Why Policymakers Might Care about Stock Market Bubbles

by Paul Gomme

On the face of it, it's somewhat perplexing that variations in the stock market should have effects on the macroeconomy more generally. After all, on each side of a stock market transaction is a buyer and a seller; the sale of stock by one individual corresponds to the transfer of ownership of a small piece of a firm to another individual. Following such a transaction, the firm can continue to produce the same goods and services since all the employees still work for the firm, the firm still owns the same plant and equipment, and the particular ways of utilizing these inputs are still known.

But the stock market's ups and downs can have very real, if not direct, effects on the macroeconomy. Stock market bubbles are a case in point. The inevitable crash that follows a bubble has the potential to cause recessions—the Great Depression being the worst-case example of that connection to date. The mere possibility of repeating an episode so destructive warrants policymakers' interest in the behavior of the stock market, even though the link between the stock market and the macroeconomy may not be well understood. Indeed, there is continuing debate within the economics profession over the exact causes of the Great Depression, as well as the factors that led to its severity and duration. We should also keep in mind that the link between the stock market and the macroeconomy is not very tight. As Paul Samuelson quipped, the stock market has predicted nine of the last five recessions. Perhaps the lack of a tight connection between the stock market and the macroeconomy is a positive development, particularly if we think that policymakers have managed to

insulate the macroeconomy somewhat from stock market fluctuations.

If there isn't much of a link between the stock market and the supply side of the economy (the ability of the economy to produce goods and services), then perhaps there is one between the stock market and the demand side (the influences on demand for goods and services). Two likely candidates present themselves: consumption and investment. The next section briefly examines the consumption channel and finds that it simply isn't big enough. We then examine the more promising channel of investment. We consider a particular theory of investment (known to economists as Tobin's q), but the crux of the argument is that stock market prices serve as a signal to firms' managers to buy new investment goods. We will see that a stock market crash can very quickly lead to a reduction in investment, and so a recession. Further, we will see that such investment-triggered recessions may be long-lived.

■ Wealth Effects

One reason that fluctuations in stock prices may affect the macroeconomy is that individuals who hold stocks, either directly or indirectly (for example, through mutual funds or pension plans), feel poorer when the stock market falls. This wealth effect causes people to cut back on their consumption, a major component of aggregate demand.

How big might these wealth effects be? Consider what happened during the stock market decline that began in the first quarter of 2000 and ended in the third quarter of 2002. Over this period, the combined market capitalization of the NASDAQ and NYSE fell from 1.9

This *Commentary* makes a case for Fed action in the event of a stock market bubble. Because stock market prices serve as a signal to business managers to invest, bubbles can mislead managers into investing when it is not profitable. The overinvestment, which becomes apparent after the bubble bursts, can lead to a period of low investment, which can cause a recession. Policymakers may wish to step in to end a bubble before stock prices get too far out of line relative to their fundamentals.

times GDP to 1 times GDP. Such a fall in market wealth is estimated to have caused a reduction in consumption of 0.36 percent of GDP. (This figure is calculated using a reasonable estimate of the degree to which U.S. consumers change their consumption when their wealth changes—known as the "marginal propensity to consume out of wealth"—of 4 percent. That is, for every $100 decline in wealth, the estimate suggests that U.S. consumers lower their consumption by $4.) Put differently, we would expect GDP growth to be 0.36 percentage points lower than it would have been had the stock market capitalization stayed at 1.9 times GDP.

While 0.36 percentage points of growth over 10 quarters is nothing to sneeze at, it certainly is not a disaster. In fact, it would be difficult to identify a 0.36 percentage point change in growth in light of the large and routine fluctuations in GDP growth during a business cycle expansion. In other words, this wealth

effect is unlikely the channel that causes stock market crashes to lead to recessions.

■ Tobin's q

We now turn to a more promising channel between the stock market and the macroeconomy: investment. Some economists argue that stock market prices provide information that business managers use to make investment decisions, and when the market is overvalued, it leads to overinvestment. James Tobin expressed this idea in his "q theory" of investment. It's only one way the stock market might affect investment and, in turn, the macroeconomy, but it will serve to illustrate how the link might work.

To start, Tobin defines a "marginal q" for a firm as the ratio of the market value of new additional investment goods to their replacement cost. The reason q is of interest is that only when q is greater than one should the firm invest (purchase new capital goods). To understand why q being greater than one is the crucial relationship, consider the following example. Suppose that a firm has an investment project that costs $1 million to implement, and this project will increase the market value of the firm by $1.5 million. In this case, q equals 1.5, and proceeding with the project generates a net gain of $500,000. In fact, only when q is greater than one will a project generate a net gain for the firm.

While the replacement cost of new capital goods is known, figuring out how the stock market will value the firm with this new investment is problematic. Consequently, the related "average q" is more typically used; it is defined as the ratio of the stock market valuation of the firm to the replacement cost of its assets. Notice that if average q is greater than 1, then investors' valuation of the firm exceeds the cost of its assets. Again, average q being greater than one is the key relationship that signals what we would expect to happen to investment in the future. Consider a specific example: Suppose the firm has a market value of $300 million, while the replacement cost of its assets is $250 million; then its average q equals 1.2. Now, suppose that the firm could create an exact replica of itself, at a cost of $250 million (the replacement cost of its assets). If this "copy" could be sold on the stock market for $300 million (the current market value of the firm), then $50 million in additional value would be generated. In other words, by spending only $250 million, the replicated firm would have a market value of $300 million, so that the investment would yield a substantial return and so should be undertaken.

■ The Connection to the Macroeconomy

The story told by Tobin's q is, perhaps, overly stylized. For example, it may be difficult for firms to replicate themselves. The market value of a firm includes the value of its intangible assets—things like patents, copyrights, and trademarks. In this case, we would expect to see average q be greater than one even though there is no compelling reason for the firm to increase its investment activity. This example points out that what we would really like to know is marginal q, but what we observe is average q.

Nonetheless, the basic intuition underlying Tobin's q is compelling: Changes in stock prices should serve as a signal to firms' managers. Consider what should happen when a firm discovers a process that makes it more productive, or equivalently, allows it to produce its goods at a lower cost than its competitors. Realizing the competitive advantage now held by this firm, investors on the stock market will bid up the price of the firm. This run-up in the firm's stock price then serves as a signal to the firm's managers to increase their purchases of capital goods. Through the lens of Tobin's q theory, the firm's q would initially equal one. Following the discovery of the new process, the firm's q would rise above one as its stock price increases. Above, we saw that when q is greater than one, it is a signal to the firm to increase its purchases of investment goods.

Of course, the stock market prices of other firms in the industry should fall because they are now at a competitive disadvantage, and their qs will presumably be driven below one. The fall in these other firms' stock prices (such that their q is less than one) signals that these firms should not be buying investment goods.

So, in the normal course of events, stock market prices (firms' qs) send the appropriate signals to firms: Invest only if q is greater than one.

■ Stock Market Bubbles and Investment

A problem arises when "irrational exuberance" leads to a "bubble" in stock market prices—that is, when the stock market prices of firms rise above their fundamental prices, as dictated by the present value of firms' current and future dividends. In this case, many—perhaps even all—firms see their q rise above one. And according to q theory, firm managers will increase their investment in capital goods. This is the first problem: Owing to the stock price bubble, firms are buying capital goods when they "shouldn't be."

The second problem arises when the bubble pops. If firms' profitability is more or less unchanged, then stock prices should return to their previous fundamental levels. But during the bull market, firms acquired lots of capital goods (after all, their qs were larger than one). As a result, the replacement cost of firms' assets has increased, thereby driving down their average qs. Consequently, we would expect that firms would curtail their purchases of investment goods for some time.

Of course, there's a complication in that firms have more capital goods at their disposal and so can produce more goods. Each firm now generates more profits, and so the fundamental stock market price of the firm should be higher. But these investment projects have relatively low returns; if they didn't, firms would have made these investments before the stock market bubble. So while each firm can generate more profits, now and in the future, the increase in profits is smaller in percentage terms than the increase in the firm's assets. Consequently, the contribution of these additional capital goods still constitutes a drag on average q. Firms' purchases of investment goods will, then, be low.

■ Does It Matter?

Are policymakers right to be concerned about the stock market? More importantly, if the stock market is characterized by a bubble, should policymakers react? While a bursting bubble will certainly affect investment, if the investment effects are small, then there is little for policymakers to worry about—at least from the macroeconomic perspective.

To estimate the size of the effects, consider the following. From 1929 to the present, private fixed nonresidential investment (the relevant measure for the *q* calculations) has averaged 9.5 percent of GDP; if we consider only the post–World War II period, the average rises to 10.5 percent. So, following the bursting of a stock market bubble, suppose that investment falls from 10 percent to 0 percent (the lower bound for investment). Such a fall would precipitate a 10 percent fall in GDP, and so a 10 percentage point fall in GDP growth. Now we're talking about recession-sized changes in output.

Such a fall in investment—and so GDP—could easily occur very quickly. Tobin's *q* theory would suggest that the fall would occur the instant that firms' *q*s fall below one, but given the fact that many investment projects take several quarters to complete, the fall in investment would likely be somewhat more gradual.

The period of low investment following a stock market crash is likely to be prolonged. After all, during the bull market preceding the crash, firms were acquiring lots of capital goods. After the crash, firms find themselves with more capital than they "need"—a situation often referred to as "capital overhang." Over time, this "excess" capital will be worked off through both economic growth and depreciation of firms' existing capital. But this process can be expected to take quite some time.

■ **Conclusions**

This *Commentary* has given a potential rationale for policymakers to monitor the stock market. However, it is only when there is a bubble—when stock prices deviate from their fundamental values—that trouble can arise. During a bubble, firms are undertaking investments that they "shouldn't." When the bubble pops and stock market prices return to their fundamental prices, we can expect a long period of low investment, and likely recession.

The forces that perpetuate a stock market bubble are somewhat better understood than the causes of a bubble. Even those investors who recognize that the market is experiencing a bubble will rationally participate in the bubble. After all, stock market prices are rising, and positive gains can be earned while the bubble lasts—that is, so long as there is some other investor willing to buy your stock at an "inflated" price. It is in this context that policymakers may wish to step in to end the bubble before stock prices get too far out of line relative to their fundamentals.

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