

Federal Reserve Bank of Cleveland

# Stock Prices and Output Growth: An Examination of the Credit Channel

by Charles T. Carlstrom, Timothy S. Fuerst, and Vasso P. Ioannidou

With the economy still officially in a recession since March 2001, all eyes are on the stock market to help answer how quickly the economy will rebound from the current slowdown. The reason the stock market receives such attention is that it is considered a leading indicator of future economic activity. Recessions are characterized by sharp falls in equity prices, and these typically precede slower economic growth by approximately two quarters (see figure 1). If we used the stock market as our crystal ball, albeit a very cloudy one, we would be concerned that the recession might not be over. The stock markets seemed to recover during the last quarter of 2001—by the beginning of 2002, the S&P 500 had risen over 20 percent from its low on September 21. Since then, however, that gain has been erased, and the market is lower than it has been since 1997.

But why should stock prices and future real GDP growth be related? This *Economic Commentary* examines two prominent explanations for why stock market values and real GDP figures move together. The first explanation says that changes in information about the future course of real GDP may cause prices to change in the stock market today. This explanation suggests that, while stock prices are used to predict future economic activity, the actual causality is from future GDP growth (that is, the prediction of it) to current stock prices. The other explanation for the linkage between the stock market and real GDP growth is that changes in stock prices, no matter what the source, will reduce firms' asset positions and affect the cost of their borrowing. When it costs more for firms to borrow money,

they borrow and invest less, and when firms invest less, real GDP growth slows. According to this view—referred to by some as *balance-sheet effects* and others as the *credit channel*—stock prices will change because of changes in real economic conditions or some other factor, but the credit channel may impact the severity and length of recessions.

## ■ Correlation Does Not Imply Causality: Stock Prices and Real GDP

While movements in stock prices precede movements in GDP, it doesn't prove that stock price movements cause changes in real GDP growth. In fact, the causality may go the other way. Stock prices reflect the fundamental value of the firm—the present discounted value of future firm earnings, so, by definition, they incorporate forecasts of future economic activity. Investors who expect future GDP growth to slow may lower stock prices today. But just as we wouldn't conclude that commuters cause afternoon rain because they decided to carry an umbrella to work after hearing the morning weather report, we can't conclude that when stock prices change today, this causes future GDP growth to change.

This implies that a fall in the stock market, if caused by some factor that does not affect economic growth directly, might not say anything about future GDP. For example, suppose that the weakness in the stock market at the beginning of 2002 was caused by general accounting worries in the aftermath of Enron's collapse and is not directly related to forecasts of future GDP growth. A fall in the stock market for this reason might be bad for your 401(k)s but is not indicative of future low GDP growth.

**When stock market values fall, we know it means investors expect lower economic growth in the future. But can stock market declines actually affect future growth? There is some evidence that they can—through the credit channel.**

There is reason to believe, however, that a decline in stock prices can have a dampening effect on real GDP growth and, in fact, cause real GDP growth to fall. The next section explains how this dampening effect works and examines the evidence for it.

## ■ Firm Balance Sheet Effects

A decline in stock prices can dampen future GDP growth through the credit channel because debt is costly. Companies raise money either by issuing additional stock or by borrowing from a bank or the public. Debt brings with it the possibility of bankruptcy, and there are nontrivial bankruptcy costs (legal and accounting) that could be avoided with equity finance—that is, raising money by issuing more shares of stock. Then why do firms issue debt? Besides the obvious tax advantages, another reason is that not all investors are equally informed about a firm's financial status. To ensure that a firm's managers correctly report on the firm's projects, investors use debt and the resulting threat of costly bankruptcy proceedings as a means of ensuring good managerial conduct.

But in a world with perfect information in which all investors are fully informed, firms would entirely avoid costly bankruptcy by being largely equity financed.

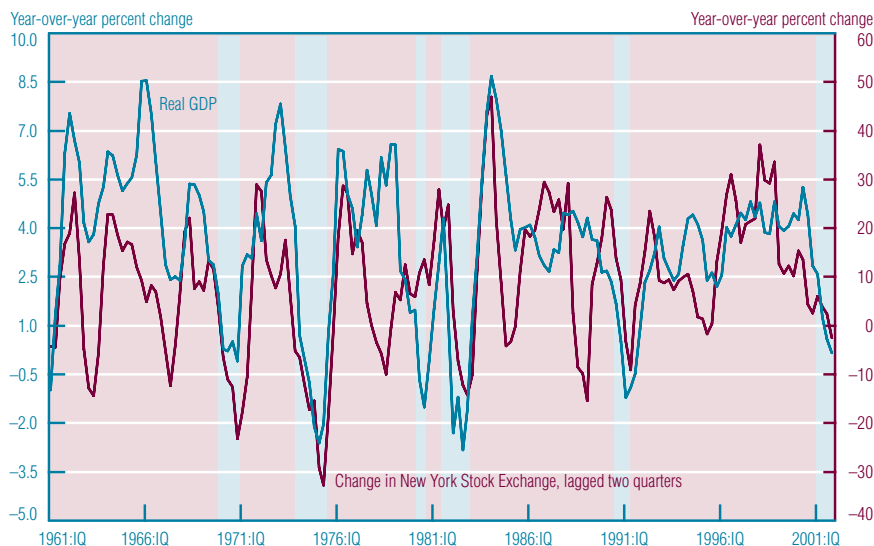
Because of potential bankruptcy costs, any debt issuance would be perfectly safe, always at a level that could be covered even under the worst possible profit scenario for the firm. Hence, in a world without informational frictions, firms would borrow at the same rate as the government, a zero “risk premium.”

Because of credit frictions, however, a firm’s cost of borrowing will typically exceed a government’s cost of borrowing. This difference, or wedge, between these borrowing costs is inefficient for the economy as a whole. The degree of this inefficiency depends on firms’ balance sheets. Firms with few assets, and hence little collateral to back a loan in the case of default, will borrow at the highest rates.

The credit channel works through the stock market as follows: First, stock prices change. This change can be caused by something that has nothing to do with the predicted value of firms’ future earnings (like the bursting of a stock market bubble), but more often it will occur because real economic conditions change. Roughly speaking, an economic downturn reduces stock prices and hence the value of some firms’ assets. Now the credit channel comes into play because lower stock prices imply a decline in the amount of collateral that the average corporation can post when obtaining a loan. Therefore, the risk premium and the cost of borrowing for most firms will be higher. A higher cost of borrowing further depresses current output and decreases future real GDP growth as well. Current output will decline more than it would have in the absence of these balance-sheet effects because an increase in the risk premium further reduces investment, which increases consumption and reduces hours worked.

Evidence of the credit channel can be seen in the strong positive correlation between the ratio of investment to market capitalization (stock market value) and one measure of the risk premium—the difference between the bank prime loan rate and the six-month Treasury bill rate (see figure 2). The ratio of investment to market capitalization represents the amount of borrowing firms want to undertake (investment) relative to the amount of collateral available

**FIGURE 1 CHANGE IN STOCK PRICES AND GROWTH IN REAL GDP**



NOTE: Shaded areas indicate recessions.  
SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis; and *Wall Street Journal*.

(market capitalization). To calculate the risk premium, we use the bank prime rate, a benchmark interest rate that reflects how much banks might charge their most creditworthy customers. This is because if balance-sheet effects are truly important for macroeconomic purposes, they should affect stable businesses and not just fledgling mom and pop stores. And because the prime rate is based on a short-term rate, we use the six-month Treasury bill (the government’s cost of borrowing) in calculating the risk premium.

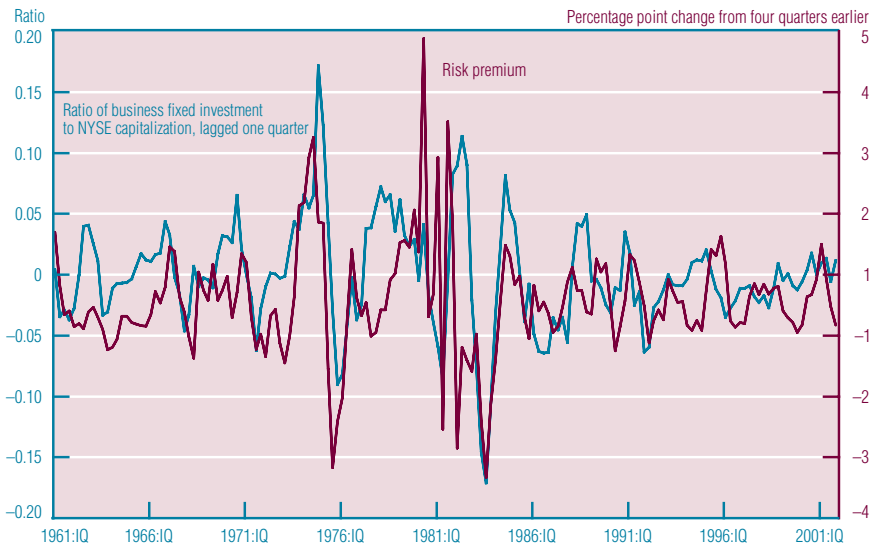
The strong correlation between the investment-to-market-capitalization ratio and the risk premium derives from the way the risk premium is determined. The risk premium is determined by the relationship between the amount of borrowing that firms are undertaking and the amount of collateral available to back this borrowing. When firms invest more heavily, their demand for borrowing rises, which, for a given value of equity prices (collateral), increases the risk premium. A decline in equity values also increases the risk premium because it decreases the amount of collateral available. The increase in the risk premium from either source would tend to decrease investment and thus output.

### Recessions and the Risk Premium

If the credit channel is important in helping drive the correlation between the stock market and output, it has implications for how we might expect the risk premium and output to be correlated. A fall in stock prices may cause the risk premium to increase and investment and output to fall, thus generating a negative association between the two. On the other hand, if a weak economy causes investment and thus borrowing to fall by *more* than the decline in stock prices, we would expect GDP growth and the risk premium to be positively related.

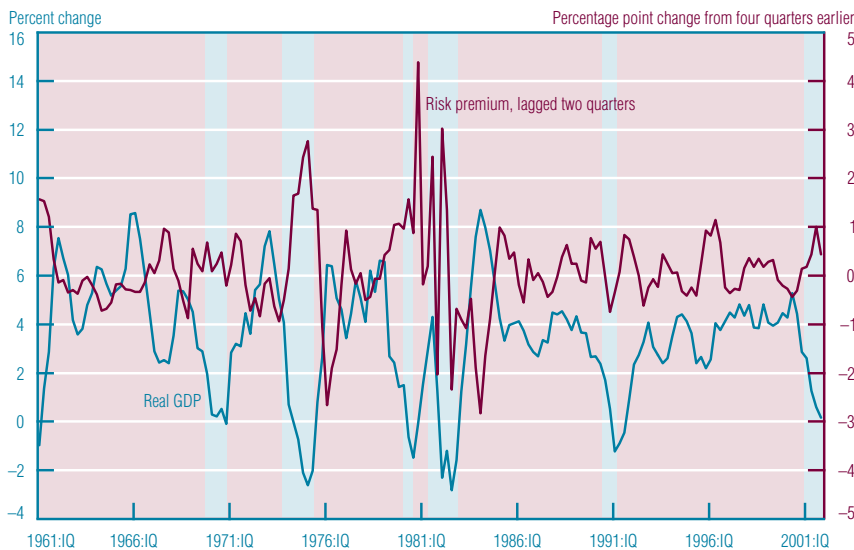
If we examine the data carefully, there is support for both of these possibilities. A high risk premium tends to precede lower economic growth, while low economic growth tends to precede a lower risk premium. Figure 3 shows that decreases in real GDP growth tend to precede increases in the risk premium by four quarters, and increases in real GDP growth tend to precede decreases in the risk premium by the same amount. The graph also shows that recessions are generally preceded by sharp increases in the risk premium. If stock prices did not affect future real GDP through the credit channel, we would not necessarily expect any association between real GDP growth and the risk premium.

**FIGURE 2 CHANGES IN THE RISK PREMIUM AND THE RATIO OF BUSINESS INVESTMENT TO NEW YORK STOCK EXCHANGE CAPITALIZATION**



SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis; Board of Governors of the Federal Reserve System; and New York Stock Exchange.

**FIGURE 3 CHANGE IN RISK PREMIUM AND REAL GDP GROWTH**



NOTE: Shaded areas indicate recessions.

SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis; Board of Governors of the Federal Reserve System; and New York Stock Exchange.

## Conclusion

This *Economic Commentary* has reviewed the reasons why stock prices and real GDP may be correlated. In doing so we have emphasized that firms' balance-sheet effects may be important in understanding output growth. To understand this channel we sometimes treated stock price changes as occurring for some exogenous reason, like the bursting of a stock market

bubble, and examined why this would affect investment and output. Of course, stock price changes very rarely occur without a change in some fundamental economic variables. Reality is likely a synthesis of both scenarios: Future GDP growth affects current stock prices, and this change in stock prices affects future GDP growth. Most people view the credit channel as explaining how the feedback effects

between stock prices and real output tend to amplify and propagate exogenous shocks to output.

For example, suppose that productivity in the coming quarters is expected to slow. An upcoming decline in productivity will lower GDP tomorrow and cause the stock market to drop today. But this drop in the stock market may cause firms' balance sheets to deteriorate, further pushing down GDP. This is the amplification part of the credit channel. But these effects may feed on each other through time, thus lengthening the coming recession. This is the propagation part of the story.

In closing, let us consider the current downturn. Unlike the deep recessions in the mid-1970s and early 1980s, the current downturn and the 1991 recession both saw only very small increases in the risk premium. This suggests that the credit channel has had only a small effect in amplifying and propagating the current downturn.

But this differential impact is what the credit channel would predict. It is during the largest downturns that the stock market and collateral take a big hit, causing a big increase in the risk premium. Hence, the amplification and propagation effects of the credit channel are likely to be most significant during more severe recessions.

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