

Threats to Future Effectiveness of Monetary Policy

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The mid-1960s Henry Levin film *Genghis Khan* featured a rugged-looking Omar Sharif in the title role playing opposite Robert Morley, at his plump and pompous best as the Chin emperor Wang Wei-shao. One of the film's early scenes shows the exquisitely attired Morley, calligraphy brush in hand, elegantly composing a poem. With an ethereal self-assurance born of unquestioning confidence in the divinely ordained course of worldly affairs, Morley explains that the poem's purpose is to express his displeasure at the Mongol barbarians who have lately been creating a disturbance on the Chin empire's western frontier, and, by so doing, cause them to desist.

Today expressions of intentions by leaders of the world's major central banks typically have immediate repercussions in financial markets, and perhaps more broadly as well. Does Chairman Greenspan believe that the U.S. business expansion has advanced to the point where a new round of wage inflation may be imminent? Did President Duisenberg imply that because Article 103 of the Maastricht Treaty refers to Article 102a, and both Article 102a and Article 105 refer to Article 2, Europe's chronic high unemployment may be a proper object of policy concern for the European Central Bank after all? Is Governor Hayami content to allow Japan to languish in a slump for yet another half-decade? Central bankers' public utterances and other, more subtle signals on such questions regularly move prices and yields in the financial markets, and these financial variables in turn affect nonfinancial economic activity in a variety of ways. Indeed, a widely shared opinion today is that central banks need not actually *do* anything. With a clear enough statement of intentions, "the markets will do the work for them."

In truth, the ability of central banks to affect the evolution of prices and output in the nonfinancial economy has always been something of a

mystery. It is not that there are no good accounts of how this influence might arise. There are many. The problem is rather that each such story, while plausible enough at first or even second thought, turns out to depend on one or another of a series of by now familiar fictions: households and firms need currency to purchase goods and services. Banks can issue only reserve-bearing liabilities. No nonbank financial institutions create credit. And so on.

This central mystery notwithstanding, at the practical level there is today little doubt that a country's monetary policy not only can but does largely determine the evolution of its general price level over the medium to longer run, and almost as little doubt that monetary policy exerts significant influence over aspects of real economic activity, like output and employment, over the short to medium run. The assumptions necessary to explain in simple terms how this happens are fictions, but they are useful fictions. Apart from purely empirical matters of magnitude and timing, the live question today is which set of fictions (that is, which model) provides the most useful description of the underlying causal process.

Circumstances change over time, however, and when they do the fictions that once described matters adequately may no longer do so. A later scene in Levin's film shows Morley still magnificently clothed but now lying in the mud, face blackened by gunpowder, in the wake of a Mongol attack on the Chin capital. There may well have been an earlier time when the might of the Chin empire was such that the mere suggestion of willingness to use it was sufficient to make potential invaders reconsider and withdraw. But by Wang Wei-shao's day that time had evidently passed.

The object of this paper is to consider the possible future of central banks' monetary policy making—say, over the next quarter-century—in light of several significant aspects of how the circumstances that bear on this process have been changing over the past quarter-century. Simply extrapolating in this way the recent development of financial market institutions and practices is, of course, no substitute for actually knowing what lies ahead, but doing so at least provides some observationally grounded basis for thinking about the future. The point is to work out the implications for central banks' ability to carry out monetary policy. The question of what to do in response to those implications, should they indeed materialize, lies beyond the scope of this paper.

In keeping with the structure and themes of this conference on "Social Science and the Future," the first section pauses to consider the major issues on which monetary economists have, in the past, made predictions about what then represented the future. In retrospect, what is striking about the field in this regard has been not the record of success or failure but rather the inability to achieve agreement, even on first-magnitude issues of public import within this area of economics.

The second section then sets the stage for the main inquiry undertaken in this paper by asking just how a central bank's monetary policy actions influence financial markets (and, in turn, nonfinancial economic activity) in the first place. The answer to this question turns on the central bank's role as a legally maintained monopolist—in particular, a monopolist over the supply of bank reserves.

The third section sets forth the paper's main concern for the future of monetary policy: the possibility that the further progress of any or all of several trends, already visible in the financial markets of many countries today, may weaken or even undermine the relevance of the central bank's monopoly. The concern is that if this were to occur, then except for sheer self-fulfilling expectations analogous to what Wang Wei-shao mistakenly thought his poems would engender, the central bank would be powerless to move interest rates and hence also unable to affect either prices or real outcomes (like output and employment) in the nonfinancial economy.

The fourth section extends this line of argument to consider several aspects of these potential developments that arise in an explicitly international context.

The final section concludes with brief remarks on what to make of all this from a normative policy perspective.

Some Past Predictions from Monetary Economics

What can individual disciplines within the social sciences say now about prospects for the intermediate-term future—roughly a quarter-century ahead? A useful preliminary to that inquiry is to look back on what success or failure these same disciplines have had, in the past, in assessing prospects for what is now the present.

Anyone at all familiar with the field of monetary economics knows that the researchers and policy makers engaged in this particular line of

economic inquiry often fail to display unanimity on important questions. This tendency toward disagreement has been strikingly evident within the past quarter-century. It has also been characteristic of views on issues with fairly immediate implications for what lay ahead no less than issues that are more narrowly analytical in the descriptive sense. As a result, it is difficult to represent the field as a whole as either successful or unsuccessful, right or wrong, in anticipating the major trends that have emerged in recent years. In short, on any given question experience has shown some views (and some economists) right, others wrong.

Among the issues of the last twenty-five years that have especially lent themselves to drawing inferences about the future, three stand out as having not only generated widespread attention within monetary economics but also borne on issues of sufficient public import to reach the attention of economists and noneconomists alike.

Money Growth Targets for Monetary Policy

The live issue on which monetary economics achieved the greatest degree of consensus (among the three considered here) is the extent to which the growth of one or another measure of "money" is reliably related to the growth of income and prices and hence provides a useful operating guide by which central banks can and should steer their monetary policy. As the financial systems of one country after another recovered from the dislocations and stringent regulation associated with World War II, central banks in countries that ran independent monetary policies (as opposed to, for example, simply pegging the value of their currency against some other currency) mostly did so by setting interest rates. By the 1960s, however—and especially by the mid-1970s—this procedure displayed clear shortcomings.

At the simplest level, the emergence of price inflation meant that the "nominal" interest rates observed in financial markets did not correspond closely to the corresponding "real" interest rates that presumably affect nonfinancial economic activity. More fundamentally, however, because an interest rate is merely a *relative* price—it is the price of dollars or yen or marks today versus dollars or yen or marks at some specified date later on—a fixed interest rate meant that there was nothing to anchor the economy's price level. In principle, a central bank that was simply fixing an interest rate stood ready to see *any* amount of money in

the public's hands, and by extension any level of prices in the economy, as long as the interest rate remained at the chosen level.

At the same time, economists also observed that in many countries some quantitative measure of "money," however defined for practical purposes, appeared to move closely with fluctuations of either income or prices or both. The suggestion therefore followed that by fixing the growth of money, a country's central bank could more closely influence its rate of business expansion or price inflation or both. In time, widely understood analysis of these ideas showed that whether choosing an interest rate or choosing a money growth rate (or attempting some compromise procedure) gave the central bank better control over such matters as inflation and employment depended not on first principles but rather on quantitative relationships that could only be assessed empirically. Because monetary economics is not a laboratory science capable of generating replicable experiments, the evidence available from actual experience is often incapable of clearly resolving such questions. Hence much disagreement persisted on the "money growth versus interest rates" debate. But it is fair to say that as of twenty-five years ago a clear majority of active monetary economists thought choosing money growth was the better procedure.

As a result of this line of thinking, in the 1970s many central banks around the world adopted formal targets for the growth of one or another measure of money. In the United States the Federal Reserve System did so halfheartedly in 1970, more seriously in 1975 under the prodding of a mandate legislated by Congress, and with still greater commitment beginning in 1979. The Deutsche Bundesbank adopted a money growth target in 1974. The Bank of England did so in 1976. (Beginning in 1975, and more so after 1978, the Bank of Japan often referred to a "money focused" policy and even used explicit money growth forecasts, but it is doubtful that Japan ever had genuine money growth targets.) In each case, procedural issues remained to be addressed—which measure of money? over what horizon? how to respond when actual money growth deviated from the target?—but the majority opinion among monetary economists was that these problems were resolvable and that money growth targets should be the centerpiece of formulating and conducting monetary policy.

Today few central banks still carry out monetary policy in this way. The conversation is instead—once again—almost entirely in terms of

what (short-term) interest rate to choose. The Federal Reserve System began to de-emphasize money growth targets in the mid-1980s and finally made clear their unimportance to U.S. monetary policy in 1993. The Bank of England reduced money growth targets to a secondary status in 1988 and abandoned them in 1990. The Bundesbank never acknowledged any reduced importance of its money growth target, but over the years its policy choices increasingly resulted in actual money growth either faster or slower than the designated range. The new European Central Bank has formally stated that it regards money growth as one of the two "pillars" of its approach to conducting monetary policy (the other is the bank's inflation forecast), but it remains unclear how the two fit together and thus far actual E.C.B. policy making seems mostly to consist of choosing an interest rate anyway. Only the Swiss National Bank continues to rely on money growth targets as if nothing had changed. (Note: At the end of 1999 the Swiss National Bank too abandoned its monetary targets.)

And what did change? Put quite simply, the observed relationships connecting money growth to the movement of income and prices either deteriorated or collapsed outright in most countries. Plausible explanations for this phenomenon include the introduction of new financial technologies (both in the hardware used for data processing and communications and in the product designs offered by issuers of deposits), changing government or central bank regulations, increased interconnections among the respective financial systems in different countries, and even new attitudes among investors, businesspeople, and consumers as a consequence of their having lived through a period of rapid inflation. But for whatever reason, money-income and money-price relationships broke down. (As Bank of Canada Governor John Crow put it, "We didn't abandon the monetary aggregates. They abandoned us.")

But it was these empirical relationships that had stood behind the (near) consensus on the usefulness of money growth targets. Most monetary economists overestimated the durability of these relationships over time. As a result, they advocated a policymaking framework that most central banks have since had to abandon.

Costs of Disinflation

A pervasive problem among the world's industrialized economies a quarter-century ago—indeed, part of the motivation for adopting money

growth targets for monetary policy—was high inflation. Economists and central bankers widely believed that they knew how to solve this problem: simply reduce the pace of economic activity to the point at which excess supplies (of labor for hire, finished products for sale, raw materials, investment goods, and so on) slowed the upward spiral of wages and prices. But they also widely believed that along with slowing inflation, this kind of policy would impose large costs in terms of foregone output, jobs, incomes, and profits. Hence the dilemma that led many countries to do little or nothing about inflation at all, and others to resort to intrusive (and often ineffective) controls on wages and prices.

A new line of thinking advanced in the 1970s disagreed, arguing instead that *foreknowledge* of a disinflationary policy would reduce—in the limit, eliminate altogether—such a policy's real costs. The basic claim was that, in making decisions about real economic activities like how much to work, or what and how much to produce, workers and firms would be indifferent to their economy's overall inflation rate (or, equivalently, its overall price level) as long as they knew in advance what it would be. What sometimes led them to make decisions that took the economy away from full employment was being surprised by inflation that was either faster or slower (and therefore prices that were either higher or lower) than they had expected. Under this view disinflationary policy depressed economic activity only because the disinflation took people by surprise. A fully anticipated disinflation would instead be, in principle, costless.

At an intuitive level what was novel in this line of thinking was its application in the short to intermediate run of economic principles that were familiar, indeed widely accepted, as a description of the long run. Nobody believes that the level of output and employment in the United States in the year 2100 will depend much on whether the evolution of prices over the next hundred years is such that the typical worker's weekly wage at the century's end is \$1,000 or \$2,000, or even \$5,000. Fundamental forces of human desire, productivity, and capital accumulation (importantly including the accumulation of knowledge, skills, and organizational insights) will determine real outcomes like output and employment, as well as real wages, over this horizon. But the idea that one price level versus another would not matter for real outcomes *next year*, as long as whatever level price were to prevail was fully anticipated, was new. And because it bore directly on one of the most important policy issues of the day, it was not just new but interesting.

Here far more than on the question of money growth targets, opinion was divided. Not surprisingly, analysis showed that this argument for the potential costlessness of disinflationary policy hinged on several important conditions, and how closely the circumstances of any given economy approximated those conditions was an empirical question. But shifting the debate to focus on required conditions, rather than implied outcomes *per se*, did little to resolve it.

In the end experience was also mixed. The disinflation that most industrialized countries have achieved over the last two decades has come at heavy cost. Output declined, unemployment rose (temporarily in the United States, but to date without reversal in many European countries), and profits and investment lagged. Hence any simple rendering of the "disinflation is costless" argument proved plainly wrong.

But it was also true that, by some measures, disinflation was less costly than many of the more pessimistic assessments had warned. In the United States, for example, a significant part of this story was a shift in the relationship between output and labor input. Measured by the rise in unemployment, the U.S. disinflation of the 1980s turned out to be almost precisely as costly as the earlier, pessimistic estimates had indicated. But measured by the shortfall of output from the existing trend, it was distinctly less so. In retrospect, the persistent disagreement stands out more than the clarity of the experience.

Need for Institutional Change

A different reaction to the phenomenon of chronic high inflation in so many countries was the suggestion, among some monetary economists, that this problem was the natural consequence of policymaking institutions that impart an inflationary bias to decisions made under them. The focus of this line of argument was the leeway that most central banks had always had to use "discretion" in deciding how to conduct monetary policy. Under some conditions, central banks exercising that discretion on a year-to-year (or even more frequent) basis would seek to boost output and employment by choosing an easier monetary policy than what firms and workers expected, thereby also allowing faster-than-expected inflation. But once that faster inflation had occurred, people might expect it to continue. Then the only way to boost output and employment again would be to choose a sufficiently easy monetary policy that inflation would be faster still. Over time, the result implied by this argument was an inflation rate that ratcheted ever higher, and that

policymakers would be reluctant to reduce for fear of triggering declines in output and employment.

The positive suggestion that followed from this line of thinking was that the way to reduce inflation, and then keep it low, was to amend policymaking institutions so as to take away central banks' discretion. The most severe way to do so would be to adopt some form of constitutional provision (in those countries with written constitutions) mandating a specific noninflationary monetary policy. Less extreme measures toward this end might be a legislative mandate along the same lines, or perhaps even a fixed regimen that the central bank could impose on itself.

The link between this idea and the "costless disinflation" debate that had arisen only slightly earlier was the crucial role assigned to workers' and firms' expectations, and hence to the credibility of the central bank's commitment to an anti-inflation policy. Under one view, disinflation would be costless if everyone believed it was coming. Under the other, what mattered was knowing that the central bank would not—because it could not—try to stimulate the economy by an inflationary policy. The two were clearly related. But in the latter case the focus was on the institutional arrangements under which the central bank makes policy, rather than on the central bank's choices directly.

Here too opinion among monetary economists was sharply divided. Some called for institutional change of a variety of forms, mostly at either the legislative or the internal central bank level. Others rejected this entire line of thinking as having little bearing on the actual problem of inflation in economies where conditions differed from those assumed in the underlying theory.

Whatever the potential relevance of this idea, experience showed that formal institutional change was not a necessary element in a successful disinflation. Most of the industrialized countries that have achieved virtual price stability over the last two decades did so under monetary policymaking institutions no different than they had before, when inflation was such a problem. (The United States is an especially good example in this regard.) Even in countries that have recently changed their policymaking institutions, in most cases the change occurred *after* inflation had slowed. (The establishment of the European Central Bank, with its primary if not exclusive focus on price stability, is an apt example here.) Some elements emphasized in this line of thinking, like the

importance of the central bank's "reputation," or of appointing central bankers whose personal policy preferences are highly averse to inflation, may well have been key to the success that occurred. But formal institutional change was not.

On this question as well, however, the more salient point is that opinion was divided. It is impossible to say whether "monetary economics" got the future right or not. Many monetary economists did, but many didn't.

The Central Bank as Monopolist

The influence of central banks, especially over nonfinancial economic activity but even over the financial markets, has always been something of a puzzle. The easiest way to see why this is so is to consider the small size of most central banks, and the even smaller size of their monetary policy operations, in relation to the economies that they supposedly influence. In the United States, for example, a year's production of final output is more than \$8.5 trillion. Including the production and exchange of intermediate goods and services, the volume of nonfinancial transactions that take place in the course of a year is several times \$8.5 trillion. Yet the total volume of reserves that banks and other financial institutions maintain with the Federal Reserve System is less than \$50 billion. And the difference between 2 percent per annum growth of reserves (which most observers would consider a tight monetary policy, all else equal) and 10 percent per annum reserves growth (which most would think highly expansionary) is whether the Federal Reserve buys \$1 billion or \$5 billion of securities over an entire year.

The more typical way of looking at the central bank's influence over the nonfinancial economy sidesteps these quantitative disparities by focusing on market interest rates. Firms as well as households rely on borrowing to finance their spending for many purposes, from putting up factories and houses to buying new cars and refrigerators, to paying college tuitions or simply taking vacations. It is not surprising that the cost of financing these expenditures therefore affects the willingness to undertake them. Moreover, in many cases where spending does not rely on borrowing, interest rates and expected asset returns more generally represent the relevant opportunity cost. Hence the ability to affect interest rates and asset returns is in turn sufficient to enable the central bank to affect spending in nonfinancial markets.

But this line of thinking only pushes the anomaly to be explained into a different arena: how, exactly, does the central bank affect interest rates? Here again, even a quick glance at the relevant magnitudes highlights the problem. In the United States, for example, the outstanding volume of securities issued directly by the U.S. Treasury is \$3.7 trillion. Including issues of U.S. government-sponsored and guaranteed agencies brings the overall size of the government securities market to \$7.1 trillion. Further including privately issued but publicly traded debt instruments that are close substitutes for government securities of one maturity or other brings the total size of the U.S. fixed-income securities market to \$13.6 trillion. In 1998 alone, insurance companies bought (on net) \$101 billion of securities in this market, pension funds bought \$186 billion, banks bought \$82 billion, and households liquidated \$57 billion of securities that they already owned. Gross trading volume is typically in the hundreds of billions of dollars *daily*, and it is not unusual for a single private firm to buy or sell more than \$1 billion of securities in a single transaction. Yet it is somehow supposed to make a major difference, for the entire level and structure of prices and yields in this nearly \$14 trillion market, whether the Federal Reserve buys or sells \$1 billion or \$5 billion of securities *over an entire year*.

As table 7.1 shows, a similar disparity between the magnitude of central banks' monetary policy operations and the size of the markets in which they operate is characteristic of other economies as well. Going on to consider currency substitution—in other words, the fact that for many investors a debt security denominated in a foreign currency is an actual or potential portfolio substitute for a comparable debt security denominated in the currency of the investor's country of residence—only makes the disparity all that much greater from the perspective of any individual central bank (though not for all central banks taken together, as if they acted in concert). Considering equity securities as actual or potential substitutes for debt securities makes the disparity greater still, from the perspective of either a single central bank or all taken together. (The volume of equity securities held in U.S. markets was \$15.4 trillion at 1998 yearend market prices.)

The standard explanation for central banks' ability to affect such large markets through such small operations is that transactions by the central bank are fundamentally different from transactions by private market participants. When a central bank buys securities, it makes payment by increasing the reserve account of the seller's bank, thereby

Table 7.1
Comparisons of Financial Magnitudes

	Percent of GDP				
	Bank reserves	Monetary base	Broad money	Out-standing government debt securities	Total domestic debt securities
Canada	0.6%	4.0%	43.4%	71.8%	84.5%
Euro-11	1.8	8.8	80.6	n.a.	n.a.
France	0.6	4.0	66.0	47.6	81.9
Germany	2.5	6.8	67.5	38.2	85.4
Italy	4.5	10.0	47.7	101.4	132.8
Japan	1.8	12.2	73.7	79.8	113.6
Sweden	0.6	4.9	47.5	55.4%	122.8
Switzerland	2.7	10.6	106.9	21.4	70.7
United Kingdom	1.1	4.0	91.7	35.8	59.8
United States	0.5	6.3	70.5	43.8	163.8

Notes: All figures are percentages of GDP.

U.S. data, as of yearend 1998, are from the Board of Governors of the Federal Reserve System.

Euro-11 data, as of yearend 1998, are from the European Central Bank.

All other data, as of yearend 1997, are from the IMF (for bank reserves, monetary base, and broad money) and the BIS (for government and total domestic debt securities).

increasing the total volume of reserves that the banking system collectively holds. When a central bank sells securities, it receives payment by reducing the reserve account of the buyer's bank, thereby reducing the total volume of reserves. No other market participant can either increase or reduce the total volume of reserves. The central bank is a monopoly supplier (and withdrawer) of reserves.

This monopoly position matters because, under any of a variety of conceptions of the monetary policy process, banks and other financial institutions must hold reserves with the central bank in order to carry out the economic functions that households and firms look to them to perform. The traditional "money view" of monetary policy begins with households' and firms' demand for bank-issued money, against which banks must, by law, hold reserves (usually specified as some set fraction of each bank's outstanding deposits). When the monopolist central bank reduces the supply of reserves, banks therefore must reduce the amount

of money that they supply to households and firms. As households and firms compete with one another to hold the now shrunken supply of money, their individual efforts to sell securities for money cannot produce any more money but do, collectively, drive the price of securities down—that is, they drive interest rates up.

The "credit view" of monetary policy focuses on a different aspect of the relationship between the financial and nonfinancial worlds, but for this purpose it leads to the same conclusion. Households and firms look to banks to extend loans (credit). Banks can do so only to the extent that they simultaneously create money—in other words, the respective totals on the two sides of any bank's balance sheet must always remain equal. But if banks must create money in order to advance credit, and creating more money means requiring more reserves, the central bank's role as monopoly supplier of reserves is again crucial. When the central bank reduces the supply of reserves, banks have to cut back on their lending, and the loan market will clear at a higher interest rate.

Under either the "money" or the "credit" view, therefore, the process by which monetary policy affects interest rates begins when the central bank buys or sells securities. In the case of a sale, the central bank receives payment by reducing the amount shown in the account that some bank maintains with the central bank itself. That bank therefore has less reserves than it did beforehand. If before this transaction the bank's reserves were just sufficient to meet its reserve requirement, based on its outstanding deposits, its reserves will now be insufficient. This bank may try to recoup its lost reserves by selling securities to someone else, but doing so only shifts the reserve deficiency from one bank to another. The only way for no bank to have a deficiency after the central bank sells securities (if all banks were just meeting their respective requirements at the outset) is to reduce the reserves that some bank is required to hold.

But since required reserves are based on deposits outstanding, this means inducing some bank customer(s) to hold a smaller volume of reservable deposits. Moreover, the amount by which deposits need to fall in order to bring the banking system back into reserve compliance after the central bank sells securities is a multiple of the central bank's transaction. (If the reserve requirement is 10 percent, then the needed fall in deposits is ten times the sale of securities by the central bank.) One possibility is that a bank could induce some of its customers to switch from reservable deposits to some other bank-issued instrument, like a savings account or

a CD. In order to do so, the bank would presumably have to raise the interest rates it offered on those other instruments. Alternatively, a bank could induce some customer to repay a loan, presumably by raising the interest rate it charged on bank credit. Equivalently, the bank could decide not to extend a new loan that it otherwise would have made. In this case the would-be borrower would have to seek credit elsewhere.

Any one of these responses (or all in combination) would, in sufficient volume, enable the banking system to meet its reserve requirements following a sale of securities by the central bank. And what all of these responses have in common is that they exert upward pressure on interest rates—from reselling the securities, from inducing customers to switch to savings accounts or CDs, from seeking early repayment of loans, or from denying credit to would-be borrowers. In each case the reaction triggered by the central bank's sale of securities pushes interest rates higher. (Conversely, reaction to a purchase of securities by the central bank would drive interest rates lower.) And in each case banks' need to hold required reserves with the central bank is the fulcrum of the process. Further, because banks also need to hold reserves to settle interbank payments, the same process would still be at work even in the absence of formal reserve requirements (more on this aspect below).

Some observers of financial markets, mindful of the intertemporal arbitrage conditions that relate the pricing of short- and long-term securities, attempt to skirt this kind of reasoning and argue that the central bank can affect interest rates on all but the shortest-term instruments—and hence can influence nonfinancial economic activity—merely by signaling its intention to change the prevailing level of short-term rates in the future. Hence a signal of intentions is sufficient to influence nonfinancial activity as well. The basic idea underlying this argument is that, apart from whatever risk and liquidity premia the market assesses, the yield on a two-year bond should equal the (geometric) average of the currently prevailing one-year yield and the expected one-year yield a year in the future. If the central bank does or says something that changes expectations about next year's short-term rate, it thereby moves today's long-term rate. And since many if not most kinds of spending by households and firms are more sensitive to long- (or at least medium-) than short-term interest rates, doing so thereby affects the nonfinancial economy as well. It is just this kind of reasoning that people have in mind when they speak of letting the markets do the central bank's work for it.

But this logic makes sense only if the central bank can credibly affect widely shared expectations of future short-term interest rates, and unless most market participants are prepared to be fooled most of the time, that in turn makes sense only if the central bank can indeed affect actual short-term interest rates when the time comes. And that ability relies on some process like the ones described by the familiar “money view” and “credit view.” At the end of the logical chain, the central bank's role as the monopoly supplier of reserves is essential.

Threats to the Relevance of the Central Bank's Monopoly

It may seem odd, at the close of the twentieth century, to suggest that the ability of central banks to control or at least shape the development of their respective economies stands at risk. Two decades ago chronic price inflation had reached levels that profoundly disturbed not only many economists and public policy mavens but also much of the general public in most of the world's industrialized countries. In some countries prices threatened to rise even faster, perhaps explosively. Today inflation is negligible in most industrialized countries, and almost everyone awards central banks primary responsibility for this dramatic reversal. Over just the last decade many large economies have also experienced reduced instability of output and employment, and many people credit central banks for this accomplishment too. In short, it has been a good era for monetary policy.

But financial institutions and financial practices are changing, and the direction of many of these changes spells trouble for the ability of central banks to carry out their monetary policy responsibilities effectively. The heart of the matter lies in the way central banks influence market interest rates. In most countries there is no challenge to the central bank's position as the monopolist controlling the supply of reserves. Rather, the question is whether that monopoly will remain relevant.

Erosion of the Demand for Bank Money

Being a monopolist is of little value if nobody needs, or even wants, to have whatever the monopoly consists of. The “money view” of monetary policy begins from the assumption that households and firms need money, for transactions purposes or portfolio purposes or both, and goes on to exploit the fact that banks can create money only if they have the

example, the single-vendor advance-payment cards already put into circulation by many telephone service providers (this practice is now especially widespread in Japan), or by the New York subway system—could develop into genuine private monies. In New York, for example, the Metropolitan Transit Authority has made several attempts, to date largely unsuccessful, to persuade city-area merchants to accept MTA smart cards in payment for purchases. Even if such cards were to gain acceptance, as long as issuers like the MTA in turn settled with merchants by transferring balances at banks, then in effect these cards would be no different from today's Visa or Mastercard. But it is easy to imagine how—twenty-five years in the future, after acceptance of such cards had become sufficiently widespread—firms would simply accept, and swap, balances on the MTA's books. (Hence the form of "smart card" in question here also differs importantly from today's MONDEX card, in which the issuer is always a bank and the redeemer is always a bank.)

Such a system would still involve the use of bank money, but only as the initial base of the value chain. The customer who buys a "smart card" from a nonbank firm would presumably pay for it using a bank check or cash. But to the extent that third parties were willing to accept balances on the nonbank firm's books in payment for their own transactions, there would be no need for the firm that issues the card to maintain bank balances to back up in full its corresponding liability. At that point, nonfinancial transactions made by swapping balances on that firm's books would take place independently of any new, contemporary use of bank money (or cash), and hence independently of any need for reserves at the central bank.

Needless to say, not all nonfinancial firms are equally plausible candidates to undertake this activity. Nonfinancial firms typically do not have access to the safety net that central banks, deposit insurance funds, and other government agencies normally maintain for banks. Hence a customer who buys this kind of "smart card" would have to have confidence in the permanence and soundness of the firm issuing it. Moreover, telephone companies and other widely used utilities have the further advantage that nearly everyone buys services from them on an ongoing basis. Even if customers bought a telephone company's advance-payment card and then found that no merchants would accept it, they could always use the balance on it (which, to recall, represents the company's liability to them) to pay their telephone bills.

reserves they are required to hold in parallel with their outstanding deposits. (In the United States today, for example, banks are required to hold reserves against forms of deposits used to settle transactions but not against other kinds of deposits, like savings accounts and CDs.) That is what makes the central bank's monopoly over the supply of reserves relevant.

In recent years, however, the development of new technologies has advanced to the point where there are a variety of visible alternatives to conventional bank money as a means of undertaking transactions, and in some cases even of settling transactions. Especially with the introduction of third-party credit cards in the 1960s, and increasingly so since then, economists' standard "cash in advance" models have no longer borne much relation to arrangements for purchasing goods and services in the modern economy. For most items, neither cash in one's pocket nor an adequate balance in one's checking account is necessary at the time of purchase. More recent improvements like electronic cash, and "smart cards" (which have now made significant inroads in such countries as Germany, France, and Japan and are just coming into use in the United States), have accentuated this trend.

The reason central banks' influence over interest rates has survived these developments is that money, in the conventional sense, has remained necessary for ultimate settlement of these transactions. The merchants who accept Visa or Mastercard need to be paid, and that still means having conventional money deposited into their bank accounts. And once a month individuals who use these credit cards must make a payment by transferring conventional money out of their bank accounts (unless they borrow the money that is due—about which more below). For reasons well described by familiar models of the "transactions" and "precautionary" demand for money, the ability to buy goods and services at will throughout the month but then settle all of the transactions together at month's end may well reduce the typical household's or firm's average need to hold money balances, but it does not eliminate this need. Hence banks' demand for reserves may be smaller, for a given fractional reserve requirement, but it remains as well. As is well known, the central bank's ability to carry out monetary policy depends not on the size but on the stability of the demand for reserves.

The future may be different, however, in either of two ways that bear on just this question. First, some types of "smart cards"—for

Such a development would involve advancing these card systems, or other forms of e-cash, to the point where they would provide not merely payment but also settlement. At the moment this prospect is hardly imminent. But with rapidly advancing data processing and encryption technology, and the gradual disappearance of the visible distinction between banks and other businesses (importantly including nonfinancial firms) in the public's perception, the prospect is far from inconceivable a quarter-century in the future. As long as taking deposits and providing payment services is a source of profit for banks, bank customers—like telephone companies, New York's MTA, or the merchants whom the MTA would like to induce to use its cards—have an incentive to recoup some of their costs by undertaking a form of this activity themselves. And to the extent that they can pass on some of what they recoup to their own customers, individuals will have an incentive to use these alternative payment vehicles just as nonbank firms will have an incentive to provide them.

How would central banks respond? One possibility would be to engage in a regulatory race, in which the monetary authorities in each country continually expanded the coverage of reserve requirements to blanket new issuers of what amounts to money, while the issuers of private monies responded by continually changing their product in order to evade each new set of expanded requirements. Experience—for example, that of the Federal Reserve System in the 1960s, when the new instruments in question were Eurodollar deposits and negotiable CDs—suggests that this is a race the central banks might well lose.

If so, what would then be left to the central bank would be its control over the remainder of the monetary base, the great majority of which in most countries is not bank reserves but circulating currency. Although monetary theorists frequently write as if control over "central bank money" were all there was to monetary policy, and sometimes point to empirical correlations between a country's monetary base and its income or prices, currency has become increasingly irrelevant to legal, domestic transactions. Moreover, the observed correlations between growth of currency and growth of either income or prices mostly reflect the fact that central banks normally just accommodate whatever the public's demand for currency happens to be. If advances in electronic technology facilitate the use of private nonbank monies outside the scope of the central bank's reserve requirements, neither the nickels and

dimes used in vending machines nor the \$100 bills used to pay drug dealers will be sufficient to preserve the efficacy of monetary policy.

Cooperation of a central bank's government can also be an important part of the story. Governments typically make payments, for purposes of income transfers as well as purchases of goods and services, using deposit accounts at banks. It is fair to assume that they will continue to do so. Governments can also easily require that all tax payments be in the form of bank money (or an equivalent that is settled in bank money). Hence one sector of the economy—a large one in many countries—is a potentially captive market for this purpose. But the government sector is not what most people have in mind when they worry about the central bank's ability to influence nonfinancial economic activity. If private monies not linked to the holding of reserves were to proliferate, the fact that the government pays by check and requires all tax payments to be by bank check would not be sufficient to maintain the effectiveness of monetary policy either.

Proliferation of Nonbank Credit

An entirely different trend, but one that likewise threatens the relevance of the central bank's position as monopoly supplier of reserves, is the declining role of banks (and other depository intermediaries) in advancing credit to the nonfinancial economy. Under the "credit view" of monetary policy, banks are important not because they create deposits but because they make loans. Money creation is merely what happens on the other side of the balance sheet when a bank extends credit. But because the deposits thus created are subject to reserve requirements, this process too generates a demand for the reserves over which the central bank has a monopoly on supply. If the lender is not a bank, however, so that the liabilities behind the loan are not deposits, then credit creation ordinarily implies no increase in the demand for reserves.

In the United States banks have been losing market share in the credit business ever since World War II. In 1950 the financial assets (mostly loans and securities investments) of U.S. commercial banks represented 51 percent of the total assets of all U.S. financial intermediaries. By 1975 banks' market share had fallen to 38 percent. Today it is just 24 percent. Including savings institutions and credit unions, which also come within the scope of the central bank's reserve requirements, the combined share of the U.S. credit market accounted for by depository

two-thirds of government-sponsored student loans, all originated by banks, are securitized. But securitization has only just begun to gain momentum in other sectors of what until recently was primarily the banks' market. Today 28 percent of consumer credit, 17 percent of commercial mortgages, and 11 percent of firms' trade credit is securitized. There is now even a small but rapidly growing market in which banks are securitizing their ordinary commercial and industrial loans.

The import of securitization in this context is simply that it severs even the bank-originated component of the economy's credit extension process from any direct relation to the central bank's system of required reserves. A loan extended by a bank and held on the bank's balance sheet is financed by deposits, which are subject to reserve requirements. (In many countries not all kinds of deposits, and not all forms of nondeposit bank liabilities, are subject to reserve requirements; but this only makes the existing linkage weaker.) The same loan extended by the same bank but securitized and sold to a nonbank investor is financed by that investor's liabilities or net worth, neither of which is subject to reserve requirements. From the perspective of the "credit view," therefore, the central bank's monopoly over the supply of reserves becomes irrelevant.

Private Bank Clearing Mechanisms

In some countries today—for example, in the United Kingdom and Canada, and increasingly so among small banks in the United States since required reserve ratios were reduced in 1990 and 1991—many banks' motivation for holding reserve balances with the central bank actually has little or nothing to do with reserve requirements. These reserves are, rather, a necessary means of settling interbank transactions through the central bank's clearing mechanism. On any given day, a bank may have more checks presented for payment than checks deposited. If its reserve balance is insufficient to cover the difference, its account at the central bank will be overdrawn at the end of the day, in which case most central banks will assess a penalty of one form or other. If the central bank does not allow "daylight overdrafts," the bank must similarly maintain an adequate reserve balance to cover such contingencies even on an intraday basis.

The role played by the interbank clearing mechanism in creating a demand for reserves is far removed from either the "money view" or the "credit view" of monetary policy—or any other standard textbook

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institutions was 65 percent in 1950, but only 30 percent today. The difference over time primarily represents the rapid advance of pension funds, insurance companies, and mutual funds—none of which hold reserves (in the sense of balances with the central bank) against their liabilities. In consequence, economists' empirical research on questions pertaining to the "credit view" of monetary policy mostly focuses not on aggregate business need for credit but only on those firms that are "bank dependent" by virtue of being too small, or otherwise insufficiently known, to borrow from nonbank lenders via the securities market.

There are two reasons, apart from simple extrapolation of past experience, for thinking that the trend toward diminished importance of banks and other depository intermediaries is likely to continue. First, advances in data processing technology, and therefore in the availability of information, are continually reducing the prevalence of the informational asymmetries that give bank-type "relationship" lending an advantage over "arm's length" lending in securities markets. Individual households seeking home mortgage financing, for example, no longer have to sit through extensive interviews with bank loan officers. In uncomplicated cases, which represent the majority of home financings, supplying standard information on line—information that potential lenders can in turn readily verify on line—is sufficient to produce a competitive loan offer within twenty-four hours.

And second, even for those households and firms that remain "bank dependent," securities markets have now advanced to the point where the bank that investigates the borrower's creditworthiness, originates the loan, and services the credit relationship, no longer needs to hold the loan in its own portfolio. Instead, today most kinds of bank-originated loans are regularly sold to firms that package them into aggregated portfolios of similar credits, which in turn stand as collateral behind securities owned and traded by market investors—the pension funds and insurance companies and mutual funds that are taking over market share from banks, as well as households who buy these securities directly on their own account.

In the United States, home mortgage lending was the first sector of the credit markets to be securitized in this way, under government sponsorship, and by now more than half (by dollar volume) of all home mortgages outstanding are held by securities market investors rather than by the banks or savings institutions that made the loans. Similarly, nearly

story, for that matter. (There is some ultimate connection to the "money view," since the use of bank money in executing day-to-day transactions is what creates the need for a clearing mechanism in the first place.) But nonetheless, and in just the same way, it gives the central bank the leverage to move large markets with tiny operations. The main point is once again that these clearing needs impose on banks, and therefore indirectly on the economy as a whole, a need for what the central bank is a monopolist over.

But competition can threaten this monopoly too. Private clearing mechanisms like the CHIPS network, and other privately maintained interbank netting systems like those studied in the 1990 report of the ad hoc BIS committee (the Lamfalussy Report), potentially represent just such threats. In a way that is conceptually parallel to nonfinancial businesses' incentive to introduce private monies in order to capture for themselves some of the profit that otherwise accrues to the banks, private clearing mechanisms like CHIPS offer banks the ability to economize on either charges paid or collateral required in central bank settlement systems, like the Federal Reserve System's "Fedwire" or the European countries' systems that are now linked by the European Union's TARGET system. The crucial question is who is best situated to be the provider of financial network services. Central banks have some advantages in this regard, but their superiority is not unambiguous. And, again by analogy to the use of private monies, private settlement systems can be (and are) used along with the systems provided by central banks.

Most of the discussion of private clearing mechanisms to date has focused on the risks that they present for a breakdown of the payments system in the event of default, and as of today that prospect is certainly the more serious concern. Moreover, so far even these private mechanisms for clearing interbank accounts rely, at the end of the process, on transfers of central bank money. CHIPS, for example, is a net settlement system in the sense that it nets participating banks' respective claims on one another *within the day*. But at the end of each day, remaining claims on CHIPS that have not netted out are settled using the Fedwire. Except for the intraday netting, therefore, banks participating in CHIPS still need reserves at the central bank to settle their payments.

But this need not be so. A private mechanism like CHIPS could evolve into a system of purely bilateral transfers among private banks analogous to the settlement method now used by European countries'

central banks, which do not maintain clearing balances at the European Central Bank. Another possibility would be transfers of deposits at a single private bank that all the others agreed to use. A quarter-century or so into the future, therefore, it is also readily conceivable that one or more of these private clearing mechanisms may sufficiently erode banks' need for central bank reserves to undermine the relevance of the central bank's monopoly. If so, it would also undermine the central bank's ability to carry out an effective monetary policy.

Explicitly International Dimensions

One of the most consistent developments in the monetary sphere in the last quarter of the twentieth century has been the increasing irrelevance of nation-state boundaries. The easiest way to see that this is so is simply to note that the number of national currencies has not kept pace with the proliferation of independent countries. One of the few safe predictions about the world twenty-five years in the future is probably that there will be more countries but fewer currencies.

The disappearing relevance of national borders in this context also prompts several lines of speculation (and each is no more than that) about what the future may bring. Each stems from realizing that the wave of currency consolidation that is now in progress, and likely to continue for the foreseeable future, is mostly not an attempt to rearrange the world into "optimal currency areas" in economists' usual sense. In some settings, like Western Europe, the motivation is instead to exploit economic unification, in this instance monetary unification, as the leading edge of political unification. In other settings, especially among smaller countries and in the developing world, the motivation is to mitigate the speculative instabilities that many central banks increasingly face in a world where currencies are convertible, capital flows freely, and market participants in the aggregate (and even some individually) bulk large compared to the assets at the central bank's disposal.

Especially in the wake of the East Asian financial crisis of 1997-1998, much of the discussion of the implications of globalization of financial markets has emphasized the problems posed for a central bank of a small country that is trying to maintain a specific chosen value of its currency. But for this purpose currency policy and monetary policy are the same. Whether the central bank has the resources to withstand

speculation against the exchange value of its currency is really the same question as whether the central bank has the ability to control the short-term interest rate on marketable obligations denominated in its currency.

Rapid advances in electronic technology, especially in communications, not only have brought many more investors into the international markets (some on their own account, some via mutual funds) but also have created a much greater degree of coherence in the attitudes and portfolio behavior of investors who remain physically dispersed. As a result, one central bank after another, among economies that are not large but not tiny either, has found itself overwhelmed. Thus far the central banks of the larger industrialized countries have not faced serious inability to control their short-term interest rates. But as financial globalization advances, this prospect too is hardly impossible. If so, the central banks of the large countries would, in all likelihood, seek to change the rules governing global financial markets in some way designed to maintain their ability to carry out monetary policy.

The tendency for central banks of the larger countries to resist surrendering their monetary policy powers to the forces of global market speculation is likely to be even greater because of some of the lessons learned from the East Asian crisis. Benign assumptions about the workings of speculative markets notwithstanding, it was simply not true that the countries that got into difficulty were exclusively those that were highly indebted, or were running large budget deficits or current account deficits, or had made other obvious policy mistakes, or where transparency of financial dealings and the rule of law more generally were especially weak. What was striking about the crisis as it rolled through one country and then another was the degree of apparent arbitrariness in investors' behavior. Even the explanations offered after the fact, for what had happened to any specific country, often tended to point to national vices that, only a few years before, the international investment community had largely hailed as virtues.

Small countries have little ability to alter the rules of international finance in order to protect themselves from arbitrarily destabilizing speculation. Their only choice is to participate in global markets or not. Large countries, however—and especially the large countries acting in concert—have broader latitude in this respect, and if they feel threatened they are likely to use it. Just what changes in the rules they would most likely seek is harder to say, although the surprising abruptness with

which the idea of capital controls has gone from being a taboo subject in polite conversation to a focus of open-minded inquiry is perhaps suggestive. (Indeed, the sheer number of recently published books hailing the wisdom of the judgments made by unfettered capital markets may itself be a marker that the tide of informed opinion is beginning to turn in a different direction.)

Here too, the likely outcome in many cases is a continued race between regulators and innovators, with the advantage over time probably on the side of the innovators. To the extent that countries act in concert, however, they may gain an advantage in this regard. One of the reasons for the failure of many past attempts at the national level to bring certain classes of transactions with the central bank's regulatory (and reserve requirement) sphere is market participants' ability to move the endangered transactions "off shore." No doubt regulatory havens will always exist, but the more countries were to coordinate their efforts in this dimension the more isolated, and therefore subject to potential discrimination, the remaining unregulated domiciles would become.

Globalization of financial markets also has implications for the ability of central banks to maintain the relevance of their monopoly over the supply of reserves—and hence the effectiveness of their monetary policy actions—through their operation of the payments clearing mechanism. International markets magnify the potential ability of private clearing mechanisms to compete with public ones. Moreover, currency substitution opens the way for what amounts to competition among national clearing mechanisms, even if each is maintained by a different country's central bank in its own currency. As firms and households, and therefore banks, use currencies other than that of their own country, the country's geographical space becomes less relevant for indicating over what financial transactions and nonfinancial economic behavior the central bank's actions have efficacy. (A parallel process is the use of "units of account" other than a country's currency to denominate wages and other payments.) Hence individual central banks may have influence over geographically dispersed sectors of economic activity, and specific economic disturbances like productivity shocks or oil price shocks may likewise exert their effect on geographically dispersed sectors rather than recognizable national economies.

Finally, what implications follow from the trend toward currency consolidation *per se*? Living with a common currency means living

under the same monetary policy, and hence the same interest rates and exchange rates. When different countries or different parts of the same country have a common currency, therefore, it is highly likely that from time to time the monetary policy that will be best for one will be quite unsuitable for the other. This phenomenon is thoroughly familiar among the disparate regional economies within the United States. (The most obvious example is what happened to Texas in the mid-1980s, when the regional economy was depressed because of falling oil prices but U.S. monetary policy remained highly restrictive as part of the continuing effort to restore nationwide price stability.) There is no reason not to expect the same kind of outcome from time to time among, for example, the member countries of the European Union.

As is well known from the standard theory of optimal currency areas, however, under the right conditions even countries or regions with highly dissimilar economies can happily share a common monetary policy. The usual list of such conditions includes price flexibility, labor mobility, and the ability and willingness to make cross-country, or cross-region, fiscal transfers. Of these, neither price flexibility nor labor mobility seems likely to increase sharply within the immediate future (although each is really the subject for another paper). What remains, therefore, is the possibility of fiscal transfers.

It is extremely doubtful that the countries that are now pursuing currency consolidation in reaction to financial or economic distress have any prospect of coupling it with any kind of serious international fiscal transfer system. If Argentina goes ahead and abandons the peso in favor of the U.S. dollar, for example, it presumably will not do so in the expectation of compensation from the United States any time the Federal Open Market Committee chooses a monetary policy that may be optimal for the U.S. economy but injurious to Argentina. Countries that are consolidating their currencies as an aspect of desired further political unification, however—like the European Union—are a different story.

Because of the substantial economic heterogeneity that prevails across the participating countries, Europe's new monetary union is very likely to prove unstable in its current form. Much speculation, recently diminished by the euphoria surrounding the Euro's successful introduction (to date only as a unit of account), has focused on whether some crisis or other may drive one or more of the union's eleven member countries to abandon the project, and if so, just what that would mean. A

more likely outcome, however, is that the pressures of such a crisis—or of repeated crises—would trigger the creation of a deeper union, importantly encompassing coordination of fiscal policies across the member countries (beyond the existing obligation under the Maastricht Treaty to limit government deficits to 3 percent of national income) as well as fiscal transfers among them.

The logical starting place for such fiscal transfers would be lender-of-last-resort policy and deposit insurance, both of which arise as natural adjuncts of monetary policy even though they are essentially fiscal functions, and both of which (especially lender-of-last-resort actions) may be easier to introduce politically because they arise in the context of actual or threatened financial crises rather than as an aspect of ordinary ongoing circumstances. Beyond lies the entire range of intergovernmental revenue sharing schemes, as well as personal tax and transfer systems, that would enable a member country enjoying a monetary policy that is right for its economic needs to help ease the burden on another member country that is forced to accept the same monetary policy even if its needs are sharply different. Just how far the European Union will go along this route, if that is indeed the eventual outcome, is no doubt a matter of the specific time horizon in question. But the thought that monetary union may in time foster the evolution of a deeper, more fundamentally political level of unification is probably not inconsistent with what the Euro's original architects had in mind.

Concluding Remarks

It is important to be clear that the threat outlined here to central banks' ability to conduct monetary policy, arising from any or all of several ways in which their monopoly over the supply of reserves might become irrelevant, applies to central banks' ability to influence prices in the nonfinancial economy no less than production and employment. Hence even those who believe that central banks should not concern themselves with real outcomes anyway (as a stricter interpretation of the European Central Bank's mission than that given above would imply) cannot simply sweep the issue aside. If the central bank cannot affect interest rates—in other words, the prices of financial assets—in its country's financial markets, because borrowing and lending in those markets proceed independently of whatever amount of reserves it chooses to supply, it cannot

Note

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affect the price level of goods and services in the nonfinancial economy either.

Whether, and to what extent, the appropriate response to this loss of monetary policy potency is to be regretted—and, where possible, resisted—depends on fundamental economic presumptions that lie well beyond the scope of this paper. At the most basic level, economic theory provides no clear answer to what would determine an economy's price level if what its inhabitants used as money depended entirely on their own ability and willingness to innovate, without effective restraint from the central bank or some other designated authority. Especially in light of many industrialized economies' success in achieving price stability over the last two decades, and the important role that most observers assign to these countries' central banks in bringing about this achievement, the prospect of diminished central bank effectiveness will not be reassuring.

Similar considerations arise with respect to output and employment. There is no lack of theories to describe how central bank actions can affect nonfinancial economic outcomes, but the quantitative importance of actual monetary policies in accounting for observed business fluctuations remains a subject of empirical debate. Those who discount that importance (in the limit, who believe that monetary policy is "neutral" with respect to nonfinancial outcomes) need not be apprehensive, at least on this ground, about the trends identified here. But for those who believe that monetary policy is a major influence underlying the movement of output and employment—for example, who credit the favorable economic performance in the United States in recent years in substantial part to the Federal Reserve System—the prospect of diminished central bank potency is a proper object of concern. Whether, and to what extent, to favor aggressive regulatory changes to preserve the economic relevance of the central bank's monopoly over the supply of reserves turns on the same set of issues.

Of course, central banks will still always be able to announce what they want interest rates, or inflation, or output and employment to be. Private economic agents, and especially participants in the financial markets, will continue to pay attention. But without the ability to implement a policy with some independent means of making those intentions come about, such pronouncements will be just that. With nothing behavioral to back them up, they will have about the same force over events as Wang Wei-shao's splendid poems.