the policy focus should be on offering incentives for corporate decision makers—managers and shareholders—to prioritize productive investments over other uses of funds instead of means to entice lenders to increase lending to manufacturing firms.

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TABLE A-1  
Variable Definitions and Sources

Variable Name	Definition	Source
Investment	The difference in the current quarter's level of Fixed Assets from the previous quarter's	QFR
Coverage Ratio	The ratio of cash flow to total interest payments	QFR
Sales	Total quarterly sales	QFR
Stock Market Bubble	Difference between actual stock price and trend stock price	Standard and Poor's