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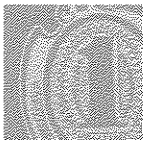

Commentary

Mark Gertler

Steve Cecchetti has written a very nice survey. A central point of his article, with which I completely agree, is that in assessing the empirical relevance of the credit channel literature, it is incorrect to focus on credit aggregates. Perhaps contrary to conventional wisdom, these theories do not imply that credit aggregates should forecast output better than standard indicators of monetary policy, nor do they imply that credit aggregates should lead output over the business cycle.[1] Because I agree with virtually everything Steve said, I would like to take the opportunity to clarify what I believe are the central elements of the literature.

In my view, a credit channel for monetary policy is a special case of a financial propagation mechanism. To understand the former, therefore, it is first useful to define the latter. Suppose that $1 + \rho_t$ is the gross borrowing rate that an economic agent would face at time t if capital markets were perfect. The net rate ρ_t equals the sum of the safe rate plus a premium that depends on the systematic risk of the agent's investment.

Suppose now that we allow for the possibility that the agent may have imperfect access to the capital market. In this instance, due to information and enforcement problems, the price of external funds will exceed the (risk-corrected) opportunity cost of internal funds.[2] The effective borrowing rate that the agent faces may be expressed as $Q_t(1 + \rho_t)$, where $Q_t \geq 1$. This rate is the explicit cost of funds if there are no non-price terms to the loan. Otherwise, it is the implicit cost, after taking into account the effect of the non-price terms.

The multiplier Q_t is interpretable as the shadow cost of a unit of internal funds. It is the maximum the agent would be willing to pay for an additional unit of internal funds. In the benchmark case of perfect capital markets, $Q_t = 1$. As credit constraints tighten, internal funds become more valuable and, consequently, Q_t rises. Notice that the spread between the cost of external and internal funds is approximately $Q_t - 1$.

Now suppose that X_t is a decision variable in an intertemporal choice problem. In the case of a firm, for example, X_t could represent either capital investment or inventory investment. In the case of a household, it could represent saving or the acquisition of a consumer durable. At the optimum, the agent adjusts X_t to the point where the marginal cost equals the discounted marginal benefit:

$$(1)\quad MC_t(X_t) = [1/Q_t(1 + \rho_t)]E\{MB_{t+1}(X_t)\}.$$

Since Q_t influences the effective discount rate, it ultimately influences the choice of X_t.

Up to this point, we have taken Q_t as given. In the theoretical literature on the financial propagation mechanism, Q_t is derived endogenously, and in equilibrium it is determined jointly with X_t. Roughly speaking, the theory suggests that Q_t should depend on financial variables such as the agent's net worth (that is, collateral and internal funds) and the availability of intermediary credit. That is, we can write:

$$(2)\quad Q_t = Q(NW_t, IC_t),$$

where NW is the agent's net worth and IC is an indicator of the availability of intermediary credit.

Now to the point: A financial propagation mechanism amplifies the impact of a primitive disturbance on X_t via an impact on Q_t. One example is Bernanke's (1983) theory of the Great Depression. The bank runs associated with the initial downturn reduced the availability of intermediary credit, forcing up Q_t, further depressing spending and output. Another example is the financial accelerator theory of investment described in Bernanke and Gertler (1989). In that framework, endogenous procyclical movements

[1] In addition to Cecchetti (1995), see the discussion in Bernanke, Gertler and Gilchrist (forthcoming), and Kashyap and Stein (1994).

[2] For more detail, see Bernanke, Gertler and Gilchrist (forthcoming)

in the strength of firm balance sheets induce countercyclical movements in Q_t. The resulting countercyclical movements in the spread between the cost of external and internal funds serve to amplify investment fluctuations.

A credit channel for monetary policy is a financial propagation mechanism, in which the primitive impulse is monetary policy. A credit channel thus amplifies the impact of a shift in interest rates induced by monetary policy by causing an associated movement in the spread between the cost of external and internal funds; that is, by altering how smoothly funds flow between lenders and borrowers. In my view, the variety of types of mechanisms in the literature that have received the label "credit channel" fit this broad definition.

Let me illustrate the impact of a credit channel with the following simple neoclassical investment problem. Let Y be the firm's output, K its capital stock, I the rate of investment, θ a technology parameter and δ the rate of depreciation. Then suppose

$$Y_t = \tilde{\theta}_t K_t^{\alpha},$$

where by definition

$$K_{t+1} = I_t + (1-\delta)K_t.$$

At the optimum, the firm chooses investment to equate the marginal cost of a unit of capital, normalized at unity, with the discounted expected marginal gain:

$$1 = \left[1/Q_t\left(1+\rho_t\right)\right] \cdot E\left\{\alpha\tilde{\theta}K_{t+1}^{\alpha-1} + Q_{t+1}\left(1-\delta\right)\right\}.$$

The marginal benefit of a unit of capital in the next period is the sum of the marginal product of the next period and the value of the undepreciated capital. The latter is valued at the shadow price of internal funds of the next period, Q_{t+1}. This reflects the fact that credit market imperfections make a unit of capital worth more if it is already inside the firm than if the firm had to borrow to buy it.

In the conventional description of the transmission mechanism, both Q_t and Q_{t+1} are fixed at unity. A shift in monetary policy alters the short-term interest rate, directly influencing the discount rate $1/(1+\rho_t)$ and, in turn, the firm's investment decision. With a credit channel present, however, Q_t and possibly also Q_{t+1} change in a way that magnifies the overall impact.

The key point I wish to emphasize is that relatively small changes in Q_t may have a large effect (that is, the propagation mechanism may be strong). A numerical example is helpful. Consider the impact of 1 percentage point change in Q_t on the firm's investment decision. This corresponds to a 100 basis point rise in the cost of external funds relative to internal funds. If the rise in Q_t is persistent (so that Q_{t+1} adjusts to keep Q_t unchanged), then investment drops 12.5 percent, assuming conventional values for the exogenous parameters.[3] That is a large effect.

If the rise in Q_t is purely transitory, so that Q_{t+1} is unchanged, then investment drops a whopping 250 percent. In this latter case, there is a strong intertemporal substitution effect. Because the shadow price of internal funds is high today relative to tomorrow, the firm defers investment. More informally, if credit constraints are tight today but expected to be lax tomorrow, then the firm has a strong incentive to defer investment. To be sure, in constructing this example, I have abstracted from factors such as physical adjustment costs that will dampen the impact. Nonetheless, it is interesting that movements in the spread can have such a large impact in a fairly conventional framework.

Finally, let me fill in the details of how a credit channel may produce a shift in the spread between external and internal funds that complements the movement in interest rates associated with monetary policy.[4] There are two distinct but complementary ways in which the credit channel may work. The first is via the impact on borrower balance sheets. A rise in short-term interest rates induced by monetary tightening may weaken borrower balance sheets in several different ways. The rise in interest expenses on short-term debt directly reduces the supply of internal funds by reducing net cash flows (after interest payments). In addition, the

[3] In particular, I take $\alpha = 0.33$, $\delta = 0.1$, $\rho = 0.04$ and the steady-state growth rate of the economy equal to 0.02.

[4] See the discussion in Gertler and Gilchrist (1993), and the Cecchetti and Hubbard papers in this issue of the *Review* (May/June 1995).

associated decline in asset prices may reduce the value of the borrower's collateral. Either of these effects works to raise the shadow price of internal funds and, in this way, magnifies the impact of monetary policy on the borrower's effective discount rate. The magnified impact on the discount rate translates into a magnified effect on spending.

The second and perhaps more controversial way in which the credit channel may work is via the impact of a shift in bank reserves on the loan supply schedule that commercial banks may offer. Here, tightening of monetary policy forces banks to contract reservable deposits, reducing banks' source of funds available to service loan demand. This forces the bank loan rate up relative to the open market rate, raising the cost of capital for bank-dependent borrowers. In terms of the language here, the rise in the bank loan rate due to the contraction in deposits raises the shadow price of internal funds for bank-dependent borrowers. As pointed out by Romer and Romer (1993), Gertler and Gilchrist (1993) and Thornton (1994), however, a critical premise is that banks cannot perfectly decouple deposits from loans by elastically issuing managed liabilities at the margin. Although this premise seems to be a reasonable description of financial markets prior to the financial deregulation that began in 1980, it is less clear that it is applicable in the contemporary financial climate. The key issue concerns the liquidity of the market for large CDs. None of the existing studies have really addressed this difficult question.

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