Business Cycles and Equilibrium

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Introduction

Since the late 1960s I have been working on theories that depend on the idea that economic and financial markets are in continual equilibrium. Equilibrium means there are no opportunities to make abnormal profits; more generally, it means that there are no easy ways for people to shift positions in a way that makes everyone better off.

Equilibrium was the concept that attracted me to finance and economics. I have never had a course in either subject. While working at Arthur D. Little in 1966, I met Jack Treynor, who began telling me about an equilibrium theory he was working on called the capital asset pricing model. I was hooked.

I began doing research in finance, and later in economics. I started doing consulting in finance. I was especially interested in applying the idea of continual equilibrium to all kinds of markets. I found it stimulating to combine consulting and research: most of the key concepts in my work were developed at this time, before I went to the University of Chicago to start my academic career.

The capital asset pricing model was first applied to stocks, but I wanted to apply it to other securities, like options and bonds. In trying to apply it to options, Myron Scholes and I found an option pricing formula. In trying to apply it to bonds, I developed the notion that monetary policy is and must be passive in an economy with well-developed financial markets.

This research on monetary policy and banking led to my first published paper, which begins this volume. I continued looking for a model that would allow markets to be in continual equilibrium while leaving a way for the government to control the money stock, but I was never able to find one. I decided that monetary policy can influence neither output nor prices.

At first I felt that the government could not influence interest rates through open market operations, but I changed that view over time.

I became convinced that it takes time for people to respond to certain events even when markets are in continual equilibrium. This allows the government to force the federal funds rate above or below its natural level while the government is intervening actively in debt markets, but only if it forces other interest rates in the opposite direction. I still believe that the government has no control over "the" interest rate through monetary policy.

This work on monetary theory led me into research on business cycles. If monetary policy does not influence the economy, what does? I decided that business cycles are a natural result of uncertainty in a general equilibrium model. I see no need to assume sticky prices or easily corrected ignorance or government-influenced aggregate demand to explain business cycles.

At first I put some emphasis on rational expectations in my theories. Later I decided I didn't need that assumption. My key assumption now is simply that markets are in continual equilibrium. Some people may be confused, and others may have odd-looking objectives, but so long as prices and quantities are free to move, we are in a general equilibrium world.

While I don't believe the government can do much with open market operations, I do think it has some influence on the economy through taxes and regulations. Changes in taxes and regulations may even play a small role in business cycles. Taxes can also be used to affect the balance of trade with other countries, though I don't think the balance of trade affects our welfare in any particular way.

Though I think monetary policy is ineffective in a country with well-developed financial markets, I believe that when the government in a country with more primitive markets prints money and spends it, the inflation rate will rise. Hyperinflation will be a common result.

I'm not sure we should say that it's monetary policy that causes the hyperinflation. A government that prints money and spends it is usually creating massive deficits at the same time. Perhaps we should say that fiscal policy causes the hyperinflation. In any case, a government that prints massive amounts of money to spend will usually cause both hyperinflation and a general breakdown in financial markets.

My research on monetary theory and business cycles led to work on the balance of payments and the world business cycle. I was unable to find any interesting definition of the balance of payments other than the net flow of gold out of a country, and even that has no obvious impact on the country's welfare.

The idea that the business cycle is just a way of looking at an economy in general equilibrium leads naturally to the world business cycle as a reflection of world general equilibrium. In countries that produce mostly a few products or services, it is especially clear that changes in overall supply and demand factors can explain business cycles without the need for devices like sticky prices.

The idea that the world general equilibrium is independent of monetary factors is a sophisticated version of purchasing power parity. It says that the paths of real output and relative prices will be unaffected by the paths of the price level and exchange rates. Government intervention in the foreign exchange market can affect exchange rates and therefore inflation rates, but this will not cause the path of total real output or the composition of real output or relative prices to be different than they would otherwise have been.

With fixed exchange rates, inflation rates in different countries will be tied together. They will not be the same, but if inflation in one country is higher than it would otherwise have been, inflation in other countries will be higher than it would otherwise have been. With flexible exchange rates, exchange rate variations can cause price level variations in the same sense, but it seems more likely that price level variations will cause exchange rate variations. That is, when the price level in one country is higher than it would otherwise have been, the exchange rates for that country with other countries will be lower than they would otherwise have been.

Nominal interest rates and inflation rates will be connected in a similar way. When the nominal interest rate is higher than it would otherwise have been, the inflation rate using any price index will be higher than it would otherwise have been, though the higher nominal interest rate is not likely to be a direct cause of the higher inflation rate. I believe that monetary policy is passive, and therefore affects neither real nor nominal quantities. In particular, it has no effect on interest rates, exchange rates, or the inflation rate.

But if monetary policy doesn't affect the inflation rate, what does?

At first I said that changes in the inflation rate are caused by non-monetary factors such as changes in relative prices. I outlined a theory of inflation in which an increase or decrease in the price of oil will cause an increase or decrease in the inflation rate, other things equal. Later I added expectations as an important causal factor. In the theories in this book, the price level and inflation rate and exchange rates are indeterminate. In the world, though, they are determined, and I now think that expectations play an important role.

In a real sense, inflation can be whatever we expect it will be, even when our expectations are based on the incorrect view that the government can control inflation through open market operations.

There was a time, though, when we had a gold standard, which seems to rule out a role for expectations. If relative prices are given by the real equilibrium, then fixing the dollar price of a single good will fix the dollar prices of all goods. None of the prices will be constant, but they will all be determined by the price of gold.

Thus I decided that the government can control the price level by standing ready to buy or sell gold at a fixed price. Since the government can use this process to fix the price of gold at a point in time, it can adjust the fixed price of gold over time to stabilize a general price index.

Only standing ready to buy or sell gold will do it: the government cannot just pass a law specifying the price of gold, since that would soon cause almost all transactions in gold to stop. And since monetary policy must still be passive in my world, controlling the price of gold acts directly on the price level, rather than acting through monetary policy.

In a "small country," controlling the exchange rate can be as effective as controlling the price of gold. Even a large country can influence its inflation rate to some degree if it intervenes in foreign exchange markets.

In foreign exchange markets, the government can control exchange rates without holding much currency, since currency can always be exchanged for other assets. Similarly, the government can apparently control the price of gold without holding much gold, and without fear of running out of gold, since it can always exchange gold and other assets.

This leads to the puzzling notion that the government stands ready to buy or sell gold at a price that is fixed at each moment, while at the same time adjusting any surplus or deficiency in its stock of gold by exchanging it for other assets. Or the same thing with foreign exchange if it is fixing exchange rates. If this is possible, then the government can control the path of the price level indefinitely.

Buying and selling gold or foreign exchange can be costly, though. The government bears direct and indirect transaction costs, especially when there is "pressure" on the price level or exchange rate. Since the gains from stabilizing the price level or inflation rate are hard to pin down, the government may decide to let the inflation rate and exchange rates wander about rather than trying to control them.

More recently, I have come to believe that speculative prices contain "noise" introduced by those who trade on mistaken beliefs. In a somewhat similar way, prices of goods and services contain noise introduced by the investment decisions of those who do not act rationally. I think this will change the character of business cycles to some degree, perhaps making the fluctuations larger than they might otherwise be. But I don't think it creates an opportunity for the government to improve welfare in some sense.

Even in the presence of noise, I believe that the business cycle is a way of looking at the evolution of a world in general equilibrium; that monetary policy normally influences neither the business cycle nor the inflation rate; and that a gold standard with a changing price of gold, but a stable inventory of gold, could be used to control the inflation rate, but won't be.

The idea that the business cycle is just an aspect of general equilibrium contrasts with most economists' views of business cycles. Can't we do some econometric tests to tell whose ideas are right? Perhaps, but I haven't been able to think of any. Econometric tests can tell us a lot about correlations, but we want to know about causation. We want to know what causes the business cycle, what causes fluctuations in the trade balance, and what influences inflation and interest rates.

I have used mostly verbal rather than mathematical descriptions of my views of business cycles. If we were going to apply statistical tests to these theories, we would try to create a mathematical description of some kind. Since I haven't been able to think of any relevant statistical tests, I'm not sure what good that would do. More important, I think creating a mathematical description would tempt us to become too specific. We would claim that some things are constant, when hardly anything is constant. So I have intentionally left the descriptions mostly verbal.

If my views are correct, there is very little the government should do to influence the economy. Monetary and exchange rate policies accomplish almost nothing, and fiscal policies are unimportant in causing or changing business cycles.

Fischer Black

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Banking and Interest Rates in a World Without Money: The Effects of Uncontrolled Banking

It is possible to imagine a world in which commercial banks and other financial institutions are free to offer checking accounts (and savings accounts) on any terms they might want to set, and in which there are no reserve requirements. Banks could pay interest on demand deposits, and might not choose to distinguish between demand deposits and time deposits. Since there would be no reserve requirements, there would be no reason for Federal Reserve open market operations.

In such a world, it would not be possible to give any reasonable definition of the quantity of money. The payments mechanism in such a world would be very efficient, but money in the usual sense would not exist. Thus neither the quantity theory of money nor the liquidity preference theory of money would be applicable.

Vickrey was one of the first writers to imagine such a world. He says (1955, p 113):

> In passing it may be noted that the essentially institutional nature of monetary theory, including much of the basic notions of the quantity theory and of the liquidity-preference theory, is brought out by considering how far either of these theories would be applicable to a situation in which all transactions are executed by check or some similar instrument, in which banks cover their operating expenses entirely from service charges and

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> pay interest on average balances at rates reflecting the return on their investments, and in which overdrafts are honored fairly freely, possibly at graduated interest rates. It seems likely that for application to such circumstances the theories would have to be rather radically modified, if indeed they did not become entirely inapplicable.

Vickrey does not explore the concept any further in this article, but he has a somewhat longer discussion in a later book (1964, pp. 108–10). There he emphasizes the fact that current monetary theory depends heavily on a rather restricted form of financial institution. He says that other institutional arrangements would make current monetary theory almost completely invalid.

Tobin comes close to saying the same thing several times. In "Commercial Banks as Creators of 'Money'," (1967) he emphasizes the similarity between commercial banks and other financial intermediaries, and thus between the liabilities of commercial banks and the liabilities of other financial intermediaries. He says that the differences would tend to vanish in an unregulated, competitive financial world; and that even in today's world, the volume of liabilities of any financial institution is determined more by depositor preferences than by government and central bank actions. However, Tobin and Brainard say (1967) that the presence of uncontrolled banking reduces, but does not eliminate, the effectiveness of monetary control through changes in the volume of government debt.

Tobin (1968) points out some advantages, at least in a long-run sense, of allowing interest on demand deposits, or allowing interest-bearing assets to serve as means of payment. He says (1968, p. 846):

> Freeing means of payment from the legal limitations of zero interest would make it theoretically possible to have an efficient growth equilibrium without deflation – efficient in the sense that the real rate of interest is high enough to avoid overcapitalization and in the sense that real resources are not diverted into economizing means of payment.

Tobin comes closest to seeing the implications of uncontrolled banking in (1969, p. 26):

> If the interest rate on money, as well as the rates on all other financial assets, were flexible and endogenous, then they would all simply adjust to the marginal efficiency of capital. There would be no room for discrepancies between market and natural rates of return on capital, between market valuation and reproduction cost. There would be no room for monetary policy to affect aggregate demand. The real economy would call the tune for the financial sector, with no feedback in the other direction. As previously observed, something like this occurs in the long run, where the influence of monetary policy is not on aggregate demand but on the relative supplies of monetary and real assets, to which all rates of return must adjust.

Gurley and Shaw (1960, pp. 253–6) observe that with laissez-faire banking, the price level is not determinate, and suffers from "aimless drift."

Patinkin (1965, p. 303) also says that the price level is indeterminate when banks are not controlled:

> Indeed, what we have here is the indeterminacy of Wicksell's "pure credit" economy in which all transactions are carried out by checks, while banks hold no reserves. The economic interpretation of this indeterminacy is straightforward: In order for the absolute price level to be determined by market-equilibrating forces, changes in it must impinge on *real* behavior in *some* market, i.e., must create excess demands in some market.

Johnson (1969) and Friedman and Schwartz (1969), on the other hand, claim that uncontrolled banking will lead to an uncontrolled increase in prices. Friedman and Schwartz say (1969, p. 5):

> In the hypothetical world in which there are no costs of setting up a bank and running a bank, and in which deposits transferable by check provide precisely the same services as dominant money, there would be no limit to this process short of a price level of infinity in terms of dominant money.

An even more extreme position is taken by Pesek and Saving (1967), and by Pesek (1968). They say that making money a "free good" (by paying full interest on demand deposits) will make it a worthless good, and will cause a return to barter.

I maintain that the views expressed by Vickrey, Tobin, Gurley and Shaw, and Patinkin are the correct ones. In a world without controls on banking, the real sector will be independent of the financial sector, and the price level will be indeterminate. Traditional monetary theories will be inapplicable; in fact, it will not be possible to define the quantity of money in meaningful terms. Finally, I claim that this world would have several advantages, and few obvious disadvantages, over our present economic and monetary system.

A World Without Money

Let us imagine, then, a world in which money does not exist.

The major financial institutions in this world are banks. There are several competing major banks with branches in every state, as well as banks that are more limited geographically. Payments in this world are made by check. Because of economies of scale in check clearing, there may be only one major clearing corporation, which is operated either by the banks as a group or by the government. We might even imagine that checks have been replaced by an electronic payments mechanism; the discussion below would not be affected by this assumption.

Each bank is allowed to accept deposits under any conditions that it chooses to specify, and to pay any rate of interest on these deposits. In particular, the bank can allow transfers of credit by check between two interest-bearing accounts. Demand deposits will pay interest, and depositors are likely to be charged the full cost of transferring credit from one account to another. Almost all deposits will be in the form of demand deposits.

The banks will make loans to individuals, businesses, and governments. They will probably establish a schedule of interest charges for each borrower, and will then allow him to write checks on his account that increase the amount of his loan whenever he needs the money. The interest rate paid by a borrower will depend on such things as the amount he has borrowed, his wealth, his current income and his future income prospects. It will also depend on the extent to which he provides the bank with collateral for his loan. The banks will also probably set a maximum amount that they will lend to any individual, but this maximum is mainly to keep the borrower from running up a very large debt and then declaring bankruptcy. An individual who intends to repay his loans would not approach the maximum except in very unusual circumstances. Repayment will be

flexible; so long as the bank is in touch with the borrower and is satisfied of his ability to repay, he will not need to make payments of principal or interest in any particular month or year. Interest will simply be charged against his account periodically and will serve to increase the amount of his loan.

There will be an active market in inter-bank funds. A bank that has more deposits than loans will deposit its excess funds with other banks that have more loans than deposits. There will be no special reason for an individual bank to have non-bank deposits equal to non-bank loans, since it can adjust any imbalance through transactions with other banks.

Banks will compete in setting schedules of interest rates on loans and in setting transactions charges. The interest rate on deposits will be a standard wholesale money rate. Individuals, corporations, governments, and other banks will all receive the same interest rate on deposits.

Banks will make money on the administration of loans and on the handling of transactions. Their profits on loans will come from the difference between the rates they charge and the wholesale interest rate, minus their expenses. Their profits on transactions will come from the difference between their transactions charges and their costs in handling transactions.

A bank will be happy to bid a customer with positive balances away from another bank, even if it simply redeposits the customer's money with the original bank, because it gets that customer's transactions business (and possibly other business as well). A bank will be happy to bid a customer with negative balances away from another bank, even if it gets the deposits it needs to balance the new loan from the original bank, because it gets both the customer's loan business and the customer's transactions business.

An individual, business, or government will simply have an account at a bank; there will be no need to distinguish between accounts with positive balances (deposits) and accounts with negative balances (loans). An individual may write a check that converts his deposit into a loan, or he may receive a salary payment that converts his loan into a deposit. So long as his loan does not come to exceed the maximum permitted by the bank, there is no need to make special note of these transactions. If his average balance in the latest period is positive, his account will be credited with interest; if his average balance is negative, interest will be charged to his account. Thus there will be no reason for an individual to have both a loan and a deposit at the bank. Since he is allowed to write checks on either a positive

or a negative account, and since the interest he pays on his negative account will be greater than the interest he receives on his positive account, he will be better off if he combines the two into a single account.

A business or government account will be handled in the same way as an individual account. The bank will establish a schedule of rates and a maximum loan size, and the account will be allowed to fluctuate freely so long as it does not become a loan larger than the maximum. The business or government can write checks against its account regardless of whether the account has a positive or negative balance.

For the federal government, the interest rate charged on loans will probably be independent of the size of the loan, since there is virtually no risk of default. And there will be no need for an individual bank to set a maximum loan size, since it will probably be happy to loan the government as much as it wants to borrow. The federal government will have very large negative balances at the banks, and will use these bank loans as a substitute for issuing bonds and notes. The total borrowing of the federal government will be limited by Congress, just as it is today. It will be determined by the relation between government outlays and income from taxes and other sources. Massive government spending that is not balanced by taxation would cause the financial system to break down, just as it would cause the existing financial system to break down.

Depositors will be protected in several ways. First of all, every bank will be required to have capital equal to a certain fraction of its loans, and any unusual losses on its loans will come out of that capital. Second, the major banks will be so large that their loan portfolios will be protected by vast diversification. A default on a single loan or on a single group of loans will not be dangerous because it will be such a small fraction of the bank's total portfolio. Finally, the government may provide deposit insurance to protect against catastrophic losses that affect a large fraction of the loans in all banks' portfolios.

Since the banks will not be restricted in making loans to businesses, they will be able to supply the bulk of the loans that businesses need, both short-term and long-term. There will be no reason for businesses to borrow directly by issuing debt securities on the open market; the banks can presumably offer loans at the same interest rate that the market would demand, and the cost of obtaining a bank loan is likely to be less than the cost of a public issue of debt securities. Businesses will obtain part of their capital from bank loans, and the rest from securities, especially common stock. There will be no fixed rule about how much of its capital a business obtains from bank loans; some

businesses will have large loans, while others will have none at all. At any time a business can issue common stock to retire some of its loans, or expand its loans to retire some of its common stock.

For the moment, let us suppose that all payments in this simpler world are handled by check or credit card, and that currency is not used. In this world, money does not exist.

An individual has no currency. He has a bank account, but there is no distinction between demand deposits and time deposits. His bank account, if it is positive, represents all of his riskless savings. If it is negative, his bank account represents his borrowing. His bank account together with his holdings of securities and marketable real assets represent his total savings.

There is nothing in this simpler world that can meaningfully be called a quantity of money. Some might say that the total value of all positive bank accounts is the quantity of money. But this makes a completely arbitrary distinction between positive and negative bank accounts. And it means that the quantity of money will change every time an individual transfers credit from his negative bank account to another individual's positive bank account. Others might say that the net value of all bank accounts, both positive and negative, is the quantity of money. But the net value of all the accounts in a bank is simply the capital of that bank. It is equal to the assets of the bank (its loans) minus the liabilities of the bank (its deposits). Thus, the net value of all bank accounts is equal to the aggregate value of all bank securities. We would hardly want to call this the quantity of money.

Still others might say that the value of all potential additional loans in all accounts is the quantity of money. They would say the quantity of money in a positive account is the balance in the account plus the maximum amount the bank would allow the customer to borrow, and the quantity of money in a negative account is the difference between the maximum amount that can be borrowed and the actual amount borrowed. But the maximum size of the loan that is set for a bank customer is arbitrary, and is intended to keep him from intentionally spending himself into bankruptcy. It is not intended to limit the amount of debt he incurs that he will be able to repay. Virtually no individuals will borrow to the maximum, because they will want to have income and borrowing power available for future consumption. So the quantity of money defined in this way will generally have no economic meaning.

There are cases in which this definition of the quantity of money will have economic meaning, however. Suppose, for example, that

the maximum loan amount for any individual is set equal to the estimated total value of his wealth, including real assets, financial assets, and the present value of his future income. Then this last definition of the quantity of money will simply be equal to the total wealth of the community. Similarly, if the maximum loan amount is set at a standard percentage of the total value of his human and non-human wealth, this last definition of the quantity of money will be equal to a standard percentage of the total wealth of the community. So although the definition has economic meaning, it is not reasonable to call it the quantity of money.

There are no government bonds, because the government simply borrows from the banks in the same way that individuals and businesses borrow. There is no qualitative difference between government loans and other loans, so there is no reason to treat them differently. Thus, there is no way to include government bonds as part of the quantity of money or the quantity of near money.

Since there is no quantity of money to control, there is no need for a Federal Reserve Board to control it. The banks are not restricted in the amount they can loan by reserve requirements, so there is no need to change their reserve positions through open market operations, or to make changes in the rules relating reserves to total bank assets. The banks may be subject to capital requirements, however. They may be required to have capital equal to some minimum percentage of their loans. But this is not a restriction on the total volume of loans that banks can make, because they can always issue new common stock to raise any additional amounts of capital they may need.

Since there is no quantity of money, it is clear that the quantity of money cannot affect the economy of this world in any way. The quantity of money cannot affect national income, employment, or the rate of inflation, because it does not exist.

We can take one step in the direction of a more complex world by introducing currency. The federal government will print the currency, and will issue it to banks as requested. When a bank receives currency from the government it will credit the government's account by the amount of currency received. The bank will then give the currency to individuals as requested. When a bank gives currency to an individual who has an account with the bank, it will simply reduce his balance by the amount given. When a bank gives currency to an individual in exchange for a check on another bank, it will reduce the balance of the other bank (or increase its balance with the