

Monetary Policy Implications of Greater Fiscal Discipline

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After nearly a quarter century of large budget deficits—causing the public debt to double from 20 percent to 42 percent as a share of GDP in the industrialized countries—the need for greater fiscal discipline appears to be reaching a consensus. Last spring a balanced budget amendment to the U.S. Constitution passed in the House of Representatives and came close to passing in the Senate—a swing of only one vote would have made the difference. In June of this year, a Congressional budget resolution, calling for a balanced budget by the year 2002, was agreed to by the House and Senate, with the President disagreeing only about the exact date. In Europe, a key criterion for admission to the European Monetary Union is a substantially reduced budget deficit for many countries. Although structural budget deficits remain large, the chances are now greater than they have been in many years that deficits will decline as a share of GDP and that stronger discipline will be put in place to prevent them from rising again in the future.

The long-run economic benefits of budget deficit reduction have received extensive investigation by economists and policy analysts. Economic research—both theory and econometric models—provides evidence that lower budget deficits will lower real interest rates, increase investment, and thereby increase productivity growth and real incomes. The increase in investment will most likely be less than the reduction in the budget deficit because consumption and net exports will rise as the budget deficit declines. Moreover, the

size of the real interest rate reduction will depend on whether the budget deficit reduction takes place through spending cuts, tax increases, or tax reforms. On balance, however, most econometric studies indicate that a reduction in the budget deficit will increase private investment and thereby benefit long-run economic growth.¹ This benefit is the main economic reason to introduce greater discipline in fiscal policy.

But what are the monetary policy implications of greater fiscal discipline, and what do these implications, in turn, imply about other economic goals such as price stability and output stability? Would the *credibility* of monetary policymakers be increased, thereby improving the efficiency of monetary policy? Would there be less pressure to inflate? Should particular monetary policy actions be taken—such as a reduction in the short-term interest rate or an increase in money growth—during a *transition* to lower budget deficits? Should the day-to-day *operations* of monetary policy—the more systematic response of the monetary instruments to events in the economy—adapt if greater fiscal discipline prevents deficits from increasing during future recessions? Would such an adaptation sacrifice or enhance the ability of the central banks to achieve price stability? How do the answers to these questions depend on the form that greater fiscal discipline takes or the speed at which it is achieved?

The purpose of this paper is to examine these questions about monetary policy and to raise relevant theoretical, empirical, and historical issues for discussion. Although the questions are important, they have received much less attention by researchers than have questions about the long-run benefits of greater fiscal discipline. There still is considerable confusion and disagreement about the answers.

I begin by considering the most straightforward and direct connection between monetary policy and fiscal policy: the *government budget constraint*. The government budget constraint has implications for central bank credibility and the pressure on central banks to inflate. Second, I examine the questions about monetary policy

during a *transition* period to lower budget deficits. Third, I consider the *operation* of monetary policy when fiscal policy is legally or constitutionally constrained.

The government budget constraint, time inconsistency, and price stability goals

There are several ways in which a change in fiscal policy can directly affect the ability of a central bank to meet its price stability objectives. All are related to the government budget constraint.

Inflationary financing of government expenditures

The simple accounting identity called the government budget constraint links the budget deficit directly to monetary policy. That is, a change in the budget deficit necessarily changes the amount of interest-bearing government bonds or high-powered money needed to finance the deficit. If greater fiscal discipline reduces the budget deficit, for example, then the growth of the sum of interest-bearing debt and base money is reduced. Of course, as long as the government has access to the debt market, a reduced deficit does not necessarily reduce the growth of money. In other words, for governments with access to credit markets, there is no necessary connection between the size of the budget deficit and the amount of money creation because changes in the budget deficit can be financed by issuing government bonds.

On the other hand, for governments that have relied on money creation to finance a significant fraction of government expenditures, or that do not have easy access to credit markets, a reduction in the budget deficit would have a large effect on money creation and a beneficial effect on price stability. For this reason, budget deficit reduction is an essential first step in reducing money growth and inflation in many developing countries and economies in transition.

In the United States, where the fraction of government expenditures that is financed by money growth is very small, neither money

growth nor inflation have shown much tendency to vary with the size of the budget deficit. The early 1980s provide an excellent historical example: when the budget deficit rose sharply in the United States, the rate of inflation declined sharply. More generally, the correlation between the size of the budget deficit as a share of GDP and high-powered money growth has been essentially zero in recent U.S. history. Hence, though of great importance in some developing countries, the government budget constraint provides little reason to believe that greater fiscal discipline and the resulting reduced budget deficits would be good for price stability in the United States or other industrialized countries that depend little on money creation for revenues.

The debt and the effectiveness of monetary policy

Sargent and Wallace (1981) have emphasized another possible monetary policy implication of the government budget constraint. Suppose that high government deficits and debt raise the real interest rate to a level above the growth rate of the economy. Then monetary actions aimed at reducing the rate of inflation can have perverse effects and actually increase inflation. Given a particular level of the budget deficit, a decrease in money growth today designed to reduce inflation, will increase the amount of debt relative to GDP, as bond finance replaces monetary finance; this will raise interest payments and the size of the future budget deficit relative to GDP, requiring more money growth in the future.

In such a situation, lower debt levels—if they brought the real interest rate below the growth rate of the economy, could restore the effectiveness of monetary policy in controlling inflation, and thereby ease the job of monetary policymakers. Lower money growth would be expected to lead to lower, not higher, inflation.

Another possible relation between the debt and the effectiveness of monetary policy has been pointed out in a recent paper by Fair (1985). He argues that high government debt levels can reduce or even reverse the negative impact of higher interest rates in slowing down the economy and thus in reducing inflation. The reason for the

reduced sensitivity of interest rates is that debt holders' incomes rise with higher interest rates; higher incomes stimulate consumption, offsetting the intertemporal substitution effects of higher interest rates on spending. By simulating his econometric model of the U.S. economy, Fair estimates that the increase in debt in the United States in the last twenty-five years has significantly reduced the effectiveness of monetary policy. Observe that Fair's analysis does not require that the real interest rate be above the growth rate of the economy as does the Sargent and Wallace analysis.

Time inconsistency and public debt repudiation

During the 1980s, as budget deficits were rising, several important theoretical papers were published analyzing the effects of budget deficits and government debt on the credibility of monetary policy. See Lucas and Stokey (1983), Persson, Persson, and Svensson (1987), Calvo (1988), and Bohn (1988). These papers grew out of earlier research on time inconsistency by Kydland and Prescott (1977), which had provided the formal rationale for achieving policy credibility in an expectational Phillips curve context. In such models policymakers are confronted with the temptation to inflate in order to temporarily reduce unemployment.

The more recent analysis of government debt and deficit is very similar to the Kydland-Prescott argument about the inflation-unemployment tradeoff. The classic time inconsistency problem arises in the case of government debt because of the temptation of the government to repudiate that debt once it has been issued. The technical explanation goes as follows: using taxes to pay interest on an existing debt is "inefficient" relative to repudiation of the debt because of the deadweight loss of taxation; on the other hand, repudiation, if it is unanticipated, is like a lump-sum tax and does not affect efficiency. This provides the temptation to repudiate the debt.

As long as government debt is not indexed to inflation, a surprise increase in inflation engineered by monetary policy is equivalent to repudiation; the government pays back its debt in dollars which are worth less in purchasing power than the dollars it originally borrowed.

The analysis by Calvo (1988) shows that the temptation to repudiate or inflate the debt away increases with the size of the debt relative to GDP. In other words, the tendency for the central bank to inflate is an increasing function of the level of the debt, and in this sense, a reduction in the debt can reduce pressures on the central bank. Alternatively stated, the central bank gains in credibility. The theoretical literature is clear, therefore, that greater fiscal discipline which reduces government debt will have a favorable effect on central bank credibility. Lower deficits should be associated with lower rates of inflation.

What has the historical experience been? As mentioned above, in the United States there appears to have been little correlation between deficits or debt and inflation. As debt rose sharply as a share of GDP in the late 1970s and early 1980s, the inflation rate declined. One could argue, perhaps, that the debt-to-GDP ratio has not risen high enough for the time inconsistency effects to take over. But, in my view, the reason that inflation came down and stayed down despite the rising deficits is that the Fed and the political environment in which the Fed operates has not succumbed to time inconsistency pressures. Central bank credibility has not, in fact, appeared to suffer from the increased debt, at least in the United States. As the debt increased in the 1980s and the inflation rate decreased, the credibility of central banks rose rather than fell, according to most accounts.

However, this history of government debt and inflation does not imply that greater fiscal discipline would entail a perverse reduction in credibility. Most likely, the increased credibility and increased price stability of many central banks in the 1980s were influenced by other factors rather than the deficit, such as a more realistic assessment of the long-run versus short-run Phillips curve. Perhaps even a better recognition of the dangers of a loss of credibility as explained by research on time inconsistency was a factor! In addition, the historical negative correlation between inflation and deficit may be due to a reverse causation: lower inflation reduced government tax revenues through a reduction of bracket creep in the tax system.

Monetary policy during a transition to lower deficits

Having examined the relationship between the level of the deficit, or the debt, and monetary policy, I now consider issues that arise during a period of transition from a high deficit to a low deficit. What is the role of monetary policy during such a transition period while the budget deficit is being reduced? Should money growth be increased to cushion the short-run impact of deficit reduction on the economy? Or, if the central bank is following an interest rate-oriented policy, should the short-term interest rate be reduced? If such a reduction in the short-term interest rate is warranted, by how much and how fast should the reduction be?

This issue was discussed and hotly debated in the United States when multiyear deficit reduction plans were introduced in 1990, and again in 1993. The same question is being asked today as fiscal consolidation is being discussed in the United States and Europe. An examination of the experience during those earlier episodes—including a reconsideration of the economic analysis that was done at the time—and some simple macroeconomic reasoning suggests, in my view, straightforward and specific answers to these questions.

The monetary effects of a decline in the real rate of interest

Suppose that the central bank is following an interest rate-oriented policy in which the short-term interest rate is changed according to the deviations of inflation from an inflation target and to the deviations of real GDP from potential GDP. As a matter of descriptive policy analysis, such an assumption closely approximates the actions of monetary policymakers in recent years.² Suppose also that the economy is in a situation where inflation is about equal to the central bank's inflation target and that this target is viewed as optimal and appropriate; thus there is no need to change monetary policy to a regime with a lower (or higher) inflation rate. To be specific, suppose that this target inflation rate is 2 percent.

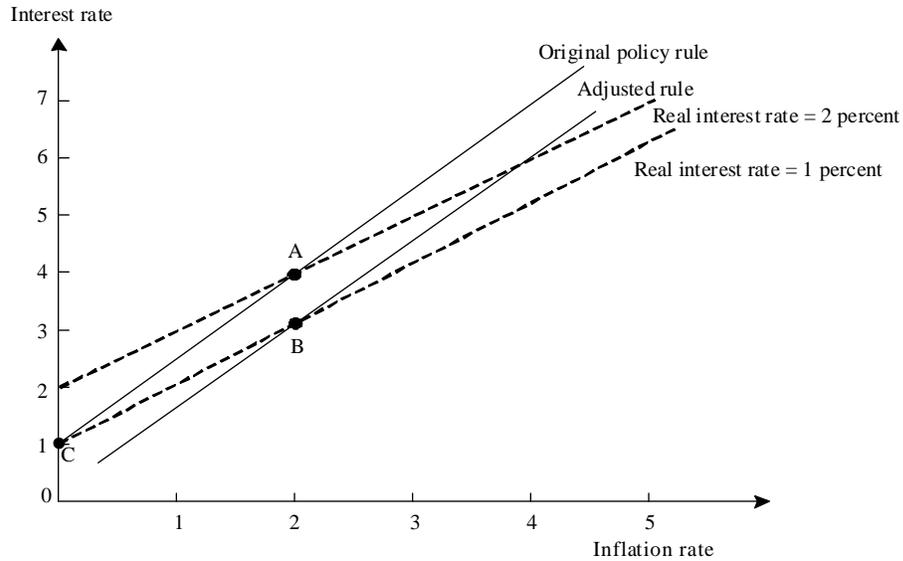
Implicit in any such interest rate-oriented monetary policy is a view on the part of policymakers of the long-run equilibrium (or

natural) real interest rate in the economy. Suppose that, because of a fiscal consolidation, this long-run real interest rate in the economy is expected to decline. There is considerable agreement among economists that a reduction in the budget deficit would bring about such a decline. For example, the Congressional Budget Office estimates that reducing the U.S. budget deficit to zero would reduce the long-run real interest rate by about 1 percentage point by the year 2002. The International Monetary Fund estimates that the world real interest rate would decline by about 1 percentage point if greater fiscal discipline in the Organization for Economic Cooperation and Development (OECD) countries as a whole led to a return to the lower budget deficits experienced in the early 1970s. Simulations of econometric models give similar calculations.³

If there is such a reduction in the long-run real interest rate, then the central bank—following an interest rate-oriented policy—should adapt its policy, or else there will be a change in the rate of inflation. If the central bank continues to follow its previous interest rate policy in the face of a decline in the long-run real interest rate, then it will set an interest rate which is too high; this will have the effect of reducing demand in the economy and thereby tend to lower the inflation rate below the target inflation rate. Because in this scenario the target inflation rate is already viewed as appropriate, this would be a mistake. Alternatively, if the central bank lowered its interest rate by the amount by which the long-run real interest rate is expected to fall (say 1 percentage point) then the inflation rate would remain near the target rate of inflation.

This relationship between changes in the long-term real interest rate and the inflation rate is illustrated in Figure 1. The nominal interest rate set by the central bank is on the vertical axis and the current inflation rate is on the horizontal axis. The solid, upward-sloping lines show two interest rate policy rules for the central bank: when inflation rises above the target inflation rate (shown to be 2 percent in the diagram) the central bank takes action to increase the interest rate. The dashed lines with a slope of 45 degrees shows the relationship between the *nominal* interest rate and the inflation rate

Figure 1
Effect of Change in Real Interest Rate



for a given *real* interest rate—assumed to be 2 percent for the upper dashed line and 1 percent for the lower dashed line in the diagram.

A long-run equilibrium occurs where the dashed and solid lines in Figure 1 intersect. At point A, for example, the real interest rate is equal to its long-run equilibrium value of 2 percent and the central bank is following its monetary policy rule. The inflation rate is also on target at 2 percent.

Now suppose that the equilibrium real interest rate falls. This is represented as a downward shift in the dashed line from 2 percent to 1 percent; that is, if the decline in the real interest rate is 1 percent, then the line shifts down by 1 percent. If the policy rule does not change, then a downward shift in the real interest rate will bring about a decline in the inflation rate to point C in Figure 1. Observe that the decline in the inflation rate is substantially larger than the decline in the real interest rate. This “multiplier” effect occurs

because of the responsiveness of the interest rate to the inflation rate—as seen by the positive, but not vertical, slope of the monetary policy rule.

The diagram also indicates how an adaptation of the monetary policy rule can prevent such a shift in the inflation rate; in particular, if the policy rule is simply shifted down by 1 percent, then the inflation rate does not change despite the decline in the long-run real interest rate. In this case the long-run equilibrium would be at point B in the diagram where the inflation rate remains at 2 percent.

The implication of this analysis is that, even if the central bank is concerned only with price stability, it should reduce its interest rate target by the amount that the long-run real interest rate declines. Thus we have a straightforward answer to the first part of the question about the role of monetary policy during a fiscal consolidation—the interest rate should be lowered and it should be lowered by the amount that the long-run real interest rate is expected to decline.

Interest rate path during a transition to lower deficits

Thus far I have made the case for shifting the monetary policy rule (again viewed as an approximation to current policy operations) by lowering the interest rate by a specific amount. But how fast should the interest be lowered? When this question came up during the debates about the 1990 and 1993 budget deals in the United States, some argued that the Fed should reduce its interest rate target by a large amount immediately when the budget deals were passed into law. Is this a good strategy? For example, if the long-run real interest rate would fall by 1 percentage point as a result of a multiyear budget deficit reduction, then should the central bank lower the interest rate by 1 percentage point immediately as the multiyear program is adopted?

For several reasons, I would now recommend against such an immediate decline in the interest rate, especially if the central bank is explicitly following an interest rate-oriented policy. Rather I

would recommend gradually reducing the interest rate at roughly the same pace as the budget deficit actually declined along its transition path. Expectational models of the term structure of interest rates, as well as historical experience, give considerable rationale for this view.

First, moving the interest rate by a large amount immediately is unnecessary if it is clear to markets that the short-term interest rate will eventually come down. It is the long-term interest rate, not the short rate, that has the potential to decline by a lot in the short run, and all this requires is an expectation that future short-term rates will decline.

Second, a rapid reduction in the short-term interest rate by the monetary policymakers puts them in a position of having to ratify the credibility of the new fiscal policy. Having the central bank act as an arbiter in what is likely to be a political debate about the credibility of the government would raise questions about the independence of the central bank.

Third, despite the best intentions, deficit reduction strategies have a tendency not to bring about as much deficit reduction as forecast. If the central bank gets out ahead of the fiscal authorities, then it may have to reverse its path if the deficit reduction path is halted.

A preferred strategy is simply to bring the interest rate down at about the same speed as the budget deficit is reduced. For example, if a 1 percentage point reduction in the real interest rate is predicted by econometric analysis, and the deficit reduction transition path is seven years long (with the same amount of reduction occurring each year), then it is appropriate to reduce the interest rate by about 15 basis points per year, cumulating to 1 percentage point over seven years; a ten-year deficit reduction path (again with equal deficit declines each year) would imply 10 basis points per year interest rate adjustment. These changes in monetary policy may appear remarkably small, and they would be nearly invisible compared to the typical fluctuations in interest rates during such a long transition period. But recall that the decline in the long-term interest rate would be much larger as future short-term interest rates are imbedded in forecasts.

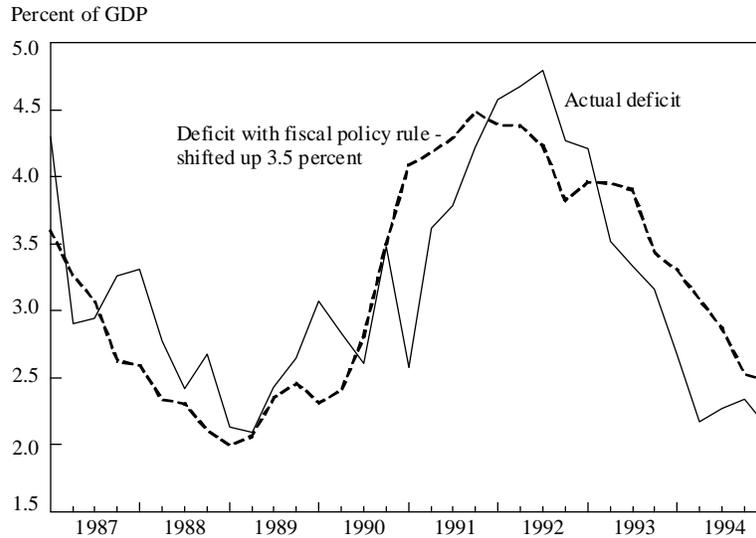
The operation of monetary policy with budget deficit limits

Thus far I have concentrated on plans for reducing the budget deficit without distinguishing between the *structural* deficit and cyclical fluctuations in the deficit. However, in addition to reducing the budget deficit, proposals to impose greater fiscal discipline often call for legislation or constitutional action to keep the budget deficit from rising in the future. These legislated limits also prevent fluctuations of the budget deficit over the business cycle. In other words, in addition to reducing the structural budget deficit to zero, fiscal discipline proposals frequently also keep the actual budget deficit at zero. For example, the balanced budget amendment to the U.S. Constitution that narrowly failed in the U.S. Senate earlier this year, called for balancing the actual budget deficit. Thus in the case of a cyclical slowdown in real GDP growth which reduced tax revenues, there would be a requirement to raise taxes or cut spending in order to keep the budget from going into deficit.⁴ Many have expressed concern that such actions forced on fiscal policy by the balanced budget amendment would make recessions worse. For the same reason, they could interfere with price stability goals.

Cyclical fluctuations in the budget deficit are huge and a policy which eliminated them would, at the least, alter the cyclical behavior of the economy for several business cycles. Chart 1 shows the behavior of the U.S. budget deficit during the 1987-1993 business cycle surrounding the 1990-91 recession. Observe how the deficit rose by nearly 3 percent of GDP from the boom of late 1988 through the end of the recession in 1991. Since then it has declined again.

This behavior of the budget is closely related to the state of economic activity. A close approximation of current fiscal policy in the United States is that the budget deficit (D) as a share of GDP rises by 0.5 times the percentage deviation (Y) of real GDP from potential GDP (the same variable in the monetary policy rule discussed above). That is, a fiscal policy rule which closely approximates the actual deficit is $D = -0.5*Y + S$ where S is a constant. Observe that the parameter S equals the structural deficit as a share of GDP; it is equal to about 3.5 percent on average during the

Chart 1
Budget Deficit and Fiscal Policy Rule



1987-1994 period shown in Chart 1. For a balanced structural deficit with a cyclically fluctuating actual deficit, we would set $S = 0$.

The correlation between the deficit and GDP implicit in the policy rule is shown in Chart 1. I have shifted up the path of the fiscal policy rule from a balanced structural deficit ($S = 0$) to more closely represent recent policy by raising S from 0 to 3.5; this shifts up the path of the policy rule. It is remarkable how closely the actual deficit follows this simple fiscal policy rule when adjusted to have the current structural deficit.

In my view, ideal fiscal reform would preserve the cyclical variation in the actual deficit while forcing the structural deficit to be zero; that is, the ideal policy would be $D = -0.5*Y$. However, many balanced budget amendments would eliminate the sensitivity of the deficit (D) to the real economy (Y); in other words, the balanced budget amendment which is on the table has $D = 0$ rather than $S = 0$.

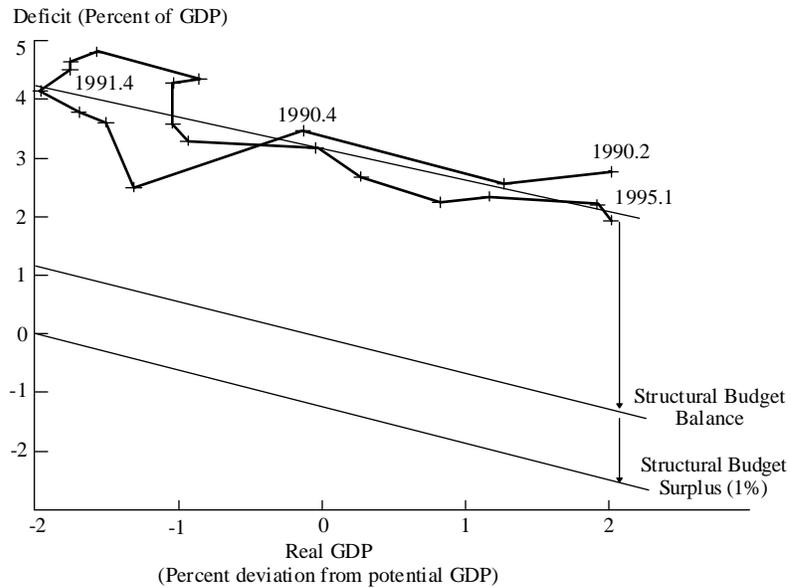
How can the cyclical sensitivity of the budget to the state of the economy be preserved in the face of a balanced budget amendment? Here are two possible ways.

First, as a matter of fiscal policy practice, policymakers could run a structural budget surplus. A surplus is certainly not ruled out by a balanced budget amendment, and by running a structural surplus, fiscal policy could automatically become more expansionary during recessions and not create a deficit. For example, if the structural surplus was 1 percent of GDP, then the surplus could be reduced (equivalent to an increase in the deficit) by a full 1 percent of GDP without creating a deficit. For the fiscal policy rule $D = -0.5*Y$, this would provide an automatic stabilizer for declines of real GDP relative to potential GDP of 2 percent, greater than the 1990-91 recession, and only slightly less than the 2.5 average of post World War II recessions in the United States.

A second approach is to change the language of the balanced budget amendment to allow for automatic cyclical fluctuations in the budget and periods of deficit during recessions. There are several ways to do this. For example, consider the budget amendment proposal in Friedman and Friedman (1979). This proposal requires simply that the growth rate of federal government spending not exceed the growth rate of GDP during the recent past, such as the previous year. Then, in a downturn when GDP growth declines, government spending would not have to be cut—it could remain at the previous year's level helping to stabilize the economy. Moreover, if the budget amendment focused on spending rather than taxes, as in the Friedmans' proposal, then the tax revenues could rise and fall as the economy fluctuated. In a slump, tax revenue could fall off and the budget could go into surplus. True, this type of proposal does not stipulate structural budget balance. However, with the constraint placed on spending as a share of GDP, it is likely that a political force that has kept taxes below spending in recent years—the hope that keeping taxes low would put downward pressure on spending—would disappear.

Both of these approaches are illustrated in Figure 2 which shows the deficit as a share of GDP on the vertical axis (D) and real GDP

Figure 2
Alternative Budget Reforms



measured as a deviation from potential GDP on the horizontal axis (Y). There are three downward sloping lines in the figure; all have the same negative slope (0.5). The uppermost line is the current situation in the United States. Observe how the increase and decrease in the budget deficit in the 1990s is accurately traced out by the line with a slope of 0.5. This uppermost line implies a substantial structural budget deficit as a percent of GDP. The ideal budget reform for achieving greater fiscal discipline, in my view, is to lower this line to one of the other two lines in the diagram.

The lower two lines illustrate the two possibilities mentioned above. The lowest line illustrates a situation of a structural budget surplus of 1 percent. As real GDP declines from potential GDP in this diagram, the surplus is reduced, but as long as the deviation

remains less than 2 percent, the budget does not go into deficit. The middle line in Figure 2 illustrates a situation of a balanced structural deficit as might be achieved with the limitation of spending growth, but letting tax revenue fluctuate as mentioned above. Clearly this middle line allows for fluctuations in the budget deficit and could help stabilize real output and inflation.

Although not shown in the diagram, a balanced budget law which did not allow for cyclical fluctuations in the deficit would imply a flat line with zero slope (at least for values of real GDP less than potential GDP) passing through the 0 deficit point in Figure 2. Clearly this would not allow automatic increases in the deficit to help stabilize the economy.

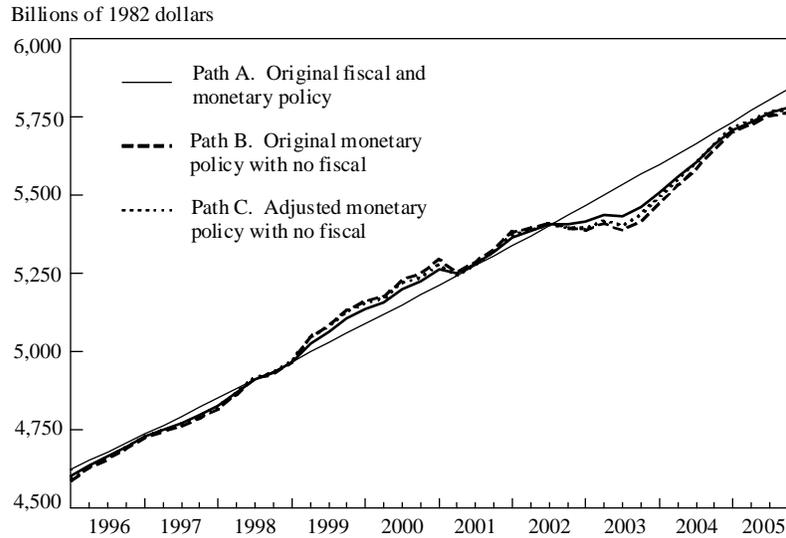
Implications for monetary policy

The implications of budget reform for the operation of monetary policy depend on which of the different possibilities for reform in Figure 2 one has in mind.

For the two reforms that allow the budget deficit to fluctuate cyclically, no adjustment in monetary policy would be necessary. These budget reforms allow the same budget deficit fluctuations as currently exist. If monetary policy reacts optimally to inflation and real GDP now, there would be no reason to change the policy.

However, if the cyclical fluctuations in the deficit are eliminated, then it is likely that some change in monetary policy would be appropriate. In terms of the monetary policy rule mentioned above, the response of the interest rate to real GDP or to inflation might have to be adjusted. The question about the implications of greater fiscal discipline for monetary policy then boils down to a question about how much, if at all, these response coefficients in the monetary policy rule should change. In my view, the most likely change would be an increase in the response of the interest rate to real GDP. This would appear to be appropriate even if one focuses entirely on price stability as the monetary policy goal. The question is *how much* should the response be increased?

Chart 2
Three Alternative Policy Responses



I have tried to answer this question by simulating different policy rules in a rational expectations econometric model of the largest seven industrialized economies. See Taylor (1993). Although more research with this model, and with other models, is needed, a brief overview of the preliminary research that is emerging might be useful.

Chart 2 summarizes the analysis. It shows some results from three stochastic simulations of my multicountry model. The shocks for the stochastic simulations are drawn from historical experience in the 1970s and 1980s. They include shocks to virtually all sectors of the economy. The three paths illustrate the impact on real GDP of three different policy scenarios: (A) current monetary and fiscal policy rules, (B) current monetary policy rule only (no automatic fiscal stabilizers), and (C) more responsive monetary policy rule only.

The real GDP path labeled (A) shows how real GDP would behave with these shocks if policy rules similar to those used currently (and discussed above) were in place.

The path labeled (B) shows what would happen with the same shocks to the economy if the automatic budget stabilizers were removed. Note that in this case, the fluctuations in real GDP are larger. Thus, according to these simulations, the current fiscal policy rule appears to be effective in improving output stability.

Path (C) in Chart 2 shows what would happen if the monetary policy rule were made to be more responsive to real GDP fluctuations than the rule in path (B), but with the budget stabilizers again turned off. The response coefficient of the interest rate to real GDP is raised from 0.5 to 1.0. Observe that the size of the fluctuations in real GDP is diminished somewhat by this change in monetary policy, restoring some of the stability that was lost by the removal of the automatic stabilizers. The analysis shows that a somewhat more responsive monetary policy might be appropriate in a situation where the automatic stabilizers are eliminated. Moreover, these very preliminary results show that the appropriate change in monetary policy might not be large, but much more research is needed to determine what size of an adjustment is needed.

Summary and conclusion

In this paper I have analyzed the monetary policy implications of a move to greater fiscal discipline in the United States and other industrialized countries. The main points can be summarized as follows:

(1) While, in theory, reduced deficits and debt in the United States should improve credibility of monetary policy and make price stability goals easier to achieve, the empirical evidence in the United States indicates that this effect is likely to be very small. Currently, money creation finances only a very small amount of expenditures in the United States, and other efforts to bolster central bank credibility seem to have dominated the negative effects of higher debt. At least as they currently operate, monetary policymakers apparently view credibility and price stability as important enough that a lower debt-to-GDP ratio will add little to credibility.

(2) If monetary policy is guided by interest rate actions rather than money supply actions, then it should adapt to a world without budget deficits by lowering the interest rate target by the amount that the real interest rate is expected to change due to the elimination of the deficit. If such action is not taken, the implicit target for inflation will change and price stability will be sacrificed. However, if budget deficit reduction proceeds gradually, then monetary policy should also adapt gradually. For example, a seven-year program to reduce the deficit would be accompanied by a seven-year monetary adjustment program with the interest rate target being adjusted gradually by approximately the same amount each year.

(3) There are several ways to achieve greater fiscal discipline over the structural deficit while preserving the automatic stabilizers of fiscal policy. If these automatic stabilizers are not preserved then monetary policy may need to adapt. Although it is very difficult to estimate the size of the adaptation that is needed, it is likely to be characterized by an increase in the responsiveness of interest rates to deviations of real GDP from potential GDP. This is an area where further research would be very useful.

In conclusion, it is worthwhile emphasizing that, while deficit reduction in the United States may not yield the monetary credibility and price stability effects predicted by simple theoretical models, and while deficit reduction may even make monetary policymaking slightly more complicated during the transition, the benefits to the economy—higher productivity growth and higher real incomes—are substantial. Greater fiscal discipline remains a highly desirable goal to pursue.

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Endnotes

¹Estimates of the effects of budget deficit reduction are provided, for example, in Taylor (1993), Bryant, Mann, and Hooper (1993), and the May 1995 *World Economic Outlook* of the International Monetary Fund.

²See Taylor (1992) for a description of such a monetary policy rule.

³See the simulations in Taylor (1993), for example.

⁴In the case of a recession or emergency, the budget could be brought into deficit with a super-majority vote of Congress.

References

- Blum, James L. "Debt Subject to Limit." Statement before the U.S. Senate Committee on Finance, July 28, 1995.
- Bohn, Henning. "Why Do We Have Nominal Government Debt?" *Journal of Monetary Economics* 21, 1988, pp. 127-40.
- Bryant, Ralph, Peter Hooper, and Catherine Mann, eds, *Evaluating Policy Regimes: New Research in Empirical Macroeconomics*. Washington, D.C.: The Brookings Institution, 1993.
- Calvo, Guillermo. "Servicing the Public Debt: The Role of Expectations," *American Economic Review* 78, 1988, pp. 647-61.
- Eichengreen, Barry, and Jurgen von Hagen. "Fiscal Policy and Monetary Union." Paper presented at a Kiel Conference, Kiel Institute for World Economics, June 21, 22, 1995.
- Friedman, Milton. "A Monetary and Fiscal Framework For Economic Stability: A Formal Analysis," *Essays in Positive Economics*. Chicago: University of Chicago Press, 1948.
- _____, and Rose Friedman. *Free to Choose: A Personal Statement*. New York: Harcourt Brace Jovanovich, 1979.
- Kydland, Finn, and Edward C. Prescott. "Rules Rather Than Discretion: The Inconsistency of Optimal Plans," *Journal of Political Economy* 85, 1977, pp. 473-92.
- Lucas, Robert E., and Nancy Stokey. "Optimal Fiscal and Monetary Policy in an Economy Without Capital," *Journal of Monetary Economics* 12, 1983, pp.55-93.
- McCallum, Bennett. "Are Bond Financed Deficits Inflationary? A Ricardian Analysis," *Journal of Political Economy* 92, 1984, pp. 123-35.
- McKinnon, Ronald. "A Fiscally Consistent Proposal for Reforming the European Monetary System," unpublished paper, Stanford University, 1995.
- Persson, Mats, Torsten Persson, and Lars Svensson. "Time Consistency of Monetary and Fiscal Policy," *Econometrica* 55, 1987, pp. 1419-32.
- Sargent, Thomas, and Neil Wallace. "Some Unpleasant Monetarist Arithmetic," Federal Reserve Bank of Minneapolis, *Quarterly Review* 5, 1981, pp. 1-17.
- Taylor, John B. "Discretion versus Policy Rules in Practice," Center for Economic Policy Research at Stanford University, Working Paper, 1992.
- _____. *Macroeconomic Policy in the World Economy: From Econometric Design to Practical Operation*. New York: W.W. Norton, 1993.
- _____. "The Inflation/Output Variability Trade-Off Revisited," in Jeffrey Fuhrer, ed., *Goals, Guidelines, and Constraints Facing Monetary Policymakers*. Federal Reserve Bank of Boston, 1994.