finance and numerous aspects of the tax code, including personal and corporate rate taxes, investment tax credits, and depreciation deductions. Stock-market fluctuations influence the cost of capital by affecting the expected cost of equity finance. A decline in the stock market implies an increase in the expected cost of equity finance and, thus, in the cost of capital.

Focusing on the cost of capital as the link between the stock market and investment, however, ignores the advantages of the \( q \) approach. In theory, stock-market fluctuations occur in response to new information about both future demand and future capital costs. If true, this implies that \( q \) should be more informative than the cost of capital.

As a practical matter, however, the advantages of the \( q \) approach have yet to be realized. While financial markets seem to respond to a wide variety of economic data, economists have not reached agreement on how to isolate the information contained in market values relevant to investment decisions. If market values are not equal to the present discounted value of future returns to capital, the link between \( q \) and the rate of investment is weakened substantially. In addition, measuring the replacement value of the capital stock is complicated by continual technological change and lack of price information for many types of unique physical assets. Measurement of market values of financial liabilities is difficult because many financial liabilities are not widely traded.

**Conclusion**

In this Economic Commentary, we have focused on the relations between \( q \), stock-market fluctuations, and investment. The links between the three are greatest if financial markets correctly incorporate information about future returns from the capital stock. Even then, however, the response of investment to a change in \( q \) is not immediate because of costs incurred in adjusting the capital stock and the delay inherent in the appropriations-orders investment process. Another problem that persists even if financial-market values are correct is the difficulty of calculating marginal \( q \).

The usefulness of average \( q \), which is more easily measured than marginal \( q \), is limited in analyzing short-run changes in investment. If stock-market values are not "correct," as may have been the case during the recent market rise and plunge, the link between \( q \) and investment is weaker still. In that case, movements in the stock market may be expected to influence investment through their effect on the cost of financing investment.

However, recent research emphasizes that some firms may fail to respond to changes in the cost of equity finance because of financial constraints. Of course, a focus on the cost of capital as the mechanism through which stock-market fluctuations influence investment ignores the advantage of \( q \). In theory, incorporation of information about \( q \) should incorporate information about more than just the expected cost of capital. Unfortunately, as a practical matter, the advantages of the \( q \) approach have yet to be realized.

**References**


Federal Reserve Bank of Cleveland

**ECONOMIC COMMENTARY**

**Stock-Market gyrations and investment**

by William P. Osterberg

The worldwide stock-market decline on October 19 has increased uncertainty about future changes in employment and output both in the United States and abroad. Part of the reason for this uncertainty is that changes in the level of equity prices have one of the best leading indicators of economic activity (Moore, 1980). In particular, the stock-market decline may affect consumer spending and business purchases of plant and equipment.

Consumer spending may be influenced through changes in the level of consumer confidence and changes in consumer wealth. Business fixed investment (BMI) may be affected by changes in the cost of financing investment and by changes in businesses' expectations of future demand. In addition, there is a presumption that stock prices, to some extent, reflect information about future demand, future interest rates, and a wide variety of other factors that are related to future economic activity. Whether stock prices correctly reflect the best available information is a question fundamental to the economics profession.

To the extent that they correctly reflect market expectations, stock prices may be valuable aids in forecasting future economic activity, particularly investment. While some preliminary information useful in predicting future consumer spending and BMI become available before the actual spending data are released, the data releases are infrequent compared to the almost instantaneous revelations of equities reflected in the stock market.

In this Economic Commentary, we analyze the relationship between stock-market gyrations and business fixed investment. We focus on BMI rather than on consumption for two reasons. First, although BMI comprises only 10 percent of gross national product (GNP), fluctuations in BMI are tied closely to changes in GNP. Second, if stock prices correctly reflect the best available information, then stock-market fluctuations should be closely tied to BMI.

One widely used investment theory directs us to focus on the ratio of the market value of financial liabilities to the replacement value of physical assets, a ratio called \( q \). In this article, we use the \( q \) theory to examine the relationship between the stock market and BMI. We find that, even if stock-market values are "correct," stock-market fluctuations only indirectly influence BMI.

**Investment and \( q \)**

A relationship between stock-market fluctuations and investment was predicted by Keynes (1936, p. 151): "The fluctuations of the Stock Exchange...invariably exert a decisive influence on the rate of current investment. For this reason it is sense in building up a new enterprise at a cost greater than that at which a similar enterprise could be purchased..." This passage, and subsequent developments in investment theory, imply that changes in the value of BMI plus equity should be related to decisions to add to the capital stock. Because investment is an

1. Business fixed investment (BMI) refers to the nonresidential business fixed investment component of the GNP accounts. Expenditures on plant and equipment constitute about 90 percent of BMI.
2. While this article focuses on BMI, it is difficult to separate the market value of physical assets such as plant and equipment from the value of other assets such as land, inventories, and intangibles such as future investment opportunities or patents.
Figure 1 Average q and the Rate of Investment for Nonfinancial Corporations

| Year | Average q | Rate of Investment
<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
<tr>
<td>1970</td>
<td>0.95</td>
<td>0.10</td>
</tr>
<tr>
<td>1971</td>
<td>0.94</td>
<td>0.11</td>
</tr>
<tr>
<td>1972</td>
<td>0.93</td>
<td>0.12</td>
</tr>
<tr>
<td>1973</td>
<td>0.92</td>
<td>0.13</td>
</tr>
<tr>
<td>1974</td>
<td>0.91</td>
<td>0.14</td>
</tr>
</tbody>
</table>

SOURCE: See footnote 5, below.

Marginal and Average q

Because investment concerns additions to the capital stock, it necessarily concerns the marginal q, which is the difference between the total average q and the rate of investment. At first, if q has increased, a relatively high and costly rate of investment will be required to maintain the value of the firm’s liabilities, because the time required for obtaining or paying off a given amount of capital is increased. If q falls below one, net investment will be negative.

In general, the rate of investment will be lower than the value of q, if there is a price difference between the amount of capital that is already invested and the amount of capital that is required for its future use.

Lags in the Response to Investment to a Change in q

Even if a change in q reflects a change in the correct valuation of the future returns generated by the capital stock, the response of investment to a change in q may be delayed and depend on the nature of the market. If q falls, firms may reduce investment by canceling orders, or they may decide to reduce their own capacity when the excess of the cost of a new capital stock over the market value of the returns from it is higher.

Since many factors affect the cost of investment, it is difficult to predict the response of investment to a change in q. The response of investment to a change in q may be delayed and may depend on the nature of the market. If q falls, firms may reduce investment by canceling orders, or they may decide to reduce their own capacity when the excess of the cost of a new capital stock over the market value of the returns from it is higher.

Changes in expectations about the tax code can affect the marginal and average q. The tax code affects the cost of investment, which is reflected in the marginal q. Changes in expectations about the tax code can affect the average q, which is the ratio between the total cost of capital and the total cost of investment.

The response of investment to a change in q may be delayed and may depend on the nature of the market. If q falls, firms may reduce investment by canceling orders, or they may decide to reduce their own capacity when the excess of the cost of a new capital stock over the market value of the returns from it is higher.

Financial Constraints and the Link Between q and Investment

Recent work for example, has suggested that the stock market decline in October did not reflect a revaluation of expectations about the future returns from the capital stock. If actual market values do not accurately reflect such information, how useful is q? Many analysts have suggested that the stock market decline in October did not reflect a revaluation of expectations about the future returns from the capital stock. If actual market values do not accurately reflect such information, how useful is q? Many analysts have suggested that the stock market decline in October did not reflect a revaluation of expectations about the future returns from the capital stock. If actual market values do not accurately reflect such information, how useful is q? Many analysts have suggested that the stock market decline in October did not reflect a revaluation of expectations about the future returns from the capital stock. If actual market values do not accurately reflect such information, how useful is q? Many analysts have suggested that the stock market decline in October did not reflect a revaluation of expectations about the future returns from the capital stock. If actual market values do not accurately reflect such information, how useful is q? Many analysts have suggested that the stock market decline in October did not reflect a revaluation of expectations about the future returns from the capital stock. If actual market values do not accurately reflect such information, how useful is q? Many analysts have suggested that the stock market decline in October did not reflect a revaluation of expectations about the future returns from the capital stock. If actual market values do not accurately reflect such information, how useful is q? Many analysts have suggested that the stock market decline in October did not reflect a revaluation of expectations about the future returns from the capital stock. If actual market values do not accurately reflect such information, how useful is q? Many analysts have suggested that the stock market decline in October did not reflect a revaluation of expectations about the future returns from the capital stock. If actual market values do not accurately reflect such information, how useful is q? Many analysts have suggested that the stock market decline in October did not reflect a revaluation of expectations about the future returns from the capital stock. If actual market values do not accurately reflect such information, how useful is q? Many analysts have suggested that the stock market decline in October did not reflect a revaluation of expectations about the future returns from the capital stock. If actual market values do not accurately reflect such information, how useful is q? Many analysts have suggested that the stock market decline in October did not reflect a revaluation of expectations about the future returns from the capital stock. If actual market values do not accurately reflect such information, how useful is q? Many analysts have suggested that the stock market decline in October did not reflect a revaluation of expectations about the future returns from the capital stock. If actual market values do not accurately reflect such information, how useful is q? Many analysts have suggested that the stock market decline in October did not reflect a revaluation of expectations about the future returns from the capital stock. If actual market values do not accurately reflect such information, how useful is q? Many analysts have suggested that the stock market decline in October did not reflect a revaluation of expectations about the future returns from the capital stock. If actual market values do not accurately reflect such information, how useful is q? Many analysts have suggested that the stock market decline in October did not reflect a revaluation of expectations about the future returns from the capital stock. If actual market values do not accurately reflect such information, how useful is q? Many analysts have suggested that the stock market decline in October did not reflect a revaluation of expectations about the future returns from the capital stock. If actual market values do not accurately reflect such information, how useful is q? Many analysts have suggested that the stock market decline in October did not reflect a revaluation of expectations about the future returns from the capital stock. If actual market values do not accurately reflect such information, how useful is q? Many analysts have suggested that the stock market decline in October did not reflect a revaluation of expectations about the future returns from the capital stock. If actual market values do not accurately reflect such information, how useful is q? Many analysts have suggested that the stock market decline in October did not reflect a revaluation of expectations about the future returns from the capital stock.
addition to the capital stock, however, firms need to compare the market value of the returns to be generated by additions to the capital stock and the cost of adding to the capital stock. If the ratio between the market value and the cost for additions (marginal q) exceeds one, net investment (BF) minus depreciation will be positive. If marginal q falls below one, net investment will be negative.

The act of building up or reducing the capital stock alters average q (the market value of all existing liabilities divided by the replacement value of the existing capital stock) by increasing the total replacement value of the capital stock. If q falls below one, net investment will be negative.

Lags in the Response of Investment to a Change in q

Even if a change in q reflects a change in the correct valuation of the future returns generated by the capital stock, the response of investment to a change in q may be delayed and may be affected by time. If the capital market rises, q will increase, and the market value of the capital stock will rise. If the firm wishes to add to the capital stock, it may have to wait until the market value of the capital stock reaches a level at which the firm can afford to buy the additional capital stock. The time delay between the change in average q and the increase in the market value of the capital stock is increased by the time delay in the response of investment to a change in q. Between June 30, 1987, and the end of November 1987, the market value of the capital stock increased by about 10 percent. The capital purchase price may be cut off. Rather than issue more stock, the firm may choose to buy back existing stock, the stock price must rise enough to compensate for the additional return to be generated by the new capital stock. Alternatively, the firm can weaken the link between q and investment. Not all firms will issue shares if their share price rises or buy back equity if their share price falls. So, fluctuations in q will not affect the rate of investment for all firms.

Financial Constraints and the Link Between q and Investment

Recent work (see, for example, Pagani, Hubbard, and Peterson [1987]) has explicitly shown how constraints on firms' ability to raise funds for investment can weaken the link between q and investment. Not all firms will issue shares if their share price rises or buy back equity if their share price falls. So, fluctuations in q will not affect the rate of investment for all firms.

Small and growing firms are likely to face constraints on their ability to finance investment. Small firms may not be as well-known, so investors may require a higher rate of return, or lower price, in order to hold their shares. A growing firm needs to utilize external sources of funding, since funds required may not be available internal funds, or cash flow.

In order for such firms to respond to an increase in q, they need to issue new stock, the stock price must rise enough to compensate for the additional return to be generated by the new capital stock. Alternatively, the firm can weaken the link between q and investment. Not all firms will issue shares if their share price rises or buy back equity if their share price falls. So, fluctuations in q will not affect the rate of investment for all firms.

The Cost of Capital, q, and Investment

In fact, fluctuations in q as the link between stock market fluctuations and investment is to focus on the cost of capital, q, as well as the amount of available internal funds, or cash flow. The cost of capital is a critical determinant of the firm's ability to finance investment and to make the cost of equity issue lower than the cost of using internal funds. Fluctuations in stock prices that do not succeed in reducing the cost of share issue below the firm's cost of capital will not succeed in reducing the cost of equity issue. Because such firms tend to be constrained by cash flow, investment would tend to respond more to fluctuations in cash flow than to q.
the present discounted value of future returns to capital, the link between \( q \) and the rate of investment is weakened substantially. In addition, measuring the replacement value of the capital stock is complicated by continual technological change and lack of price information for many types of unique physical assets. Measurement of market values of financial liabilities is difficult because many financial liabilities are not widely traded.

### References


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**ECONOMIC COMMENTARY**

**Stock-Market Gyrations and Investment**

by William P. Osterberg

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The worldwide stock-market decline on October 19 has increased uncertainty about future changes in employment and output both in the United States and abroad. The primary reason for this uncertainty is that changes in the level of equity prices have been one of the leading indicators of economic activity (Moore, 1980). In particular, the stock-market decline may affect consumer spending and business purchases of plant and equipment.

Consumer spending may be influenced through changes in the level of consumer confidence and changes in consumer wealth. Business fixed investment (BFI) may be affected by changes in the cost of financing investment and by changes in businesses' expectations of future demand.

In addition, there is a presumption that stock prices, to some extent, reflect information about future demand, future interest rates, and a wide variety of other factors that are related to future economic activity. Whether stock prices correctly reflect the best available information, then stock-market fluctuations should be closely tied to BFI.

One widely used investment theory directs us to focus on the ratio of the market value of financial liabilities to the replacement value of physical assets, a ratio called \( q \). In this article, we use the \( q \) theory to examine the relationship between the stock market and BFI. We find that, even if stock-market values are "correct," stock-market fluctuations do not consistently influence BFI.

### Investment and \( q \)

A relationship between stock-market fluctuations and investment was predicted by Keynes (1936, p. 151): "the daily evaluations of the Stock Exchange...inadvertently exert a decisive influence on the rate of current investment..." The '\( q \) theory' seeks to build up a new enterprise at a cost greater than that at which a similar enterprise could be purchased.

This passage, and subsequent developments in the theory of investment, suggests that there should be a close relationship between \( q \) (the ratio of the market value of financial liabilities to the replacement value of physical assets) and the rate of physical investment.

The theory relating \( q \) to investment is the "preferred theoretical description of investment" because it links investment to expectations about the future (Fischer, 1986).

The link between \( q \) and investment is strongest if the financial markets' valuations of debt plus equity correctly reflect relevant economic information and if investment decisions are made so as to maximize the market value of a firm's liabilities (debt plus equity).

In theory, the correct value of debt plus equity reflects all information about the returns to be received by the owners of a firm's physical capital. In the real world, the market value of debt plus equity should equal the present discounted value of the future after-tax returns to be received by the bondholders and stockholders. Thus, if the financial markets' valuations are correct, they reflect two types of information: 1) information about the future returns to be received after firm tax revenues are used to pay wages and taxes, and 2) information about rates of return available on alternative investment opportunities. For this reason, the theory is more easily understood and translated into practical terms.

If the stock market correctly reflects the value of the returns to be generated by the capital stock, and if the market is efficient, the capital stock's value in the market should equal the present discounted value of the future returns of the firm. Because investment is an

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1. Business fixed investment (BFI) refers to the nonresidential business fixed investment component of the GNP accounts. Expenditures on plant and equipment constitute about 90 percent of BFI.

2. While this article focuses on BFI, it is difficult to separate the market value of physical assets such as plant and equipment from the value of other assets such as land, inventories, and intangibles such as future investment opportunities or patents.