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Corporate Investment

There is currently widespread belief that the level of economic activity in the U.S. has outstripped productive capacity and risks an acceleration in inflation. To reduce inflationary pressures, many argue, some slackening in the pace of economic activity is necessary. In this regard, recent signs of a slowing economy could prove beneficial. But there is a debate concerning just how much slowing is necessary.

The rate of corporate investment plays a critical role in this debate. Corporate investment is an important determinant of the economy's productive capacity. In recent years, the rate of corporate investment has been more rapid than most traditional models had forecast, suggesting perhaps that the economy's productive capacity has reached a higher level.

This *Letter* discusses the traditional model of investment, as well as some recent research that assumes corporations face financial market incentives (or disincentives) to invest that are not considered in the traditional analysis. Empirical evidence suggests that these financial market incentives are significant and, when included in a model of corporate investment, raise predicted rates of investment.

Traditional investment theory

In most traditional models of corporate investment, individual firms undertake capital spending to maximize the value of their equity shares. Whenever new investment will raise the market value of a firm's equity, it has an incentive to proceed with the project.

Whether new investment will increase a firm's value, however, depends on the costs of the capital goods themselves *and* any additional costs associated with installing new equipment and building new plants. These additional costs include lost output from disrupting production lines, retraining workers, and/or adopting new management procedures. By balancing the benefits of new investment against these costs, this traditional framework describes investment as a gradual response over time to changes in the stimulus to invest.

This framework is the basis for two popular models of corporate investment. The first, the neoclassical model, describes investment as a function of the "user cost" of new capital equipment. This cost includes the price of the equipment, taxes that affect that price, and a measure of the opportunity cost of funds in the form of a market interest rate.

The second popular investment model is called the "*q*-theory" of investment. In this model, investment depends on the value the market places on the expected stream of earnings generated by new capital equipment. If the discounted expected value of this stream of earnings exceeds the cost of installing the new equipment, the firm will choose to invest. Since the market value of this new stream of earnings is not observable, empirical applications of this model describe investment as a function of the ratio of a given firm's *total* market value to the replacement cost of its existing capital stock. This ratio of market value to replacement cost was dubbed "q" by James Tobin, who developed the theory, and provides a proxy for the premium that markets place on newly-installed equipment. Investment will take place when this ratio exceeds one.

Financial factors

In both of these models, the decision to invest in a given project typically is determined separately from the choice of how to finance that project. Although some of these models include the market interest rate among their explanatory variables, the yields required by a firm's creditors and shareholders do not depend on the individual firm's investment and financing policies.

The main reason for this separation is the assumption that financial markets are perfect. A perfect capital market is one in which information is costlessly available to all market participants and in which there are no transactions costs or other factors that might cause the costs

of various financing methods to differ. In this setting, all financing alternatives entail the same costs; that is, the choice of raising funds through retaining earnings, issuing new equity, or borrowing is irrelevant as far as investment decisions are concerned.

If, however, information is costly to obtain, or is only available to certain agents, or if taxes or transactions costs drive a wedge between the costs of different methods of finance, then investment and financing decisions may interact. As a result, factors that create financial market imperfections may influence the level of corporate investment in ways that are not captured by traditional models.

One important line of research suggests that information may not be readily available to all market participants. For example, a borrowing firm may have better information than do potential creditors concerning the expected payoffs of different investment projects. Faced with such information "asymmetries," lenders may write restrictive covenants into debt contracts to prevent borrowers from engaging in behavior that diminishes the lenders' chances of being repaid. The costs of complying and monitoring compliance with these covenants represent "agency costs," which tend to reduce the investment choices available to firms and lead them to forego certain projects that otherwise would be desirable.

Other financial market imperfections are introduced by the U.S. tax code, which treats debt and equity finance differently, making interest payments tax deductible, but double taxing dividend payments. As a result, the after-tax cost of an investment project depends on how that project is financed.

These are merely two examples of the way financing decisions might affect real investment decisions. It is likely that many firms face financial constraints that arise from such market imperfections. Economists only recently have begun to explore the interaction between real investment and corporate financing behavior.

A new model of investment

I have developed a model which attempts to explain investment in an environment of imperfect capital markets. In this model, a firm chooses both its level of investment and how it will finance that investment, either through retained earnings or increased borrowing. Because increasing leverage poses increasing risk of loss for investors, the interest rate at which the firm can borrow depends positively on firm leverage.

At the same time, because lenders may find it relatively less costly to monitor larger firms, the interest rate also will depend negatively on firm size, which, in turn, depends on current and past investment. These larger firms are rewarded with lower interest rates. Reduced costs of borrowing then feed back as an additional, financial stimulus to investment.

One implication of this approach is that changes in tax policy may have a somewhat different impact on investment than previously assumed. For example, a reduction in corporate tax rates generally is believed to provide an unambiguous stimulus to investment by reducing the effective cost of capital equipment. This tax reduction, however, also reduces the incentive to borrow (by reducing the value of the interest deduction). Efforts by firms to scale back borrowing in response, then, reduce the size of the investment stimulus that results from the tax-rate reduction.

Empirical findings

To test whether capital market imperfections influence investment, I estimated a modified q-theory model over the period from 1953 to 1986. This model captures the traditional explanation of investment by identifying an important role for Tobin's q ratio. But it extends the traditional investment theory by including an additional term that reflects the influence of capital market imperfections. The sign on this added term depends on the relative effects of firm leverage and size on market interest rates.

The empirical results indicate that, in general, size effects on interest rates dominate leverage effects. That is, investing (and borrowing) firms are rewarded relatively more for becoming larger than they are penalized for assuming more debt. As a result, capital market imperfections, as they are implemented in this model, provide an additional stimulus to investment.

Thus, this framework predicts levels of investment during the 1980s that are 10 percent higher than the traditional model and much closer to

the actual values observed during this period. Many economists have expressed surprise during the last few years at the relative strength of investment spending. This model suggests that previously ignored financial market imperfections may explain some of the difference.

Moreover, the extended model yields significantly better predictions of investment spending than the traditional *q*-theory framework. During the sample period, prediction errors (measured by root mean squared errors) are reduced by one-third by incorporating capital market imperfections.

Implications

After seven years of economic expansion, U.S. and other industrial economies are approaching historically high levels of capacity utilization. There is widespread belief today that such intense usage of productive capacity is a signal that the economy is approaching significant constraints on supply. Efforts to sustain rapid economic growth in the face of these constraints, they argue, will produce an overheated economy and lead to rising rates of inflation. Signs of rising prices and wages are cited as evidence.

Furthermore, a number of economists have suggested that there is a maximum rate of real economic growth that can be sustained without raising the rate of inflation. The number most frequently mentioned is 2.5 percent. With the economy currently operating at full capacity or beyond, any rate of real growth higher than this, analysts claim, will awaken inflationary pressures in the economy.

The research described here is important because investment spending increases the economy's productive capacity. When economists cite 2.5 percent as the maximum rate of real growth that can be achieved without raising the rate of inflation, they assume that investment takes place at the historical average rate. These predictions implicitly may rely, however, on the traditional model of investment that ignores the influence of financial market imperfections. The traditional model, in particular, will fail to capture investment incentives that arise from changes in the financial behavior of corporations.

These is evidence to suggest that corporations have indeed altered their borrowing behavior in the 1980s. Since the recession in 1981, corporate leverage has increased dramatically to its highest levels in the postwar period. The rate of change in leverage is even more striking. Beginning in 1983, the apparent willingness of corporations to take on additional debt increased in a statistically significant way. This increased willingness to borrow feeds through the investment equation described here and translates into higher levels of investment.

My research thus indicates that if current corporate financial behavior persists, investment may respond more strongly to investment stimuli than previously. During the 1980s, for a given level of the traditional determinants of investment, the imperfect capital market model predicts approximately 10 percent more investment. If spending on plant and equipment responds more strongly to a particular investment stimulus, then productive capacity may grow faster than previously expected. Higher growth in capacity, in turn, may make it possible for the economy to sustain more rapid real output growth without confronting major supply constraints.

While we do not yet know how fast the economy can grow without producing a rising rate of inflation, the analysis described here suggests that the number may be higher than the 2.5 percent rate of growth commonly mentioned. At the very least, considerable work remains to be done in understanding the numerous influences that affect corporate investment and, thus, real growth. Policies aimed at enhancing financial incentives may prove particularly fruitful in permitting the U.S. to continue its long-running economic expansion without experiencing higher inflation.

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