Real boats rock: Monetary policy and real business cycles

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In the last fifteen years, economists' understanding of the economy has changed dramatically. Events have forced economists to reassess many of their most cherished assumptions about the way the economy works. Key economic relationships seem to disappear completely, only to reappear later with a casual indifference to professional opinion. The economy has pointedly and repeatedly demonstrated that it is a very complicated entity, capable of a great range of behavior. And the explanations that economists have developed to cope with this rudely apparent complexity bring into question the way economic policy has traditionally been analyzed.

This article outlines some of the major intellectual trends that have evolved in response to recent experience, paying special attention to how events have changed economists' understanding of economic policy, specifically monetary policy.

Since 1973, we have experienced three significantly different federal tax codes, three significantly different monetary regimes, and three different market assessments of basic commodity price trends. The value of imported goods as a percentage of total goods purchased has risen from 18 percent in 1980 to 26 percent in 1986. Foreign capital flows now account for 18 percent of U.S. capital needs. It is still unclear how economic theory will ultimately be affected by these events. Yet, a number of lessons are clear.

The U.S. economy is more sensitive to international markets, both capital and goods markets, than was commonly supposed. The tremendous diversity of economic experience among various sectors and regions, as well as the more celebrated effects of changes in the price of oil, have made it apparent that many fluctuations in the economy have less to do with changes either in domestic policy or demand conditions than economists had thought. The notion that supply conditions in terms of either input prices, competitive conditions, or technology are partially responsible for business cycle fluctuations is no longer an easily dismissed footnote in the history of economic thought but a major focus of current research.

The idea that real economic events such as oil shocks are responsible for some significant part of the volatility in economic activity implies directly that business cycle phenomena (including recessions and certain accelerations in inflation, as well as less dramatic events) may be necessary and natural responses to economic events. The policy implications of this are neither subtle nor small. Policymakers and economists have usually assumed that large changes in real growth and inflation represented mistakes that policy should attempt to correct. If this is not always the case, then the policy debate must be revised to deal with the possibility that bad economic news is not in itself sufficient reason for policy to act. In a world where supply factors matter, stabilization policy, while not necessarily wrong, is also not necessarily right. No longer can someone merely point to a recession and conclude that policy failed. The source of the offending event must be considered in order to evaluate whether a better outcome was really possible.

In a world where changes in supply are important, policy decisions are almost always a series of trade-offs between different goals. For instance, if policy seeks to make U.S. firms more competitive with foreign corporations by lowering the value of the dollar, it will generate a higher inflation rate. The higher inflation rate will reduce the standard of living of American workers even as the lower dollar creates more jobs for them. For business, the consequences are just as double-edged. While the lower dollar makes U.S. firms more competitive and attracts foreign capital for U.S. firms to build new factories with, it makes those same firms vulnerable to foreign takeover.

The standards by which economic policy is judged need to be revised. It can no longer be maintained that the economy would chug along at a solid 3-3.5 percent real growth rate

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no inflation if policy were run correctly. As the saying goes, "real boats rock."

Pre-oil-shock notions

Policy as repairman. The Keynesian notion of policy was one of managing an economy which, at least at the macroeconomic level, was incapable of managing itself. Greatly influenced by the Great Depression, Keynesian theory[1,2] believed the economy is subject to large demand shocks that can incapacitate much of the country's production capacity. It followed from this view of the economy that the primary goal of policy is to offset demand shocks and prevent the resulting recessions from endangering the economic health of the nation. Fundamental to this viewpoint was the notion that cyclical fluctuations were due to largely unexplainable "animal spirits." Simply put, recessions were due to an economy in error and the goal of policy was to correct that error.

The IS-LM models used by the Keynesians, being primarily static in nature, caused economists to emphasize the current health of the economy rather than the prospects for healthy growth. Thus, during the heyday of Keynesian analysis, policy paid far more attention to current unemployment than to GNP growth.

Unemployment was viewed as a measure of an economy's failure to use all available resources. Within this paradigm, it is clear that the goal of policy is to create enough current demand to assure that all available resources are fully utilized. Tomorrow will be taken care of by tomorrow's policies. The intuitive appeal of this approach to policymakers is clear: If resources are not being used, then clearly they are being wasted. Trade-offs through time were largely ignored; they were not part of the theory. Keynesians believed implicitly in immediate and forceful counter-cyclical policies.

This gap in the Keynesian paradigm leads to some well known difficulties, such as policies biased toward inflation. The greatest failure of the Keynesian approach was its complete inability to cope with the stagflation of the early 1970s. In the Keynesian world, inflation means growth. This failure paved the way for the ascendancy of monetarism.

Policy as the problem In the monetarist's paradigm,[3,4] the economy left to itself is a stable, healthy, dynamic entity that can be and often is disrupted by inappropriate policies, especially monetary policies. The heart of this analysis shares much with the Keynesian world view in that most problems originate in inappropriate levels of demand and that those problems manifest themselves in unnecessary and harmful economic fluctuations. However, the monetarist's paradigm argues that the inappropriate level of demand is the result of bad policy. Monetarists believe that if policy is stable (a steady 4 percent money growth is the most common definition of stable policy used by monetarists) then demand will remain stable, and the economy will experience steady non-inflationary growth.

The Keynesian and monetarist frameworks differ primarily in their assumptions about the ability of economic agents to make good decisions about the economy as a whole. Monetarists, unlike the Keynesians, hold that economic agents will make good decisions unless they are misled by policymakers. According to monetarists, the primary way policymakers mislead economic agents is by printing excess money. The extra money leads to excess spending that in turn leads to increased inflation and lower growth.

The monetarist paradigm is more dynamic in outlook than the Keynesian but it still does not have any formal structure for making policy trade-offs through time. There is no need in the monetarist paradigm to make trade-offs. If policy follows a strict 4 percent money-growth rule, the economy will do everything right.

Although it is hard to find policy prescriptions more different than the monetarists' and Keynesians', they both share the fundamental belief that policy can achieve stable growth, full employment, and zero inflation by the constant application of their policy recommendations. They both hold that economic outcomes can be consistently altered in a predictable way by policy. Thus, in their view, policy is ultimately responsible for all that happens in the macroeconomy.

Policy begins to lose its punch. The stagflation of the early 1970s was monetarism's big break. The Keynesian framework which had dominated macroeconomic policy for a generation was in serious trouble. Monetarism was in ascendancy. However, economic ideas were germinating that would transform

monetarism's basic policy message into something that its originators would have trouble recognizing.

The rational expectations hypothesis[5] introduced the idea that economic agents could not be routinely fooled by policymakers. If economic agents are as smart as the monetarists hold, then they should also use information about future policy in an efficient manner. And if economic agents do rationally forecast future policy, then it will be impossible for policymakers to systematically fool those agents into carrying out the policymakers' wishes. The implications of this observation for policy analysis are large. If economic agents' actions are based on optimal forecasts of policymakers' attempts to fool them, then they will only be fooled by the random component of policy. This clearly destroys the ability of policymakers to "manage" the economy. Policymakers can mess things up by following random policies but they have no ability to systematically help the economy. Deviations from a policy rule hurt the economy because they are hard to forecast. And, even stranger, it doesn't really matter what the rule is, as long as economic agents can accurately forecast policy actions. In this context, a 4 percent money growth rule follows not from a classical monetarist argument, but from the observation that four is a very easy number to predict.[6] This framework, more than any other, argued that having a rule is the best policy.

The world becomes unstable. Within the context of the rational expectations literature, the new classical approach[7,8] provides a more complete theoretic structure. In the new classical paradigm, economic agents are dynamic optimizing agents with full information processing capabilities. Every economic agent becomes not only a full service economic forecasting firm but also a full service corporate planning department. The primary policy consequences of this approach are twofold. Not only are economic agents difficult to mislead, but structural relationships in the economy became less stable. Because economic agents act on implicit forecasts, different economic regimes lead to whole new decision rules. Policymakers have to deal with the expectations of economic agents but they can not count on consistent responses even to surprises. Policymakers in the new classical world were in a two-party guessing game.

This rational expectations paradigm formally introduced the notion that policy affects macroeconomic welfare by distorting the intertemporal allocation of resources. Economic agents, by attempting to optimize, would try to match opportunity costs across periods and would err when policy caused prices to be improperly set. Within the context of these models, the markets are perfect, in the sense that profit opportunities for intertemporal arbitrage are equal between the market and the government. As a result, policy, if it can do anything, can only distort the prices at which that arbitrage takes place and thus hinder the economy.

A substantial subgroup[9,10] of the profession took issue with these policy conclusions, and pushed forward the notion that there were sufficient non-neutralities in money growth in the real world to allow plenty of room for consistent counter-cyclical policy action. What is interesting about this literature in terms of policy is that this analysis, like all of that preceding, maintained with very few exceptions that stability is good and instability is bad. The goals of policy, up to this point, are uniformly toward stability. The argument is centered around the effects of policy. Does policy correct or create the instability? All sides still hold that the economic nirvana of stable growth and zero inflation is possible if policymakers would follow *their* advice.

This is hardly surprising. From Keynes onward there have been virtually no sources of volatility in the real economy that have not involved someone making a mistake, according to economists. Although the questions about who exactly was making the mistake created many heated arguments, everyone agreed that *someone* made a mistake. It is also hardly surprising that, faced with the economic events since 1973, this world view did not hold up too well.

Post oil shock developments

Supply factors demand equal time. Beginning with the first oil shock, the economy has not behaved in ways that could be explained by previous demand-based models. The oil shocks shifted supply curves, creating upward price pressures at the same time they drove output down. Demand shifts cannot create that combination of events. The Reagan

Administration's 1981 tax law changes may have oversold their own direct supply-side effects, but the effect those tax law changes had on the value of the dollar had substantial real supply-side effects.

Many American firms simply could not compete in world markets with the price wedge that the 1981 tax bill created in the currency market. And while it is not the role of this paper to discuss exactly how the 1981 tax bill created that wedge, the wedge did indeed exist until the passage of tax reform, which returned U.S. companies to competitive health with a vengeance. Many subtle arguments may exist about arbitrage and Purchasing Power Parity, but nothing described the situation better during the peak of the wedge at the end of 1986 than a Harrod's department store ad. The ad claimed that it was possible for an American to fly to London and, by Christmas shopping in Britain, save enough to pay for airfare and hotel. The existence of such gross arbitrage opportunities provides more than a prima facie case that there were some serious distortions in the currency markets.

The effects of the price wedge were substantial. Policy efforts based on increasing the level of demand had their effects leached away by import growth. As a result, during much of this period demand growth substantially outstripped GNP growth. Inflation was reduced to artificially low levels as U.S. firms were forced to cut profit margins below long-run equilibrium just to stay in business.

Today, with the advent of tax reform we are seeing many of the price wedge effects in reverse as the economy corrects itself: GNP growth exceeding domestic demand growth, inflation artificially high, and the Japanese facing difficulties with their profit margins.

Since 1973 every aspect of macro performance has been significantly affected by "supply shocks". Real growth has been both helped and hindered by supply factors. Inflation has been both elevated and lowered. And, further, we have seen the effects of policy become attenuated in the face of larger forces.

We do not yet have a clear understanding of all of these supply-based phenomena. Nonetheless, we need to consider what the existence of substantial supply shocks implies for economic policy and for monetary policy in particular.

Real business cycles, or optimally bad times. A real business cycle is an aggregate fluctuation whose root cause is a variation in fundamental supply factors.[11] The basic economics of business cycles is very simple. If it becomes harder to produce goods, because a fundamental input such as oil has become scarce or because there has been a sudden change in international competitiveness, then it may no longer pay to produce as much, and a recession follows. As the shortage ends, or as production techniques adjust to new circumstances, production will increase.

The key element in the notion is that the increase in costs is, at least in part, only temporary. Only if tomorrow's goods will significantly undersell today's is there a good business reason for closing down. This is one of the reasons why the first oil shock in 1973, which was widely believed to be temporary, had so much more impact on production than the 1979 shock, which was viewed as permanent. Thus, temporary supply shocks make it perfectly possible to have a recession or a temporary increase in inflation without any mistakes being made.

Two key aspects distinguish the real business cycle models from all the paradigms examined so far.[12,13] First, business cycles exist without any mistakes. Second, they are optimal. Social welfare is maximized by allowing non-trivial fluctuations in economic performance. The policy consequences of these two aspects of real business cycle analysis are enormous. They bring into question the whole framework of stabilization policy. Economic stability had been synonymous with good policy. *Within a real business cycle context it is just as easy to suppose that a countercyclical policy will overstabilize the economy.*

The intellectual break here is hard to overestimate. The whole policy goal structure of the last 50 years is turned upside down by taking changes in supply conditions seriously. The Keynesian framework started with the assumption that the mere existence of a business cycle was sufficient to demonstrate a major market failure that needed correcting. The monetarists countered that the existence of a business cycle was the result of misguided and inappropriate policy and that if the Keynesian types could just leave well enough alone business cycles would largely disappear. Rational expectations analysis took this argument one

step further. It held that the market can correct for all but random policy and that business cycles were the result of random policy actions. But, in all three cases the business cycle was the symptom of a problem that it was the role of economic policy to cure.

Now, the whole mind set of policy analysis must be reassessed. The vocabulary of policy analysis may need to be rebuilt around the possibility of "good" recessions or "good" inflation. The intellectual transition will not be easy. We cannot say that all cycles are necessarily optimal. Or that there is no role for stabilization policy. But we can say that the justifications will have to be very different from what they have been.

The rest of this paper examines these issues and makes some suggestions about that new vocabulary. But a short digression to discuss how future real business cycle models may differ from today's is now in order.

New issues for old models. One obvious thing about supply-based cycles is that they may not be repeatable: A random disturbance happens only once. It may be that most shocks are enough alike that they can all be treated the same, as today's models assume, but it is equally likely that many shocks, such as oil shocks, may not be so amenable to models with stable supply functions. While each of the three oil shocks we have experienced in the last 15 years has been of approximately the same size in terms of price movements, each has had substantially different macroeconomic effects. Many reasons exist to explain the difference among oil shocks, yet the issues raised by the differing responses cannot be dismissed.

A supply shock carries with it the potential for a fundamental shift in the economic structure of an economy. As the supply curve is shifted, wealth and earning power are redistributed. While preferences may not actually shift, the relative weights across consumers may mimic such a shift at the macro level. (Saving behavior on an international basis certainly showed this kind of response after the first oil shock.) Thus, one supply shock could, from an economist's viewpoint, be the equivalent of a whole new economy. In the face of a whole new economy, it would be unreasonable to hold the policy regime constant. The current fashion of developing macro models which hold underlying structure as constant as possible may need to be abandoned.

It is also quite possible that a lack of data or repeated experience with a particular type of shock may force a return to some ad hoc constructions in macro modeling. This is not to say that economists will backtrack to Keynesian-style models, but only that we may need to use economic intuition to model the instabilities directly and that the models of those instabilities may have insufficient data to be estimated or verified.

Another significant development will be an effort to integrate industry and regional considerations with macro models. Supply shifts not only create macro disturbances but also micro ones. (Just compare Boston's and Houston's economies over the last 15 years.) It is at this level rather than economy-wide that structural stability is likely to be found. This is not the micro foundations modeling of the early 1970s or the representative agent optimization techniques of new classical analysis, but industry-, geographic-, and demographic-based analysis that takes into account the micro eddies in the macro ocean. We may be able to build models of price adjustment and output of individual sectors based on their own supply conditions. These models will allow some of the macro instabilities due to changes in industrial structure and shifts in the relative importance of various demographic groups that result from supply shifts to be analyzed if not accurately predicted.

New ways of looking at policy

In analyzing the policy implications of real business cycles, the first necessary adjustment is to recognize that policy, aside from being good or bad, random or predictable, is unavoidable. The way in which many real business cycle models have kept policy neutral is to simply not include it. Other have included it in very straightforward rational expectations usage as unexpected money. I submit neither of these approaches is adequate. The first, simply omitting policy, is clearly insufficient. The second approach misses a fundamental aspect of the real business cycle literature. By allowing events to create disturbances in real intertemporal scarcity, significant uncertainty about real intertemporal scarcity is created. Should policy obscure these economic signals, it will have real effects. While a money shock definition may or may

not be technically correct, it provides no insight into the distortions created by inappropriate policies.

An alternative approach[14,15] is borrowed from micro policy analysis. Monetary policy should be interpreted as a price wedge in the intertemporal asset market. Policy has an effect only if it distorts a market price, specifically the intertemporal market price of credit. While this is inherently a nominal interest rate policy definition, it is very different from the classical Keynesian one. Here rates are measured relative to the marginal product of capital. *The key point is the emphasis on intertemporal prices. Interest rates are interpreted as a measure of intertemporal financial scarcity. Thus, a neutral monetary policy is one where financial intertemporal scarcity equals real intertemporal scarcity, and monetary policy is the wedge between financial and real intertemporal scarcity.*

The links to past definitions are fairly straightforward. In a world where real scarcity is constant, a stable money demand function without foresight would produce a monetarist definition of policy, and a stable money demand function with foresight gives you a rational expectations definition of policy. The Keynesian notion of policy would hold if the analysis were collapsed to one period. The key is that policy only has effects by distorting market prices, so that whether or not there are significant non-neutralities in the money supply process, the same notion of policy holds. In addition, we gain the advantage of avoiding the current difficulties by defining money in a useful way in a deregulated electronic world.

Unfortunately, interest rates are not the only prices that policy can distort. As we have seen demonstrated dramatically in the last six years, distortions in international currency markets can have large effects on the U.S. economy. Thus, the price distortion concept will need to include more than one asset. In some sense, it requires the inclusion of a whole structure of intertemporal prices both in domestic and foreign markets, although financial-market arbitrage reduces the relevant prices to the domestic term structure and current and future foreign exchange prices.

However, new policy definitions and supply-based models do not in any way invalidate either the monetarist or rational expectations lessons about policy; they simply make implementing them that much more difficult. Policy can still clearly disturb the economy. In an economy that has reasonably efficient markets, it is difficult, though not impossible, for policy to have positive marginal product and the potential for significant social loss due to policy-created price distortions remains quite high.

So what is policy supposed to do?

The easier question is, "What is policy not supposed to do?" Clearly, it should not seek to destabilize the economy. Just because a cycle may be optimal does not make it optimal. Likewise, policy should not seek to automatically stabilize the economy because real business cycles clearly cause all economic variables, both financial and real, to vary through time. Policy should not seek to artificially stabilize some particular variable above all others.

Real business cycle analysis points out a whole new set of limitations of policy. Not only can policy not create the full-employment prosperity of the Keynesian models, it cannot, or at least should not, seek to provide the steady, even growth and steady prices that the monetarists so value. Rather, it suggests a world where policy should seek to fit in and be as unobtrusive as possible. When supply shocks hit, it may be best to batten the hatches and sail into the wind.

Such a policy would clearly avoid the dangers of systemic inflationary excesses that seemed to characterize policy in the late 1970s. Policy would be run so that everything in the economy could be explained without reference to policy. This is a sort of real business cycle monetarism. It lacks only a mathematically compact rule.

It is interesting to note just how close this view of policy fits the Federal Reserve's own public statements. Academics have usually viewed the Federal Reserve as a big fish in a small pond. The internal view is of a small fish in a large ocean. In some ways the real business cycle literature is closer to the older institutional view of the role of Federal Reserve policy, that of providing a sympathetic financial environment for the conduct of business. If you examine the Federal Open Market Committee's reports to Congress, it is very clear that it is trying to do exactly what has been described in this article. Whether it has been successful or not remains a question. Analysts

outside the Federal Reserve have always viewed this line of argument as mere bureaucratic hedging.

Changing justifications

In the context of real business cycles literature, justifications for more activist policies require new arguments as well. Market imperfection arguments have often been used to explain the existence of business cycles or at least their "exaggerated amplitude," thus providing opportunity for activist policy. These arguments take on new importance in a real business cycle context. They also lose their conclusions. In a real business cycle context, activist policies require the same justification that has always been required in economics, save macro policy, a cost-benefit analysis. It is no longer sufficient to demonstrate the ability to stabilize the economy to justify action. It must first be demonstrated that the fluctuation under consideration is suboptimal. Then it must be shown that the gain from intervening in the economy is greater than the loss from disrupting necessary adjustments in the economy. If the intervention dampens useful cycles, that will be part of the cost of intervention.

I believe that it is precisely this type of analysis that will come to dominate the policy process in the years to come. We must consider what is to be gained by action and what is to be lost. It is possible that we may come to the conclusion that economic policy has caused the economy to be substantially less volatile than it should be.

There will likely be arguments about the human costs of instability being traded off against the lower total social welfare that results from stabilization policies. This is a classic economic argument that, up until now, has been absent from the monetary policy debate, which has historically assumed stable growth is high growth.

The evaluation of policy

One of the more difficult aspects of this line of argument is deciding how to judge the success of policy. In a world where recessions can be called good, what constitutes failure? The obvious answer, that performance must be measured against what other policies would have produced, is perfectly true and largely useless. The answer lies with the notion of market distortion.

There are some things that only policy can do. Systemic inflations, massive trade deficits unrelated to the true marginal product of physical capital, and multi-year recessions are clear evidence of failed policies, though not necessarily of failed monetary policy. Marginal judgments may not be possible, but an economy which is being severely disturbed is not hard to spot. The inability to reallocate resources from low-marginal-product industries to high-marginal-product industries is a sign of an economy which is growing too fast. An economy where the size and volatility of price increases are hindering investment planning is suffering from an overactive monetary policy.

Resource allocation is critical. Policy can harm the economy by interfering with the correct allocation of resources. Conversely, policy can assist the economy by helping in the correct allocation of resources. Thus, it is the easy flow of resources that must be the final measure of policy effectiveness. As suggested earlier, policy must rely on common sense and so must its evaluation. While it may be hard to formalize the exact nature of bad policy, it is not that difficult to spot bad policy by observing its bad outcome. This is precisely the role of the Federal Reserve's Humphrey-Hawkins testimony before Congress. It is unlikely that the real-business-cycle paradigm will substantially quiet Federal Reserve critics.

Conclusions

The policy implications of the real business cycle literature are large. They point on the whole to policies that in the literature have always been referred to as discretionary. However, there is a big difference between discretionary and random. Policy in a real business cycle world must be very aware of its limitations. The most important message to policymakers from the real business cycle literature is, "Don't try to do too much" and the primary lesson for critics of monetary policy is, "Don't expect too much".

[1] See Keynes, John Maynard, *The General Theory of Employment, Interest, and Money*, London: Macmillan, 1936.

[2] See Hicks, John, "Mr. Keynes and the Classics: A Suggested Interpretation," *Econometrica*, Vol. 5, April 1937, pp. 147-59.

[3] See Freidman, Milton, "The Role of Monetary Policy," *American Economic Review*, Vol. 58, March 1968, pp. 1-17.

[4] See Friedman, Milton, and Anna J. Schwartz, *A Monetary History of the United States: 1867-1960*, Princeton: Princeton University Press, 1963.

[5] See Barro, Robert J., "Unanticipated Money, Output and the Price Level in the United States," *Journal of Political Economy*, Vol. 86, August 1978, pp. 549-80.

[6] See Lucas, Robert E., Jr., "Roles, Discrection and the Role of the Economic Advisor," *Rational Expectation and Economic Policy*, ed. Stanley Fischer. National Bureau of Economic Research, Chicago, 1980, pp. 199-210.

[7] See Lucas, Robert E., Jr., "Econometric Policy Evaluation: A Critique," *Carnegie-Rochester Conference on Public Policy*, Vol. 1, 1976, pp. 19-46.

[8] See Sargent, Thomas, and Neil Wallace, "Rational Expectations, the Optimal Monetary Instrument, and the Optimal Money Supply Rule," *Journal of Political Economy*, Vol. 83, April 1975, pp. 241-547.

[9] See Fischer, Stanley, "Long-term Contracts, Rational Expectations, and the Optimal Money Supply Rule," *Journal of Political Economy*, Vol. 85, February 1977, pp. 191-206.

[10] See Taylor, John B., "Staggered Wage Setting in a Macro Model," *American Economic Review*, Vol. 69, May 1979, pp. 108-13.

[11] This is a somewhat broader class of model than the Kydland-Prescott real business cycle models in that it allows for a larger variety of supply shocks.

[12] See Long, John B., and Charles I. Plosser, "Real Business Cycles," *Journal of Political Economy*, Vol. 91, February 1983, pp. 39-69.

[13] See Barro, Robert, and Robert King, "Time Separable Preferences and Intertemporal Substitution Models of the Business Cycle," *Quarterly Journal of Economics*, Vol. 99, November 1984, pp. 817-39.

[14] See Laurent, Robert D., "An interest rate-based indicator of monetary policy," *Economic Perspectives*, Federal Reserve Bank of Chicago, Vol. 12, No. 1, January/February 1988, pp. 3-14.

[15] See Mote, Larry R., "Looking back: The use of interest rates in monetary policy," *Economic Perspectives*, Federal Reserve Bank of Chicago, Vol. 12, No. 1, January/February 1988, pp. 15-29.