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A Simple Dynamic Model of Credit and Aggregate Demand

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Abstract: The purpose of this paper is to present a tractable model of an old topic which is becoming more and more important in modern macroeconomics: the link between financial structure and economic activity.

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It is not money what makes the world go round, but credit.
J.E. Stiglitz (1988)

The paper presents a tractable model of an old topic which is becoming more and more important in modern macroeconomics: the link between financial structure and economic activity.[1] During our lectures in advanced macroeconomics at ITAM and COLEF, we have realized the need for models which can illustratively describe the dynamics of allocation of credit and its impact of aggregate variables, such as output, money, interest rates, etc. Perhaps the most celebrated model of this type is that of Blinder (1987) on credit restrictions and their impact on effective supply. Here, we present a simpler dynamic model taking as a reference the seminal work made by Bernanke & Blinder (1988) where the interaction mechanisms between credit and aggregate demand are clearly analysed.

The paper is organized as follows: Section I presents the most important aspects of the Bernanke-Blinder model in its original static structure and its main conclusion. Section II presents a dynamic model following that of Bernanke & Blinder. And finally, Section III highlights the main implications of using such a model as a illustrative method. We hope this work serve as a guide for undergraduate advanced lectures and graduate lectures and help to promote more illustrative models of this type which are severely rationed in macroeconomic textbooks.

I The Bernanke-Blinder Model

Bernanke & Blinder (1988) develop a static model under the IS-LM framework which looks for an understanding of the relationship between credit and economic performance. Perhaps, the most important characteristic of that model is that introduces a third financial asset into the economy (i.e., credit). The conventional macroeconomic method assume that the economy presents two perfect-substitutable assets (i.e., bonds and money) which work smoothly under the "Walras Law". According to Bernanke & Blinder, recent studies on the theoretical and empirical relevance of imperfect information in financial markets (the influential model of Stiglitz & Weiss, 1981, for example) stress the importance of banks as "special" institutions in the monetary transmission mechanism.[2]

In their model, Bernanke & Blinder abandon an important assumption in the traditional framework: perfect substitutability between bonds and credit. Besides, they assume not to introduce credit rationing because, as it will be shown later, it is not a crucial aspect fot the credit view. Then, they assume a credit market that can be cleared at any point in time. I will follow these assumptions in the Section III.

[1] See Gertler (1988) for an excellent survey.
[2] This is a crucial aspect of the "credit view". There is a huge literature on this concept which will not be covered here. For more details, see surveys by Bernanke (1992-93), Gertler (1988), Gertler & Gilchrist (1993).

Bernanke & Blinder present a demand for credit which depends on the rate on loans (ρ), the market interest rate, i.e., the rate on bonds (i), and finally on an autonomous transaction motive (y). In brief, the demand for credit can be seen as follows:

$$L^d = L(\overset{-}{\rho}, \overset{+}{i}, \overset{+}{y})$$

On the other hand, the supply of credit is determined by banks' balance sheet (i.e., reserves (R) plus bonds (B) plus loans (L) must equal total deposits assuming equity zero), and regulatory framework which determines in turn the reserve requirement ratio (τ):

$$L^s = \lambda(\overset{+}{\rho}, \overset{-}{i},)D(1-\tau)$$

Implicitly, $\lambda_\rho>0$ assumes no credit rationing and therefore there is no upper bound for the interest rates where credit can be restricted because beyond that point bank's profits may decrease as a result of moral hazard and adverse selection effects as in Stiglitz & Weiss (1981). Both equations represents the typical LM curve.

Finally, the goods market is affected not only by a Keynesian mechanism (interest rates affecting investment and consumption) but also it depends on the rate on loans granted by the financial institutions, which is interpreted as an alternative mechanism called "nonmonetary" channel.[3] The following equation represents an adjusted IS curve which the authors call CC curve:

$$y = y(\overset{-}{\rho}, \overset{-}{i},)$$

where,

$$\rho = \phi(\overset{+}{i}, \overset{+}{y}, \overset{-}{R})$$

In this latter equation, the rate on loans is made to be endogenously determined by the rate on bonds, output and monetary policy through bank reserves. In essence, the demand and supply for loans determine their rate in a market which has no imperfections and it is competitive. In turn, the rate on loans affects aggregate demand via bank reserves which can be seen as a policy determining the availability of bank loans.[4]

The comparative statics made by Bernanke & Blinder introduces the "nonmonetary" mechanism into the IS-LM framework. Such a mechanism is created in the credit market and the propagation effects into the goods market are canalised by the rate on loans (ρ). Let

[3] The introduction of a link between the rate on loans and the goods markets is made considering the market for deposits where the monetary policy is done by reserves positions (a positive reserve position or a negative one as in Tobin (1982)).

[4] Here the assumption of bank loans being no perfect substitutes of bonds takes special relevance.

illustrate two cases shown in their paper: a) a higher demand for credit and b) a lower credit supply.

a) Higher demand for credit

This case will be interpreted as an adverse selection effect in the next Section. In other words, borrowers are perceiving less risk and, absent of informational problems, they are exogenously increasing the demand for credit money (See Figure 1.a). The authors exemplify this case as an increase in the need for working capital by firms or higher liquidity needs.[5] The result is a decrease in the CC curve with a LM constant (Figure 1.b).

Figure 1
A higher demand for credit in the Bernanke-Blinder model

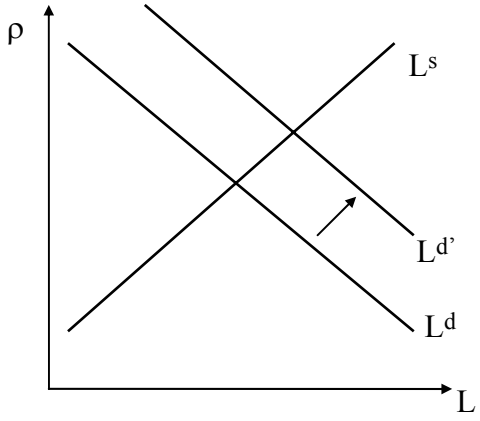


Figure 1.a

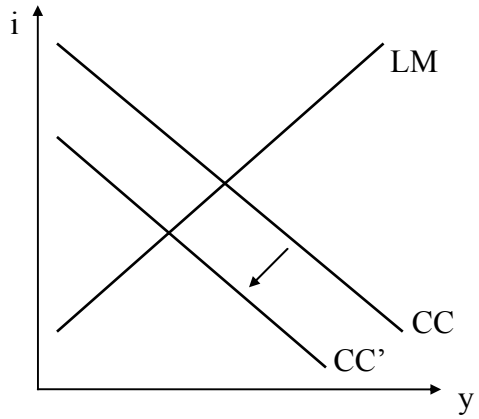


Figure 1.b

b) Lower supply of credit

This case will be interpreted as an *inverse* moral hazard effect in the next section. It is called *inverse* because it generates a reduction in the supply (Figure 2.a).[6] Some authors have identified several causes for an *inverse* moral hazard effect. For example, Bernanke's (1983) main conclusion about the Great Depression lies in the heart of this point: "The banking problems of 1930-1933 disrupted the credit allocation process by creating large, unplanned changes in the channels of credit flow. Fear of runs led to large withdrawals of deposits, precautionary increases in reserve-deposit ratios, and an increased desire by banks for very liquid or discountable assets. These factors, plus the actual failures, forced a contraction of the banking system's role in the intermediation of credit. Some of the slack

[5] This case is also consistent with the post-keynesian approach where money is considered endogenous in the sense of being credit driven and demand determined. Thus, an exogenous increase in the demand for credit would move its supply (they are interdependent). In this approach, credit is determined solely by demand because banks has unlimited access to funds due to financial innovations developed in wholesale markets. See Moore (1989) and Goodhart (1989) for more on this perspective.

[6] On the other hand, a *positive* moral hazard effect in the credit market would result from the fact that lenders are perceiving less risk in granting loans increasing the supply of credit. This effect would be a result of an inefficient regulatory framework, i.e., deposit insurance or anticipated ex-post Central Bank interventions, which can create incentives for banks to undertake risky activities.

was taken up by the growing importance of alternative channels of credit. However, the rapid switch away from the banks...no doubt impaired financial efficiency and raised the cost of credit intermediation".[7] In short, a higher perception of risk by banks caused by an increase in real cost of credit intermediation led to a disruption in the normal credit flow reducing the supply of credit. In the static model this would be illustrated as follows.

Figure 2
A lower supply of credit in the Bernanke-Blinder model

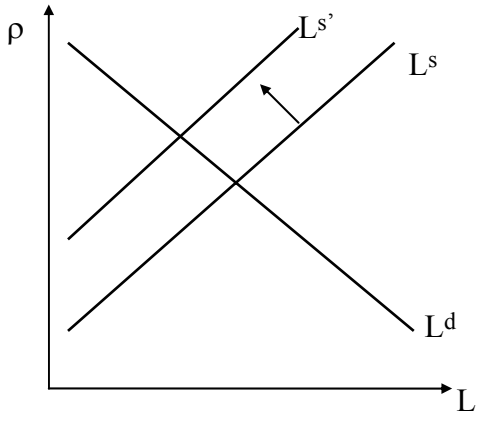


Figure 2.a

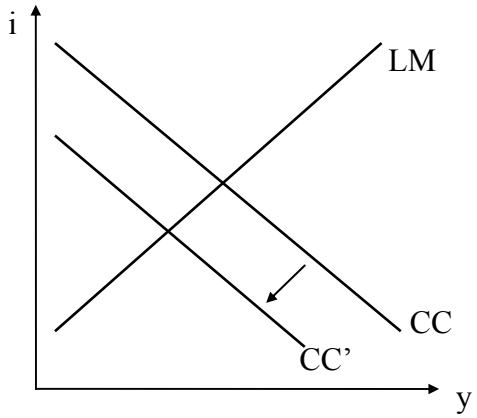


Figure 2.b

From my point of view, the most important contribution of the Bernanke-Blinder model is that it helps us to understand the link between the financial sector variables, such as the rate on loans, credit allocation, the degree of risk perceived by economic agents, institutional and regulatory schemes, etc. and the real sector variables such as output, aggregate demand, and market rates without assuming any specific formation of expectations, restrictions in the credit market, or anything else. They resume their results in a table which is presented below.

Rise in:	y	M	L	i	ρ
R	↑	↑	↑	↓	↓
M^d	↓	↑	↓	↑	↓
L^s	↑	↑	↑	↑	↓
L^d	↓	↓	↑	↓	↑
y	↑	↑	↑	↑	↑

This general framework of the Bernanke-Blinder model presented above will be developed in the next section using a dynamic representation. In the long run, variables will interact in the same way as in the model, but short run dynamics will be generated under several assumptions, many of them consistent with the basic story. Remember that the main

[7] Bernanke, B. "Nonmonetary effects of the Financial Crisis in the Propagation of the Great Depression" in "New Keynesian Economics" Vol. II, edited by G. Mankiw and D. Romer, MIT Press, pp. 302-303.

motivation of this paper is due to exposition reasons, it does not attempt to provide any guide for monetary and credit policies.

II The Dynamics of the Bernanke-Blinder model

In general terms, macroeconomic textbooks suffer from an evident lack of discussion about credit and financial aspects. This is of course more critical in advanced textbooks where in other areas of macroeconomics there have been a mathematical and theoretical revolution. However, during the 80's, the macroeconomics of credit and financial intermediation had important contributions (many of them are cited in this article) and developed several analytical tools. Motivated by both factors, we present a simple dynamic model where the interaction between financial and real factors is explained both in the short run and in the long run. The main idea is to facilitate lectures using a general framework which, as I will discuss later, can be extended and complemented with different assumptions.

There is, of course, a seminal article by Blinder (1987) which might look for the same motivations as this one. However, because of its complexity and the use of the credit rationing assumption, it does not provide a general framework for exposition purposes during undergraduate lectures. So, we believe, there is a need for a basic tool which should be complicated depending on the teaching level. Here we present a model which follows the same structure as that of Bernanke & Blinder explained before and tries to reach the same conclusions, at least in the long run.

As in the Bernanke-Blinder model, the assumption is that there is no credit rationing equilibrium in the long run,[8] loans and bonds are imperfect substitutes, fixed prices,[9] output is a predetermined state variable which moves gradually in response to shocks, and the rate on loans is a non-predetermined variable.

a) The model

The CC curve in the Bernanke-Blinder model, which incorporates the real sector variables, will be transformed to a simple short run-long run adjustment between demand and supply for goods. Because prices are fixed, adjustments in the short run are made through aggregate demand (supply) excesses which generates the dynamics of output. When an excess aggregate demand is observed, output will increase (a decline in firms' inventories) and conversely, when an excess aggregate supply is observed (or what is the same in qualitative terms, when output is below its long run level) output will decline.

[8] By not introducing credit rationing, I do not think it will create any difference from the main results. It does not hit on my mind anyway because as noted by Bernanke: "...credit rationing is not at all *necessary* for the credit channel to exist. All that is required for a credit channel is that bank credit and other forms of credit be imperfect substitutes for borrowers". Bernanke (1992-93), pp. 56.

[9] Blinder (1987) present a dynamic model where prices can adjust via a demand-supply mechanism or via a Phillips curve adjustment.

$$\dot{y} = \beta(y^d - y) \qquad \beta > 0 \tag{1}$$

As in the model in the first section, aggregate demand (y^d) depends on the rate on loans, the market rate, and we introduce a fiscal policy index (G). In the same spirit, the market rate is determined by monetary policy (bank reserves, R) and the demand for money (M^d).

$$y^d = f(\rho, G, i) \qquad f_\rho < 0,\ f_G > 0,\ f_i < 0 \tag{2}$$

$$i = h(R, M^d) \qquad h_R < 0,\ h_{M^d} > 0 \tag{3}$$

The dynamics of the financial sector, the LM curve, come from the evolution during time of a single relevant variable in the Bernanke-Blinder model, the price of loans (ρ). Here we assume that because of no credit rationing, this variable will adjust through demand or supply excesses in credit market. So we let credit rationing, i.e., demand excess, exists at least in the short run. But there is no credit rationing equilibrium in the long run as in Stiglitz and Weiss (1981). If there is an excess demand for loans, their price will increase up to the point where supply and demand are equal. The same dynamics apply for an excess supply for credit.

$$\dot{\rho} = \alpha(L^d - L^s) \qquad \alpha > 0 \tag{4}$$

$$L^d = L(\rho, i, y, \sigma^d) \qquad L_\rho < 0,\ L_i > 0,\ L_y > 0,\ L_{\sigma^d} < 0 \tag{5}$$

$$L^s = \lambda(\rho, i, \sigma^s) \qquad \lambda_\rho > 0,\ \lambda_i < 0,\ \lambda_{\sigma^s} < 0 \tag{6}$$

Also, the demand for credit equation is a function of the rate of loans, the market rate, output (transaction motive), but differing with Bernanke & Blinder, I introduce a fourth variable that captures any exogenous shock in the demand for loans (σ^d). This demand push factor on L^d can be interpreted as a risk degree variable affecting borrowers. For example, the adverse selection effect shown in the last section will be transformed into a decrease in σ^d, i.e., less risk is perceived by borrowers.[10] Also, σ^d captures any exogenous move in the borrowers desire for working capital change or liquidity not necessarily related to changes in the lending risks.

Similarly, the supply of loans depends on the same factors as in the previous model but there is an extra variable which captures the degree of risk in banks' credit allocation. σ^s represents this degree variable (supply push factor). For example, less degree of risk perceived by lenders (a decrease in σ^s) will induce them to increase loans to potential borrowers, creating a positive moral hazard effect. In this case, any of the regulatory and institutional variables commented in footnote 6 can be observed, and an upward shift in L^s will result. On the other hand, in the case presented in the first section, an exogenous increase in real cost of credit intermediation will be thought as an increase in σ^s.

[10] A notable example of a variable affected by legal and institutional aspects which affects σ^d is the current bankruptcy law. If there are incentives for borrowers protected by an inefficient scheme of corporate bankruptcies, they will have higher incentives to undertake riskier projects and the demand for loans will shift upward due to an adverse selection effect.

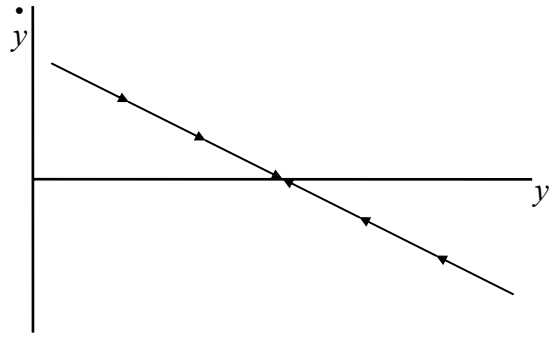
b) *The dynamics*

Equations (1) and (4) are clearly linear. Unfortunately, it will be almost impossible to characterise a demand (or supply) for credit equation. Thus, I will continue using general equations as of L, λ, f, and h. The dynamics in the real sector can be described as follows, linearizing around the long run level of each variable using a first-order Taylor expansion series.

$$\dot{y} = -\beta(y - \bar{y}) + \beta f_{\rho}(\rho - \bar{\rho}) + \beta f_{G}(G - \bar{G}) + \beta f_{i}(i - \bar{i})$$

Since $\beta > 0$, $\dot{y}$ is stable.

Figure 3

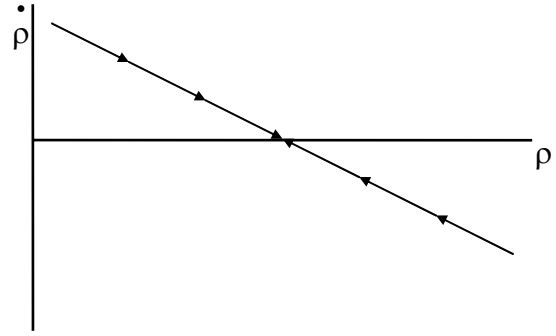


Following the same procedure as above, the dynamics of the financial sector are,

$$\dot{\rho} = \alpha L_{y}(y - \bar{y}) + \alpha(L_{\rho} - \lambda_{\rho})(\rho - \bar{\rho}) + \alpha(L_{i} - \lambda_{i})(i - \bar{i}) + \alpha L_{\sigma^{d}}(\sigma^{d} - \overline{\sigma^{d}}) - \alpha\lambda_{\sigma^{s}}(\sigma^{s} - \overline{\sigma^{s}})$$

And, since $\alpha > 0$ and $(L_{\rho} - \lambda_{\rho}) < 0$, $\dot{\rho}$ is stable.

Figure 4

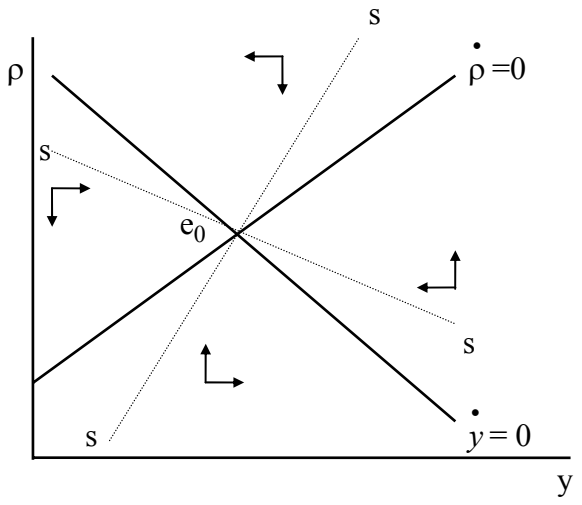


Then we can obtain the correspondent matrix for this system of two differential equations.

$$\begin{bmatrix} \dot{y} \\ \dot{\rho} \end{bmatrix} = \begin{bmatrix} -\beta & \beta f_{\rho} \\ \alpha L_y & \alpha(L_{\rho} - \lambda_{\rho}) \end{bmatrix} \begin{bmatrix} y - \bar{y} \\ \rho - \bar{\rho} \end{bmatrix} + \begin{bmatrix} \beta f_G & \beta f_i & 0 & 0 \\ 0 & \alpha(L_i - \lambda_i) & \alpha L_{\sigma^d} & -\alpha\lambda_{\sigma^s} \end{bmatrix} \begin{bmatrix} G - \bar{G} \\ i - \bar{i} \\ \sigma^d - \bar{\sigma^d} \\ \sigma^s - \bar{\sigma^s} \end{bmatrix}$$

As commonly, the dynamics of both differential equations are presented in a phase diagram (Figure 5). There can be seen that $\dot{y} = 0$ has a negative slope, and $\dot{\rho} = 0$ has a positive slope in a (y,ρ) locus.[11]

Figure 5



In summary, we have a system which is totally stable. Whenever the economy starts, it will end up to a point such "e_0" in the diagram. So long we have identified the characteristics of the system graphically. Now we need to observe the change of variables in the long run when several shocks are impinging.

c) Long run comparative statics

In the long run, variables will adjust according to exogenous or policy shocks observed in the non-dependant variables (G , R, σ^d , σ^s). It is easy to see the long run effects of ρ and y through the use of the following relationships.

[11] From the matrix it is easy to demonstrate such slopes: $\left.\frac{\partial \rho}{\partial y}\right|_{\dot{\rho}=0} = \frac{-L_y}{(L_{\rho} - \lambda_{\rho})} > 0$ and $\left.\frac{\partial \rho}{\partial y}\right|_{\dot{y}=0} = \frac{1}{f_{\rho}} < 0$

$$\left.\frac{\partial y}{\partial G}\right|_{\dot{y}=0} = \frac{-\beta f_G}{-\beta} > 0 \quad ; \qquad \left.\frac{\partial y}{\partial G}\right|_{\dot{\rho}=0} = \frac{-\partial \dot{\rho} / \partial G}{\partial \dot{\rho} / \partial y} = 0$$

i.e., an increase in public expenditure will affect output increasing its long run level. Therefore, $\dot{y}=0$ must shift to the right. $\dot{\rho}=0$ is unaffected since G does not directly impinge on the financial sector variables.

$$\left.\frac{\partial y}{\partial i}\right|_{\dot{y}=0} = \frac{-\beta f_i}{-\beta} < 0 \quad ; \qquad \left.\frac{\partial y}{\partial i}\right|_{\dot{\rho}=0} = \frac{-\alpha(L_i - \lambda_i)}{\alpha L_y} < 0 \quad ; \qquad \left.\frac{\partial i}{\partial R}\right|_{\Delta M^d = 0} < 0$$

i.e., an open market purchase (more bank reserves) allows banks to lend more (in terms of Tobin (1982), there is an excess reserve position). This increases the supply of credit lowering the cost of bank funds and moving the economy to an upper long run level. To be this possible, $\dot{y}=0$ and $\dot{\rho}=0$ must shift to the right, but the shift in $\dot{\rho}=0$ is proportionally higher.[12]

$$\left.\frac{\partial y}{\partial \sigma^s}\right|_{\dot{y}=0} = 0 \quad ; \qquad \left.\frac{\partial y}{\partial \sigma^s}\right|_{\dot{\rho}=0} = \frac{-(-\alpha\lambda_{\sigma^s})}{\alpha L_y} < 0$$

$$\left.\frac{\partial y}{\partial \sigma^d}\right|_{\dot{y}=0} = 0 \quad ; \qquad \left.\frac{\partial y}{\partial \sigma^d}\right|_{\dot{\rho}=0} = \frac{-\alpha L_{\sigma^d}}{\alpha L_y} > 0$$

i.e., shocks in the financial sector have important effects on output and interest rates in these model. For instance, if more risk is perceived by lenders (σ^s increases), they will reduce its supply and therefore the cost of credit will rise lowering long run level of output. This can be graphically illustrated by a shift to the left in $\dot{\rho}=0$.

We have characterised the long run adjustments, but it is necessary to clarify movements in the short run. In doing so, we will need to assume that output responses gradually to shocks, although being a predetermined variable, and that the rate of loans is a non predetermined variable (endogenous jumps are allowed).

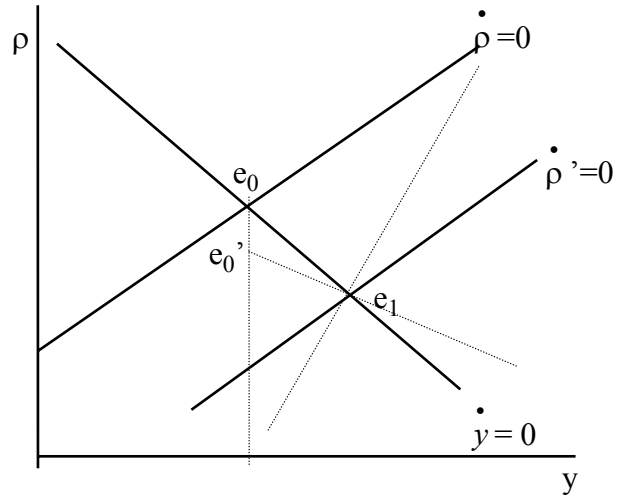
In the next part we will illustrate some of the consequences of having such assumptions in the state variables. Then, short run adjustments will differ from the basic Bernanke-Blinder story, although there is no relevant variant in the long run as observed before.

[12] Implicitly, we are assuming that $\left.\frac{\partial \rho}{\partial i}\right|_{\dot{\rho}=0} > \left.\frac{\partial \rho}{\partial i}\right|_{\dot{y}=0}$ and so $\frac{-\alpha(L_i - \lambda_i)}{\alpha(L_\rho - \lambda_\rho)} > \frac{-\beta f_i}{f_\rho}$.

d) Some implications of exogenous shocks (σ^d , σ^s)

Here we will present how the financial structure can affect real sector variables both in the short run and in the long run. As previously explained, σ^d and σ^s have important consequences in the economy. Depending on the structure of the financial sector the real effects will interact through the flow of credit. A decrease in σ^s (less risk is perceived by lenders) can be a result of a institutional and regulatory framework which incentives lenders to more risky activities. For example, sub-optimal premium charged by a Deposit Insurance Institution or an inefficient scheme of credit classification might create a *positive* moral hazard effect that allows a credit expansion in the economy. This results, as explained above, in a higher level of output in the long run and a lower long run level of the price of loans (Figure 6).

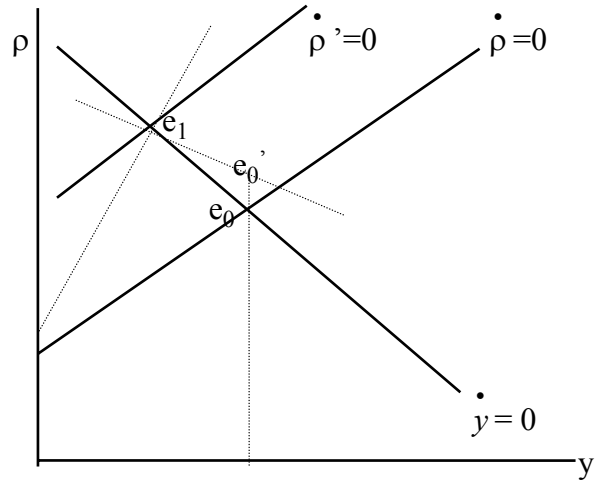
Figure 6
Less risk perceived by lenders creates a positive moral hazard effect



A decrease in σ^d will generate the opposite effects.[13] More need for working capital or liquidity by firms will impinge the demand for credit to a higher long run level rising the cost of funds. Then, if the supply of loans is held constant, output will reduce in the long run (Figure 7) as noted in the basic Bernanke-Blinder model.

[13] This case is qualitatively similar to an increase in the risk observed by lenders (higher σ^s). As discussed before, higher supply push factor can be a result of a rise in the real cost of credit intermediation.

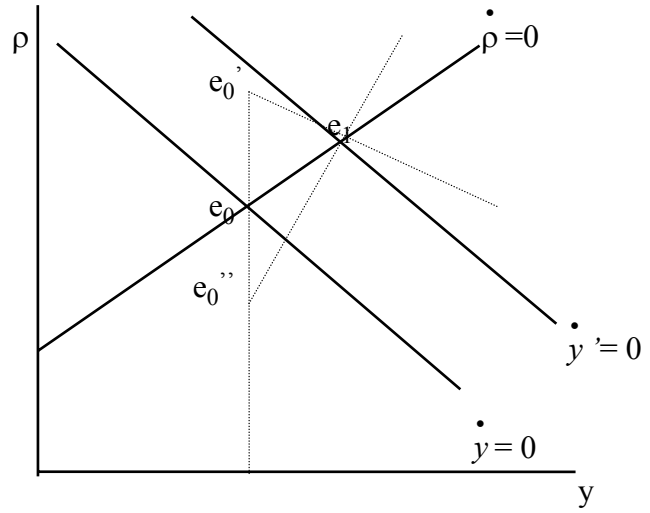
Figure 7
Less risk perceived by borrowers creates an adverse selection effect



e) Some policy implications (G , R, M^d)

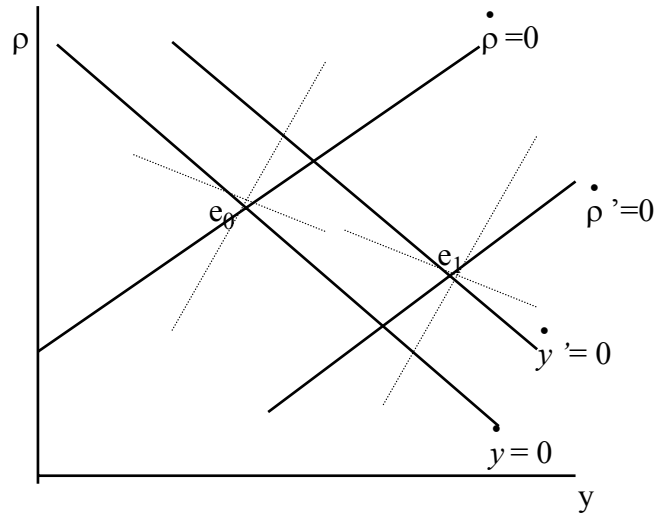
In this part of the section our purpose is to relate real sector variables with some policy actions. An expansionary fiscal policy (via government expenditure, G) will have the traditional Keynesian results: by rising the cost of bank credit and market interest rates output will be higher in the long run. The increase in output is not too high as in the case where interest rates would have held constant creating the traditional “crowding-out” effect (Figure 8).

Figure 8
Higher government purchases generate a traditional Keynesian result



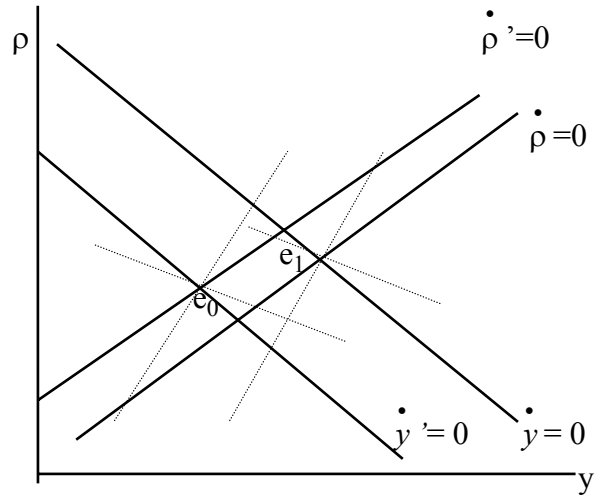
A monetary policy can exist in the Bernanke-Blinder model through bank reserves (R). If reserves are increased due to, for instance, an open market purchase banks will have more availability to lend, the supply of credit will be higher and consequently, the rate of loans will decline and output will rise in the long run (Figure 9).

Figure 9
More availability to lend for banks (higher reserves) induces a greater supply of credit



On the other hand, an exogenous increase in the demand for money will reduce the demand for bank credit since they are substitutes. A lower long run level of loans, their price, and output will then result (Figure 10).

Figure 10
Higher demand for money induces a lower demand for credit



Section III Main Implications and Conclusions

Bernanke and Blinder (1988) constructed a simple model incorporating a bank loan channel in a modified IS-LM framework. For this channel to exist, some firms must be bank dependent and monetary policy must shift the loan supply schedule. Bernanke and Blinder (1992) and Kashyap, Stein, and Wilcox (1993) show that monetary policy works partly through a bank loan channel.

A change in interest rates can affect spending decisions through two additional channels that are related to a country's financial structure. The so-called, credit and broad credit channels, see Bernanke and Gertler, 1995. The credit channel works when loans and bonds are imperfect substitutes in the balance sheets of banks and firms: following a squeeze in liquidity, banks reduce the amount of loans they supply; firms could turn to the bond market, but if bonds and loans are imperfect substitutes, the external finance premium will go up, amplifying the effects of the monetary tightening. A broad credit channel, instead, works independently of the imperfect substitutability between loan and bonds: it is associated with the credit constraints which may arise when firms' ability to borrow depends on the availability of collateral. An increase in interest rates reduces the market value of collateral (real estate values, for instance) thus affecting a firm's access to bank lending. (See Kiyotaki and Moore, 1997.)

The most convincing empirical studies on the relevance of the credit channel have used microeconomic data, and have investigated whether the responses of banks and firms to a shift in monetary policy differ according to their characteristics, their size in particular. Small firms are more likely to be liquidity constrained and to depend on banks for financing. Similarly small banks find it more difficult to insulate their loans' portfolio from a squeeze in central bank liquidity. This is because a small bank typically cannot use bond holdings as a buffer.

The credit channel is relevant in contiental Europe, where banks provide the bulk of firms' financing needs. The contrast with the US and the UK is particularly striking: British and American firms raise on the capital market 3-4 times as many funds as any continental European firm, with the possible exception of France, where securities' markets have recently developed quite fast.

Banks and Credit Rationing

The risk averse firm, and the consequent multiple determinants of investment, is an important component of investment. The same factors that make firms risk averse also make banks – a special category of firms – risk averse. The consequence is that when their net worth declines, they will faced the increased chance of bankruptcy and thus will shift their portfolio towards safer activities like investing in Treasury Bills. The result could be a reduced supply of funds, higher lending rates, and even greater credit rationing.
In addition to the conventional Keynesian "money channel" (an increase to the money supply leads to lower interest rates to induce people to hold the additional money, and thus to greater investment and output), monetary policy can work through the "credit channel" (see Blinder and Stiglitz 1983, Bernanke and Blinder 1988 and Stiglitz and Weiss 1992). Monetary policy also has effects on credit availability and thus investment. Take a decrease in the discount rate, which, among other things, raises the real wealth of banks, making them more willing to bear risk and therefore to make more loans. Because the ratio of loans to net worth is very large, even small changes in net worth can have a large impact on loans.

Parenthetically, not only has modern finance emphasized the relative importance of this credit channel, it has actually challenged the validity of the older "money" channel, as an increasingly large fraction of money bears interest, as the ratio of transactions involved in exchanges of assets to those related to income generating activities has increased, as it has been recognized that this relationship itself changes dramatically over time and over the cycle, and as new developments in financial markets make an increasingly large fraction of transactions not dependent on money, as conventionally defined.
The focus on the credit channel of transmission has several important implications for the conduct of monetary policy: The relationship between money and credit will change over the business cycle. Similarly, the relationship between interest rates and output will change over the business cycle. In particular, monetary policy may have little effect during recessions because the excess liquidity in the banking system will mean that it has little effect on the availability of credit, and can thus only operate through the conventional, and

weaker, "money channel." Movements in interest rates will not always be a good gauge of the effects of monetary policy. Monetary policy can have large effects even with little movement in the real interest rate. Monetary policy will matter less as substitutes for bank lending, like commercial paper, are developed. But informational considerations, namely the bad signal of trying to avoid bank loans, will probably continue to ensure that bank loans are an imperfect substitute for other forms of borrowing.

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