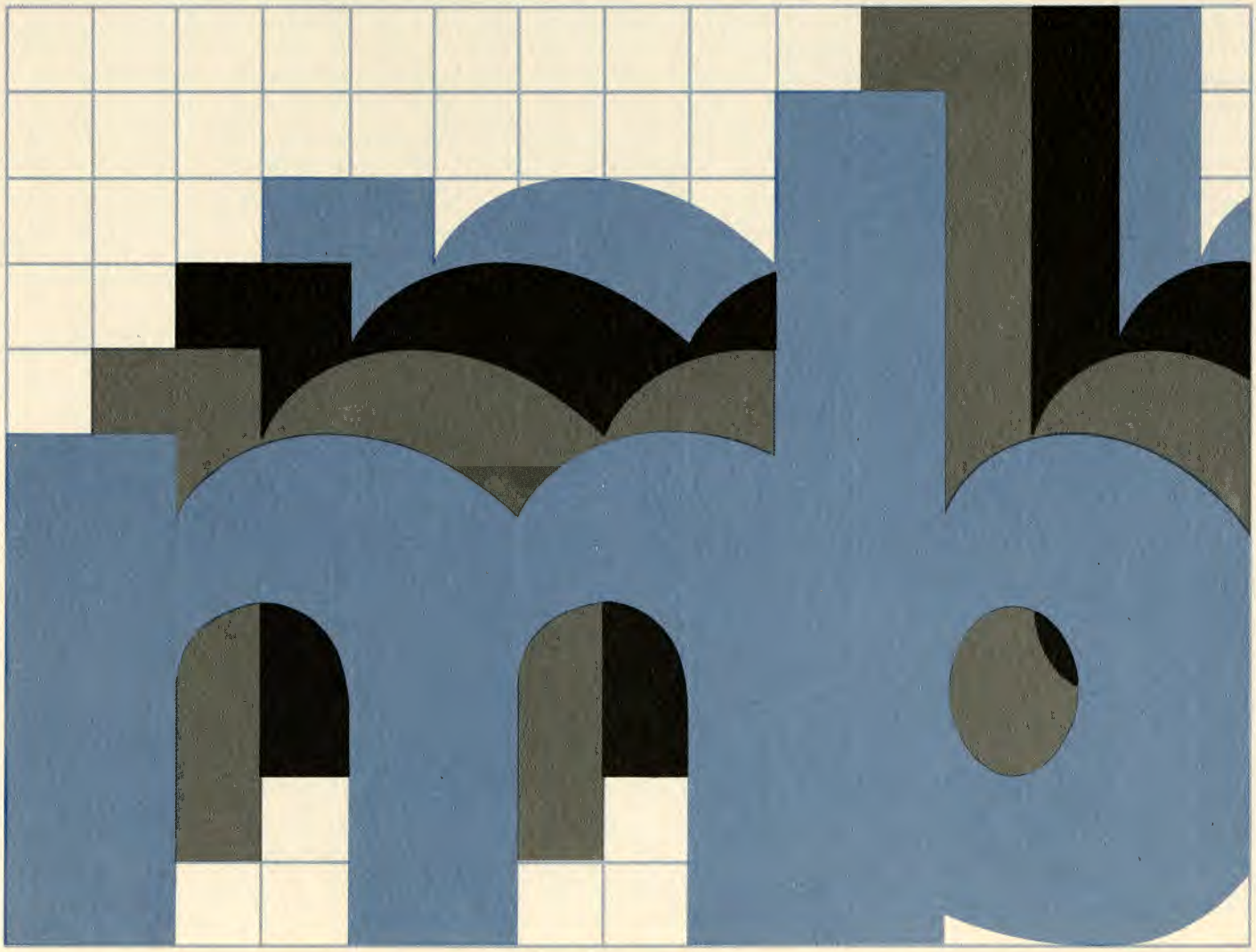
Federal Reserve Bank of Cleveland

ISSN 0013-0281

Economic Review

Spring 1981



Economic Review is published quarterly by the Research Department of the Federal Reserve Bank of Cleveland, P.O. Box 6387, Cleveland, OH 44101. Telephone: (216) 579-2000. Editor: Pat Wren.

Spring 1981
Federal Reserve Bank of Cleveland
Economic Review

Contents

The Monetary Base, the Economy, and Monetary Policy

by John B. Carlson

Perhaps the most widespread interpretation of the monetary base is that of a resource, i.e., the raw material from which money is produced. This conception stems from analysis of money-supply determination through a multiplier framework, in which the level of monetary base—determined by the monetary authority—is the basic constraint on money creation. Consequently, this framework suggests that it is a simple matter to control the money supply by controlling the base. However, many discussions of the money-base relationship abstract from the actual institutional framework in which the Federal Reserve (the supplier of the base) and depository institutions (the suppliers of money) exist. When these details are taken into consideration, issues concerning the usefulness of the base in a monetary-control procedure become more complicated.

Although the economic relevance of the base usually is considered in terms of its relationship to money, the base has its own theoretical role in models of the aggregate economy. This role emerges in an extension of the IS-LM framework by Tobin (1969) establishing outside money (the nonborrowed base) as an essential determinant of income. Nevertheless, the monetary base has not been given the same status in policy formulation as traditional measures of money.

This article reviews some of the fundamental issues concerning the monetary base, its relationship to economic activity, and its usefulness in the monetary-policy process. Part I describes briefly the role of the base in the context of the quantity theory and post-Keynesian frameworks. Part II considers the usefulness of the base in alternative policy roles and reviews recent empirical studies on this matter.

I. Role of the Base in Macroeconomic Models

The analytical relevance of the monetary base can be developed in either a quantity theory or a post-Keynesian framework. In the quantity theory the monetary base typically derives its importance by being a "proximate" determinant of the money stock, which occupies center stage in this analysis. In the second approach, particularly in Tobin's extension of the standard IS-LM model, the base—defined as nonborrowed reserves plus currency—is a close counterpart to the framework's conception of "money" (see box 1, p. 4).

John B. Carlson is an economist with the Federal Reserve Bank of Cleveland.

The Quantity Theory

The fundamental hypothesis that emerges from the monetarist literature is that a change in "money" leads to a change in expenditures that ultimately will affect prices but with an initial and perhaps short-lived impact on real output. The most basic framework in which this hypothesis is represented is Friedman's (1956) restatement of the quantity theory of money. In this reformulation, "the quantity theory is in the first instance a theory of the *demand* for money" (p. 4). When combined with other relationships, the money-demand function plays a key role in determining nominal income and prices. In essence, quantity theorists view the money-demand function as being relatively more stable than alternative key relations, particularly expenditure functions, giving money its special role.[1] This assumption implies that changes in the public's total expenditures predominantly reflect adjustments in asset portfolios in response to changes in the *supply* of money rather than in the demand for money.

The money stock (M) typically is linked to the unadjusted monetary base (B) via the money multiplier (m):

$$(1) \quad M = mB \ .$$

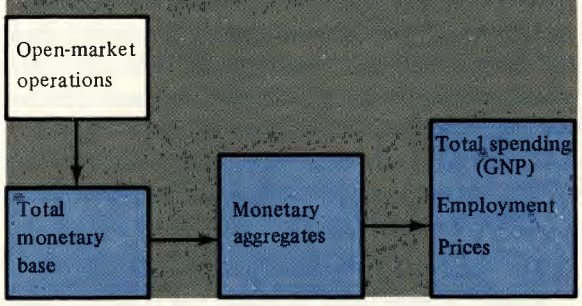
If M is defined to be M-1B, m will equal the expression

$$\frac{c+1}{r+c} \ ,$$

where c is the ratio of the currency to transactions deposits in M-1B and r is the average reserve ratio, i.e., the ratio of total reserves to transactions deposits.

1. The quantity theory, however, provides no definitive theoretical basis for choosing among alternative definitions of money. Monetarist writings have either invoked or implied definitions corresponding to traditional money measures, particularly monetary aggregates. Such measures have been restricted to include only assets providing services generally associated with "moneyness," i.e., medium of exchange, store of value, and unit of account. Without more definitive theoretical guidance, the choice of the appropriate money measure often is made on empirical grounds, adopting the concept most closely related to economic activity in a statistical sense or, in historical analysis, the definition for which history provides data.

Fig. 1 The Simple Quantity Theory: The Linkages



The multiplier relationship is essentially a schedule of market equilibrium money stock, not a true supply function. The values of r and c are not rigid ratios but in fact respond to demand-side influences, among other things.[2] Nevertheless, this relationship provides a framework for analyzing the influence of Federal Reserve actions on the money supply. It is in this operational sense (i.e., of controlling the money stock) that the monetary base earns its status in a quantity theory framework.

The relationships or linkages between policy actions and economic activity frequently have been represented along the lines of figure 1. While this figure depicts an impact on real economic activity (employment), it is temporary. The quantity theory holds that a change in the money supply ultimately must cause a proportionate change in the price level.

The Post-Keynesian Framework

In the post-Keynesian view, the influence of changes in "money" is transmitted through changes in market yields on financial assets and the market value of real capital; these changes, in turn, affect aggregate expenditures on goods and services. As Tobin (1980) has emphasized, the essential dis-

2. Saving (1977) concludes that an industry money-supply schedule (independent of demand-side influences) cannot be derived. This follows from the uniqueness of fractional reserve banking, where the demanders of the product (demand deposits) also compete with producers (banks) for a necessary factor of production (the monetary base). However, Saving argues that a monetary equilibria schedule of the kind found in macroeconomic models can be derived as long as one assumes that the demander's desired and actual currency and time deposit ratios are equal.

tinctions of money in this framework are that (1) it is an "outside" asset not generated by the private sector and (2) its own nominal interest rate is fixed and, hence, not determined in the marketplace. The monetary base—defined as nonborrowed reserves plus the currency component of M-1B—has these characteristics exclusively.

The importance of these distinctions is stated clearly by Tobin (p. 319):

> The implication is that the nominal supply of money is something to which the economy must adapt, not a variable which adapts itself to the economy—unless the policy authorities want it to. Furthermore, the private sector must be induced to hold the "outside" supply, not by adjustments in its own nominal yield as would occur with other assets, outside or inside, with market-determined yields, but by changes elsewhere in the economy. Adjustments to make the public content to hold an enlarged supply of outside money involve some combination of reductions in nominal interest rates on other assets, increases in real incomes, increases in commodity prices, and possibly downward (!) revisions of inflation expectations.[3]

The linkages of the static post-Keynesian model are illustrated in figure 2. This diagram highlights the

3. While Tobin considers the role of the base through the financial market, many analysts also have emphasized additional direct influence of outside money in the goods market as part of the net wealth of the private sector.

Box 1 Monetary-Base Semantics

Like many other concepts in economics, the monetary base (or base money) has been defined several ways, reflecting the different contexts in which it is found. In textbooks the monetary base typically is defined as deposits at the Federal Reserve and vault cash, both held as reserves, plus currency held by the nonbank public. That is, the base is defined by the uses it serves. According to this criterion, anything accepted as reserves by the monetary authority would be counted as part of the monetary base. Because an additional dollar of base can lead to a multiple increase in money, the base is sometimes identified as *high-powered money.*

Alternatively, the monetary base can be defined by the sum of its source components—factors that change the total amount of the base supplied to the public. When defined this way, it is sometimes called the *source base* or *unadjusted monetary base.* In an accounting sense, of course, the sources of the base will equal its uses. However, under the present system of lagged-reserve accounting, vault cash held two weeks earlier can be counted as reserves; hence, the source base will differ slightly from the use-oriented definition.

It is useful for both analytical and theoretical reasons to make additional distinctions. In the first regard, time series of the monetary base typically are adjusted to reflect changes in reserve requirements on deposits, which affect the relationship between reserves and reservable deposits. This adjustment is designed to incorporate the effects of reserve-requirement changes on the money stock. The terms *extended monetary base* and *monetary base* often are used to mean an adjusted monetary base.

Finally, for the theoretical reasons discussed in Part I, the monetary base sometimes is defined as nonborrowed reserves plus currency in the hands of the nonbank public. This represents net government demand debt generated "outside" the private economy by the monetary authority; hence, it is also referred to as *outside money.*[1] The nonborrowed monetary base (or *net monetary base*) also can be adjusted for changes in reserve requirements. Because alternative definitions may have different analytical and theoretical implications, it is important to be aware of what definition is being used.

1. Discount-window borrowings are excluded, because they arise at the volition of depository institutions as the counterpart of their (private) debt. While the nonborrowed base is "generated" solely by the Federal Reserve, its level is not determined independently of economic activity under the current operating procedure. Contemporaneous demands for currency and non-targeted reservable deposits are accommodated.

result that the economy reacts to changes in outside money (the nonborrowed base) and not the other way around. The two unidirectional linkages from the nonborrowed base to financial aggregates and yields on these assets depict the initial impact of a change in nonborrowed base on the economy through the financial market, simultaneously affecting both price and quantity of the financial assets. This impact is assured by the fact that the nominal yield of the nonborrowed base is fixed legally (at zero), thereby forcing other prices and quantities to adjust to changes in the base. Because financial assets are gross substitutes for real assets, changes that affect yields (and prices) of financial assets also will affect the demand for real capital. The impact of policy actions on economic activity depends on the influence of such actions on the market value of real capital relative to its replacement cost.

Assets such as demand and time deposits included in traditional measures of money appear explicitly in generalized versions of this framework (e.g., Tobin 1969 and Brunner and Meltzer 1972, 1976). These assets arise on balance sheets of depository institutions as the counterparts of private debt. Hence, their equilibrium levels depend on the interaction among borrowers, deposit holders, and financial intermediaries. In other words, levels of these assets and aggregates including them are endogenous. But the endogeneity of money does not preclude the type of relationship that some monetarists envision between the monetary aggregates and nominal income (see Brunner and Meltzer 1972 and Brunner 1973). Rather, if the demand function for any particular monetary aggregate is stable over time, that aggregate may be a useful indicator of present and future levels of economic activity.

While the monetary sector of the Brunner-Meltzer model is consistent with Tobin's general equilibrium approach, it is developed in the context of a multiplier framework, highlighting the role of the monetary aggregates in the model. That is, the Brunner-Meltzer formulation of the monetary sector allows for a special status of traditional money measures. Regardless, the differences in the qualitative results between the Tobin and the Brunner-Meltzer models are not considered substantive. Because the key aspect of economic response to monetary policy in both models is the dependence on relative price (yield) effects and stock effects, B. Friedman (1978) argues that the "transmission mechanisms" are es-

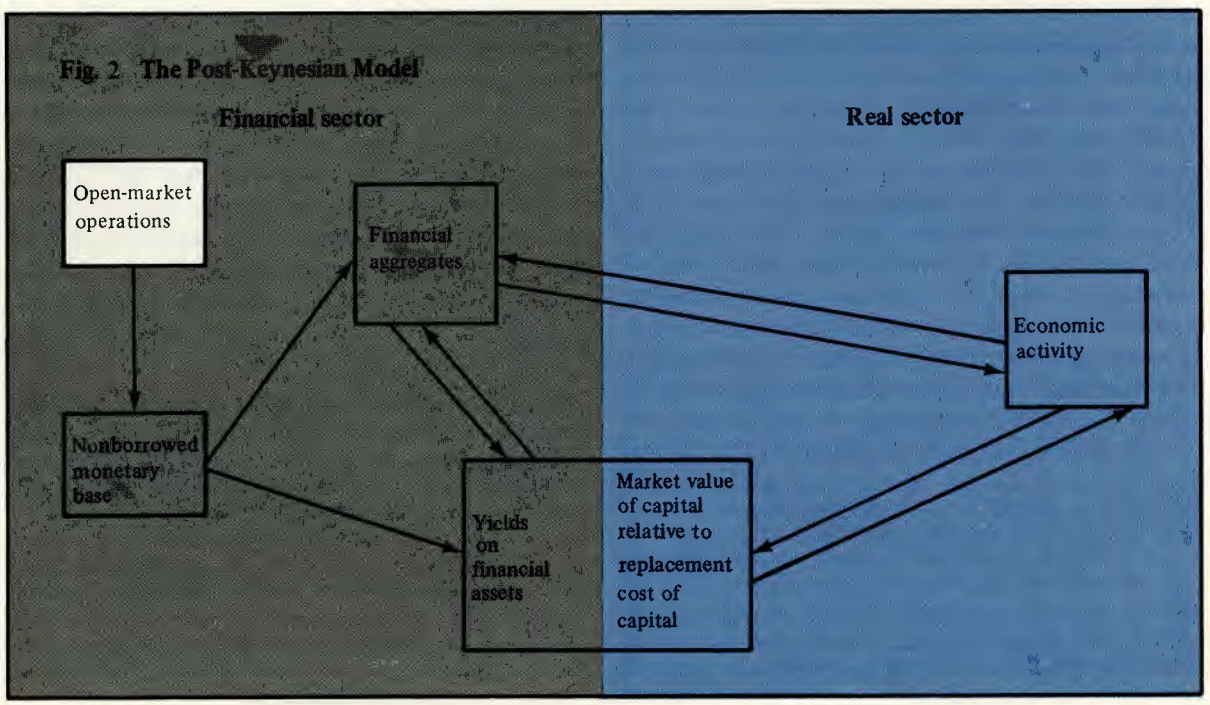


Fig. 2 The Post-Keynesian Model

sentially identical. The basis for many monetarists' propositions, particularly a constant money-supply-growth rule, arises when time and uncertainty are introduced into the analysis. The issues that surface when extending the framework in this direction are largely empirical.

To summarize, in the post-Keynesian framework it is outside money (the nonborrowed base) that plays the essential role in affecting economic activity. The monetary aggregates (including inside money) are not necessarily of primary interest, although they may be in monetarist extensions of this framework. In the quantity theory the status of these variables is reversed. The monetary base (however defined) derives its importance from its relationship to money, defined as an aggregate of transactions balances. In the monetarist view this relationship may be important on an operational level, where under appropriate institutional arrangements it may serve to guide policymakers in controlling the money supply. At this level of generality, differences in the two models are more a matter of focus and less of inconsistency.

II. Monetary Policy: Considering the Usefulness of the Base

The conduct of monetary policy has evolved significantly during the past decade, away from an emphasis on controlling interest rates (stabilizing money-market conditions) toward controlling financial aggregates. The two most important indications of this evolution are (1) the adoption of intermediate targets for monetary aggregates over both the year and the near term and (2) the October 6, 1979, policy shift to reserves targeting in place of day-to-day control of interest rates as the operating procedure for monetary control. These changes may be viewed as a response to the chronic inflation problem. According to this view, the increasing role of financial aggregates, particularly as long-term intermediate targets, reflects a widespread belief in the need to reduce the rate of monetary growth to reduce inflation.[4]

4. This view does not rule out non-monetary sources of "inflation" in the short run; hence, it does not suggest a close short-run relationship between the time paths of inflation and monetary aggregates.

While there seems to be widespread recognition of the need to slow monetary growth to curb inflation, there is some divergence in view as to the appropriate means of achieving monetary deceleration. Since 1978 the Federal Reserve has sought to reduce its annual targets for the monetary aggregates by ½ percentage point per year. This objective, however, in principle could be pursued by establishing long-term targets for the monetary base or the nonborrowed base that would be consistent with a reduction in "monetary" growth. Indeed, by virtue of being exogenous in the economic models of Tobin and of Brunner and Meltzer, the nonborrowed base would seem a logical choice as "the" monetary variable. Even if one holds the quantity-theory view that the behavior of transactions balances is the best signal of monetary stimulus, the Brunner-Meltzer framework suggests a potential role for some form of the base as an operating target to guide policy actions in achieving long-term monetary targets.

The Monetary Base as an Intermediate Target

The choice of the appropriate intermediate target ultimately involves (1) the closeness and stability of the relationship between the target variable and economic activity and (2) the Federal Reserve's ability to control the target variable.[5] The issues that arise then are largely empirical. The case for supplanting long-term monetary aggregate targets with a single monetary base target has been examined recently by Davis (1979-80) and Gambs (1980). Both studies conclude that such a change does not appear advisable, based largely on their empirical findings that the monetary base is less closely related to the economy than are money measures. This evidence,

5. An intermediate target provides guidance for policy action. It is useful because the transmission of monetary policy to ultimate policy targets (e.g., output, employment, and prices) is slow and uncertain. While not itself the ultimate concern of policymakers, the intermediate target can be measured more quickly and frequently than measures of policy objectives and, therefore, provide more timely information about both the state of the economy and the consistency of policy actions with objectives. Thus, intermediate targets should be closely related to ultimate goals, so that policy actions seeking to achieve intermediate targets will also accomplish ultimate targets.

however, may reflect econometric problems associated with the endogeneity of money.

To study the relationship between the economy and various monetary variables, Davis and Gambs estimate single-equation regression models relating total spending, as measured by GNP, to various monetary variables (see box 2, p. 8).[6] Gambs also includes a measure of fiscal stimulus. Because these models were estimated using ordinary least-squares techniques, no explanatory variable can be endogenous if the estimates (including goodness-of-fit) are to be statistically meaningful (i.e., at least consistent). However, the post-Keynesian framework (including monetarist extensions) suggests that monetary-aggregate measures (even total-base measures) are endogenously determined, specifically via the money-demand function. In light of this, the explanatory power of the money measures may reflect some feedback from money demand. Hence, comparisons involving such models are not very convincing.

It is difficult to assess the implications of the econometric problems on the reliability of the regression results. It is interesting to note, however, that comparisons of the error statistics of these models (average forecast errors four quarters out) do not unambiguously suggest a superiority of the monetary-aggregate measures over the base measures. Although Davis finds that money measures better forecast GNP, the differences are not statistically significant. In a similar comparison, Andersen and Karnosky (1977) find that the monetary base outperforms the monetary aggregates on the basis of having a smaller mean absolute error.

The other criterion involved in selecting an intermediate target is the Federal Reserve's ability to control the target variable. Both Gambs and Davis argue that the only substantial way that the base might be superior to money as a long-term intermediate target is that it is somewhat easier to control, especially over short periods of time. Davis qualifies this advantage with the comment that over periods as long as one year, the problems of control for any of the money or base measures may not be technical. However, one positive result of more reliable control *within* the year is that it can enhance the credibility of the policymakers, especially with regard to their commitment to its long-run objectives.[7] It has been argued that, by enhancing the credibility of its commitment to a disinflationary strategy, policymakers can reduce inflation expectations and thereby mitigate costly real impacts generally associated with such a strategy.

Another related issue that has become more important in recent years is the impact of financial innovation, particularly in the use of deposits and deposit substitutes.[8] This innovation has tended to reduce the level of demand deposits relative to predicted levels based on estimated relationships with interest rates and income. It is common to interpret this impact as a shift in the money-demand function. Because this impact is not readily predictable, estimated relationships relating money measures to economic activity have become less reliable. It subsequently has been argued that the breakdown in this relationship might make the base relatively more attractive as an intermediate target.

But the relationship between the various base measures and economic activity also is affected by financial innovation. Shifts in the demand for demand deposits are translated into shifts in the demand for reserves backing those deposits and therefore into shifts in the demand for base money. However, the magnitude of this disturbance (shift) is dampened by the required reserve ratio.[9] As a result,

6. Davis uses the adjusted monetary base published by the Board of Governors, while Gambs uses the St. Louis measure; neither examines a nonborrowed-base measure.

7. By maintaining growth of its intermediate variable close to its midpoint target path, the Federal Reserve demonstrates that its targets are meaningful.

8. For an analysis and discussion of the implications of financial innovation on the monetary aggregates, see Porter, Simpson, and Mauskopf (1979) and Wenninger and Sivesind (1979).

9. For example, suppose this disturbance is characterized by a permanent shift in the intercept of the demand for checkable-deposits function. Other things equal, the demand for reserves behind these deposits also will shift. But because the average reserve requirement against these deposits is less than 15 percent, the shift in the intercept of the demand for reserves (base money) will be less than 0.15 times the shift in deposits.

Box 2 Alternative Measures of the Monetary Base

The two most widely available measures of the total monetary base are published by the Board of Governors (BOG) of the Federal Reserve System and the Federal Reserve Bank of St. Louis. The major difference between the two measures is the method employed to adjust for changes in Regulations D and M (affecting reserve requirements). The adjustment method used in computing the BOG monetary base adjusts actual historical reserve levels (use of base) as if current reserve requirements were in effect for all past periods. This implies that any time reserve requirements are changed, the entire historical series of the adjusted monetary base must be revised. For the period following the last change, values of the adjusted monetary base will equal the actual unadjusted balance sheet values of the uses of the base as currency and reserves.

Specifically, the BOG has summarized the adjustment method as follows:[1]

1. For the week in which reserve requirements against deposits (net demand or time and savings) change due to a change in Regulation D, required reserves are calculated on both the old and the new reserve-requirement basis for the type of deposits affected.
2. The ratio of "new" required reserves to "old" required reserves for the particular deposit type is calculated, and this ratio is applied to actual required reserves for that deposit type for all weeks prior to the change in Regulation D.
3. As the ratio is applied back through time, it is adjusted for earlier breaks in the series due to changes in Regulation D by multiplying the current ratio by the ratio calculated at the time of the previous change in Regulation D. (This procedure is carried back, weekly, to January 1959; monthly averages are derived from prorations of the weekly data.)
4. Adjustments for breaks in the series due to changes in Regulations D and M affecting other reservable liabilities (i.e., commercial paper, finance bills, Eurodollar borrowings) and marginal reserve requirements are made by subtracting the sum of such required reserves from the actual series.

The monetary base published by the Federal Reserve Bank of St. Louis, on the other hand, employs an additive adjustment technique, allowing a source (supply) rather than use (demand) orientation. Whereas the BOG method sums up the various uses of the base (adjusted separately), the St. Louis method sums the sources of the base (e.g., Federal Reserve credit, gold stock, Treasury deposits) and then adds a reserve adjustment magnitude (*RAM*). The *RAM* is obtained by subtracting the *current* period's required reserves (*RR*) from what *would have been* required if some base period's reserve requirements were in effect instead.

Since December 1980 the latter magnitude has been approximated by combining reservable deposits into two categories—member-bank transactions deposits (*TD*) and time and savings deposits at such banks (*TS*).[2] The base period required-reserve ratios for these categories were chosen to equal the average reserve ratios required ($\bar{r}_{TD}$ and $\bar{r}_{TS}$, respectively) for the period January 1976 through August 1980. Hence, under the current practice of lagged-reserve accounting (where reserve requirements are based on deposit levels two weeks prior)

$$RAM_t = \bar{r}_{TD}\ TD_{t-2} + \bar{r}_{TS}\ TS_{t-2} - RR_t\ ,$$

where $\bar{r}_{TD} = 0.126640$ and $\bar{r}_{TS} = 0.031964$.

Prior to September 1968 required reserves were based on deposit levels of the reserve settlement week (i.e., contemporaneous). Prior to December

1959 member banks were not permitted to count vault cash as part of their balances held to satisfy required reserves. The *RAM* thus is netted from member-bank vault cash not counted as reserves by the Federal Reserve (VCNR). Hence, prior to September 1968

$$RAM_t = \bar{r}_{TD}\ TD_t + \bar{r}_{TS}\ TS_t - RR_t - VCNR_t,$$

where the last term equals 0 after December 1959.

The St. Louis and BOG measures of the monetary base also differ in respects other than reserve adjustment techniques. The BOG monetary base is seasonally adjusted at the components level. The St. Louis measure, on the other hand, is seasonally adjusted at the aggregate level. Because of reserve accounting rules, the BOG monetary base includes member-bank vault cash held two weeks earlier. The St. Louis measure is computed from a balance-sheet identity relating current sources and uses; it thus includes current vault cash of member banks. The effect of these differences on growth rates of the two unadjusted series is small.[3]

1. Board of Governors of the Federal Reserve System, *Member Bank Deposits and Reserves,* March 1980.

2. For a more detailed description of the St. Louis adjustment method, see R. Alton Gilbert, "Revision of the St. Louis Federal Reserve's Adjusted Monetary Base," *Review,* Federal Reserve Bank of St. Louis, vol. 62, no. 10 (December 1980), pp. 3-10. For comparisons between the new St. Louis measure and alternative measures, in the same issue see John A. Tatom, "Issues in Measuring an Adjusted Monetary Base," pp. 11-29.

3. See Albert E. Burger, "Alternative Measures of the Monetary Base," *Review,* Federal Reserve Bank of St. Louis, vol. 61, no. 6 (June 1979), pp. 3-8.

the relationship between base measures and nominal income has been less affected. Over the last 20 years the secular change in each of the velocities of alternative base measures has been significantly less than that of M-1B. For long-run targeting, however, adjustments can be made to target values once an unanticipated shift becomes evident. Thus, there appears to be no significant advantage to a long-term base target in dealing with the problems of financial innovation.

The Monetary Base as an Operating Target

Some monetarists have argued that the money measures should be controlled more closely. Advocates of tighter control have proposed that the Federal Reserve supplant the present operating procedures with some form of the base as an operating guide for controlling the monetary aggregates. Because the total monetary base cannot be controlled closely by the Federal Reserve under existing institutional arrangements, this variant would not make an ideal day-to-day operating target.[10] The nonborrowed base, on the other hand, could be substituted for nonborrowed reserves as the primary day-to-day guide for policy actions.

The potential performance of base-type operating targets has been investigated by Johannes and Rasche (1979, 1981). They compare econometric forecasts of M-1B multipliers for four reserve aggregates—nonborrowed reserves, total reserves, nonborrowed base, and total base. The essential feature of their model is the use of time-series analysis methods to forecast independently each of the components of the multipliers. The component forecasts then are substituted

10. Under the current practice of lagged-reserve accounting, required reserves depend on deposit levels two weeks prior and, hence, are predetermined. Because they cannot adjust to the level of nonborrowed reserves supplied in the reserve settlement week, any difference between required and nonborrowed reserves not eligible for carryover must be made available at the discount window. Thus, the Federal Reserve has little control over the amount of total reserves supplied in any given week.

into the multiplier formulae to obtain forecasts for the various multipliers.[11]

To ascertain the potential usefulness of alternative measures as operating targets, Johannes and Rasche compare error dispersion statistics for forecasts of the month-to-month percent changes of the corresponding multipliers. They find that the relative root mean square errors (RMSEs) of both the M-1B total and nonborrowed base multipliers are less than one-half of the relative RMSEs of their total and nonborrowed reserves counterparts.[12] Thus, they conclude that tighter short-run monetary control could be obtained by employing the total or nonborrowed base as an operating target than by relying on total or nonborrowed reserves. Johannes and Rasche acknowledge that they have assumed that the Federal Reserve can achieve the level of the operating target that is consistent with its money targets and that their multiplier forecasting models would remain stable under the alternative control regimes. By also acknowledging that nonborrowed reserves and nonborrowed base aggregates can be controlled more closely than their total counterparts, the inference can be drawn that the nonborrowed monetary base is the appropriate control variable, i.e., operating target.

The Johannes-Rasche forecasting approach subsequently has been compared with the implicit multiplier forecasts of the current procedure for alternative operating targets in a Federal Reserve staff study (Lindsey et al. 1981). The current procedure differs from that implied by the Johannes-Rasche approach in two respects: it does not involve explicit estimation of the multiplier, and it employs judgmental rather than strictly econometric projection techniques.

While the Federal Reserve's staff study finds that its judgmental forecasts consistently outperform the Johannes-Rasche forecasts for each of the four reserve multipliers, the error dispersion statistics of both approaches consistently decline as the reserve aggregates considered are broadened. Thus, it seems as though the Johannes-Rasche conclusion—that monetary control could be improved by employing a broader reserve measure as an operating target—also is supported by the staff study. But the staff study argues that these error statistics do not provide reliable evidence for choosing among alternative concepts for use as an operating target. The reported multiplier forecast errors contain endogenous movements of the alternative reserve aggregates away from their predicted values. Thus, the staff study concludes that these error statistics are not instructive regarding the closeness of monetary control in a regime where the alternative concepts are taken as an invariant operating target.

To deal with the endogeneity problem, the staff study employs a simulation technique designed to exogenize the alternative variables. The simulations are based on two monthly models of the money market developed by the Board of Governors and

11. To illustrate this technique, consider the M-1B net monetary-base multiplier:

$$m = \frac{1+k}{(r+l-b)(1+t_1+t_2+g+z)+k},$$

where $k = C/D$,
$t_1 = (\text{M-2} - \text{M-1B})/D$,
$t_2 = (\text{M-3} - \text{M-2})/D$,
$g = G/D$,
$z = Z/D$,
$b = B/(\text{M-2} - C + TLTD + TRPS + G + Z)$,
$r+l = (SB + RAM - C)/(\text{M-2} - C + TLTD + TRPS + G + Z)$,

and
C = currency component of M-1B,
D = total checkable deposits at banks and thrift institutions,
$TLTD$ = total large-denomination time deposits at banks and thrift institutions,
G = government deposits at commercial banks plus note balances at commercial banks and thrift institutions,
Z = demand deposits at banks due to foreign commercial banks and foreign official institutions plus time and savings deposits due to foreign commercial banks and official institutions,
$TRPS$ = term RPs,
B = member borrowing,
SB = source base,
RAM = reserve adjustment magnitude.

Each of the components (lower-case parameters) in the multiplier is modeled using time-series methods (see Johannes and Rasche 1979). Forecasts for each component are substituted in the formula to obtain a forecast of the multiplier.

12. The relative RMSE equals RMSE divided by the mean of the actual multiplier.

the Federal Reserve Bank of San Francisco.[13] (Unfortunately, the Johannes-Rasche technique is not amenable to such an experiment.) The simulation results indicate that the endogeneity bias is substantial. Error statistics of the simulation results reveal a clear superiority of nonborrowed reserves and nonborrowed base over their total counterparts. On the other hand, the support for choosing nonborrowed reserves over the nonborrowed base is marginal. The study concludes that, based on the 13-month experience following October 1979, a change in operating target from nonborrowed reserves to the nonborrowed base would not improve monetary control.

The Nonborrowed Base as a Supplemental Target

Empirical studies of the usefulness of the base in alternative policy roles generally have not examined its potential in a role that might supplement rather than supplant current procedures. As an alternative to supplanting monetary-aggregate targets with a single-base target, policymakers could establish supplemental long-term growth ranges for the nonborrowed base. Such a strategy might be advanced on a basis similar to Brunner's (1980) restatement of Friedman's case for a nonactivist policy. He argues that, because policymakers lack full and reliable knowledge of the economy's response structure to changes in a monetary stimulus, attempts by the monetary authority to stabilize economic activity actually may destabilize it. Brunner offers a number of reasons, both economic and political, supporting a constant money-supply-growth rule as the safest strategy, given the risks involved.

By advocating a constant money-supply-growth rule, Brunner presumes that policymakers have reliable information of the response of money to policy actions. Yet in his theoretical work with Meltzer, money, like income, depends on the behavior of the private sector. It is not apparent a priori why policymakers should have more reliable information to forecast the public's behavior with regard to money than they do for income.[14] On these grounds it seems reasonable to argue that attempts to control monetary aggregates too closely may destabilize them and, hence, destabilize income. In practice, short-term movements in the monetary aggregates are very difficult to interpret. They may result from factors affecting money demand, such as changes in interest rates and income, or from factors affecting the supply of money, including the behavior of banks and the public in financial markets. In addition, short-run money movements may reflect disturbances in demand and supply that are unexpected and perhaps unknown. Attempts to offset movements resulting from disturbances in money demand may in fact destabilize income.[15] A set of growth limits on the nonborrowed base might be used to supplement current procedures to hedge against such destabilizing events. These bounds thereby would limit the extent to which the monetary authority could vary the "ultimate" monetary stimulus (outside money) to achieve its monetary targets.

Such growth limits could be chosen to be consistent with the upper and lower growth path of the primary target, which is currently M-1B. These limits might be expressed in monthly average levels, for example, based on the appropriate year-over-year growth rate. Weekly paths would be adjusted seasonally. As long as the level of the nonborrowed base would be within its target ranges, the current operating procedure would remain in effect. If the procedure would push the nonborrowed base outside its long-term growth ranges, the boundary of the range would supplant nonborrowed reserves as the short-run

13. For a description of this simulation technique, see Lindsey et al. (1981, pp. 41-4).

14. Brunner acknowledges the potential information requirements currently imposed by the constant money-supply-growth rule. As an alternative policy prescription, he proposes that the monetary authority concentrate on controlling the monetary base and move its growth path to a noninflationary benchmark. He proposes this as an interim policy, however, suggesting that the Federal Reserve continue its efforts to improve monetary control.

15. For example, the disturbance may reflect an unexpected change in the public's preferences for holding other assets relative to money. For an analysis of the implications of this and other disturbances under monetary targeting, see Sellon and Teigen (1981).

guide for open-market operations.[16] The nonborrowed-base boundary would remain the short-run guide until the nonborrowed-reserve path again would be consistent with the nonborrowed-base objective. Because the nonborrowed base can be controlled closely, its growth could be contained within its targeted boundaries with virtual certainty.

Alternatively, the target ranges of the nonborrowed base could be chosen independently of the M-1B path. To reinforce the disinflation strategy, an additional objective might be to seek annual deceleration in the nonborrowed-base growth ranges, regardless of what the money multiplier might be expected to do. Such a strategy would hinge on the view that the nonborrowed base is "the" appropriate quantity fulcrum for disinflation.

III. Conclusion

The monetary base has received increasing attention as a potentially useful variable for policy purposes. It has been recently argued that the Federal Reserve should de-emphasize the monetary aggregates and rely on the monetary base as an intermediate target. On the other hand, some monetarists have argued that the monetary aggregates should be controlled more closely—and could be, if the Federal Reserve would use some form of the base as an operating target. Perhaps the strongest argument for using a monetary-base measure as an intermediate target is that it can be more closely controlled, providing greater assurance that its long-run targeted values would be achieved. Greater assurance of achieving these objectives could serve to reduce inflation expectations and thereby make the current disinflation strategy less costly in terms of real impact. The case against using monetary base measures in this capacity hinges primarily on weak empirical evidence that these measures are less closely related to income than are money measures.

The case for supplanting nonborrowed reserves with a base-type operating target is not definitive. Evidence supporting such a change has been challenged on the grounds of endogeneity bias. Furthermore, it may be premature at this point to challenge the efficacy of the new operating procedure after fewer than two years of implementation.

16. Growth outside these ranges would be considered potentially destabilizing. For example, policy actions that would lead to nonborrowed-base growth above its target range conceivably could lead to excessive money growth at some time in the *future*, even if the current level of money growth were below its long-term lower-boundary path. To demonstrate this possibility, consider the experience of 1980, specifically from May to August, when M-1B was below its midpoint path. During May the nonborrowed base grew at a 20 percent annual rate to a level above its long-run trend. It remained above trend for the rest of the year. An effective constraint on nonborrowed-base growth could have been chosen that still would have permitted an easing of policy during this period but to a lesser extent than had occurred; hence, the constraint could have reduced the likelihood that M-1B would have grown to a level above its long-term upper-boundary path by year-end.

References

1. Andersen, Leonall C., and Denis S. Karnosky. "Some Considerations in the Use of Monetary Aggregates for the Implementation of Monetary Policy," *Review,* Federal Reserve Bank of St. Louis, vol. 59, no. 9 (September 1977), pp. 2-7.

2. Board of Governors of the Federal Reserve System, *Member Bank Deposits and Reserves,* March 1980.

3. Brunner, Karl. "A Diagrammatic Exposition of the Money Supply Process," *Schweizerische Zietschrift für Volkswirtschaft und Statistik,* vol. 109 (December 1973), pp. 481-533.

4. ———."The Control of Monetary Aggregates," in *Controlling Monetary Aggregates III.* Proceedings of a Conference Held in October 1980. Conference Series No. 23. Federal Reserve Bank of Boston, pp. 1-65.

5. Brunner, Karl, and Allan H. Meltzer. "Money, Debt, and Economic Activity," *Journal of Political Economy,* vol. 80 (September/October 1972), pp. 951-77.

6. ———. "An Aggregate Theory for a Closed Economy," in Jerome L. Stein, Ed., *Monetarism.* Amsterdam: North-Holland Publishing Company, 1976.

7. Burger, Albert E. "Alternative Measures of the Monetary Base," *Review,* Federal Reserve Bank of St. Louis, vol. 61, no. 6 (June 1979), pp. 3-8.

8. Davis, Richard G. "The Monetary Base as an Intermediate Target for Monetary Policy," *Quarterly Review,* Federal Reserve Bank of New York, vol. 4, no. 4 (Winter 1979-80), pp. 1-10.

9. Friedman, Benjamin M. "The Theoretical Nondebate about Monetarism," in Thomas Mayer, Ed., *The Structure of Monetarism.* New York: W. W. Norton & Company, 1978.

10. Friedman, Milton. "The Quantity Theory of Money—A Restatement," in Milton Friedman, Ed., *Studies in the Quantity Theory of Money.* Chicago: University of Chicago, 1956, pp. 3-21.

11. Friedman, Milton, and Anna Jacobson Schwartz. *A Monetary History of the United States 1867-1960.* National Bureau of Economic Research, Studies in Business Cycles, no. 12. Princeton: Princeton University Press, 1963.

12. Gambs, Carl M. "Federal Reserve Intermediate Targets: Money or Monetary Base," *Review,* Federal Reserve Bank of Kansas City, vol. 65, no. 1 (January 1980), pp. 3-15.

13. Gilbert, R. Alton. "Revision of the St. Louis Federal Reserve's Adjusted Monetary Base," *Review,* Federal Reserve Bank of St. Louis, vol. 62, no. 10 (December 1980), pp. 3-10.

14. Johannes, James M., and Robert H. Rasche. "Predicting the Money Multiplier," *Journal of Monetary Economics,* vol. 5 (July 1979), pp. 301-25.

15. ———. "Can the Reserves Approach to Monetary Control Really Work?" Manuscript, Michigan State University, January 1981.

16. Klein, Lawrence R., et al. *Controlling Money: A Discussion.* Original Paper 29. Los Angeles: International Institute for Economic Research, November 1980.

17. Lindsey, David, et al. "Monetary Control Experience under the New Operating Procedures," in *New Monetary Control Procedures.* Federal Reserve Staff Study—vol. II. Washington: Board of Governors of the Federal Reserve System, February 1981.

18. Porter, Richard D., Thomas D. Simpson, and Eileen Mauskopf. "Financial Innovation and the Monetary Aggregates," *Brookings Papers on Economic Activity,* vol. 1 (1979), pp. 213-29.

19. Saving, Thomas R. "A Theory of the Money Supply with Competitive Banking," *Journal of Monetary Economics,* vol. 3 (July 1977), pp. 289-303.

20. Sellon, Gordon H., Jr., and Ronald L. Teigen. "The Choice of Short-Run Targets for Monetary Policy: Part 1," *Economic Review,* Federal Reserve Bank of Kansas City, vol. 66, no. 4 (April 1981), pp. 3-16.

21. Tatom, John A. "Issues in Measuring an Adjusted Monetary Base," *Review,* Federal Reserve Bank of St. Louis, vol. 62, no. 10 (December 1980), pp. 11-29.

22. Tobin, James. "A General Equilibrium Approach to Monetary Theory," *Journal of Money, Credit and Banking,* vol. 1, no. 1 (February 1969), pp. 15-29.

23. ———. "Redefining the Aggregates: Comments on the Exercise," in *Measuring the Monetary Aggregates.* Compilation of Views Prepared for the Subcommittee on Monetary Policy. House of Representatives. Committee on Banking, Finance, and Urban Affairs. 96 Cong. 2 Sess. Washington: U.S. Government Printing Office, 1980.

24. Wenninger, John, and Charles M. Sivesind. "Defining Money for a Changing Financial System," *Quarterly Review,* Federal Reserve Bank of New York, vol. 4, no. 1 (Spring 1979), pp. 1-8.

Prices of Ohio's Banks: The Multibank Holding Company Experience

by Paul R. Watro

The growth of multibank holding companies has been rapid during the past decade. Indeed, multibank holding companies (MBHCs) are today the most important type of banking organization in many states. Ohio's banking structure is dominated by MBHCs, which today account for 64 percent of total banking deposits, compared with only 17 percent in 1969.[1]

Geographical restrictions on bank branching probably are an underlying factor behind the growth of MBHCs. Until the liberalization of Ohio's branching law in 1979, a bank was prohibited from expanding beyond its home-office county. MBHCs, however, could acquire banks throughout the state.

The impact of MBHC affiliation on the performance of acquired banks has been widely documented. It generally has been difficult to demonstrate that the profitability of banks has been increased significantly by MBHC affiliation, suggesting that the impetus for formation of MBHCs lies elsewhere. Very few studies have investigated the economic rationale behind the MBHC-expansion strategies. Piper and Weiss (1971) attributed "the failure of acquisitions, on average, to improve earnings per share of the acquiring holding company to excessively generous purchase premiums paid to stockholders of the acquired bank" (pp. 3-4). In this explanation, "competition among holding companies to acquire additional banks drove up the price of stocks of possible acquisitions" (p. 4). In contrast, more recent studies by Varvel (1975) and Frieder and Apilado (1980) indicate that bank acquisitions had a positive impact on the organization's earnings.

In an approach that differs somewhat from that of earlier research, this study examines the terms of bank acquisitions by MBHCs in Ohio since 1970 and identifies certain factors that are important in explaining premiums paid for these banks.

I. Acquisitions and Premiums Paid

Measure of Value

Determining the economic value of a bank is often difficult.The most logical approach would be to consider the stock price of an institution as its true economic value. Except for the larger banks, however, bank stocks are not traded on public markets. The market price of bank stocks that are not sold over the counter may be an unreliable indicator of value, because the sale of only a few shares in a thin market (i.e., relatively inactive) might produce substantial price movements.

Another approach would be to determine the actual economic value of an institution from its selling price. One of the issues arising from the sale of a bank is that the selling price may be above the bank's book value. In attempting to determine what factors contribute to the selling price above the book value, this study uses the ratio of purchase price to book value as the measure of value.

A bank's book value is its equity capital, including common and preferred stock, surplus, undivided profits, and capital reserves. The book value is generally a reliable yardstick for measuring value, because of the relatively high turnover and liquidity of a bank's assets

1. A few BHCs in Ohio recently have merged their banking subsidiaries into one bank and by definition are no longer MBHCs. However, these organizations are still considered MBHCs for the purpose of this study.

Paul R. Watro is an economist with the Federal Reserve Bank of Cleveland.

and liabilities. Since a bank invests primarily in loans and securities as opposed to plants, equipment, and inventories, the book value of its assets more closely reflects actual market value than would be the case for manufacturing firms, for example, particularly when interest rates are relatively stable.

The method of payment for an acquisition makes a difference in calculating the premiums. When an acquisition is for cash, the premium is derived simply by dividing the purchase price by the equity capital of the bank. When an acquisition involves an exchange of stock, however, the purchase price is estimated from the current value of the MBHC's stock as listed in the application. Such an estimate should reflect the true value of the MBHC, since its stock is traded publicly. The estimated purchase price would be realized if stockholders decided to sell after the acquisition, provided the value of the MBHC's stock remained constant between the time of the application and the actual transaction.

Acquisition Activity

The study examines MBHC acquisitions of 99 individual banks in Ohio in the 1970-80 period.[2] Shareholders of 95 of these banks received premiums ranging from 3 percent to 173 percent, while MBHCs purchased four banks at prices ranging from 1 percent to 9 percent below their book values (discounts). MBHCs paid an average of 53 percent above book value to acquire banks over the period (see table 1). Premiums varied substantially within a given year as well as over time. The average premium on a yearly basis ranged from 27 percent in 1972 to 75 percent in 1980. There was a distinct tendency toward higher premiums in the later years of the period, following the liberalization of Ohio's branching law.

The number of MBHC acquisitions varied widely on a yearly basis. The year of greatest activity was 1970, when MBHCs acquired 16 banks. In contrast, only four bank acquisitions occurred in 1976.

Table 1 Premiums and Type of Acquisitions

Year[a]	Average premium, percent	Range of premium, percent	Acquisitions		
			Total	Cash	Stock
1970	44	−9 - 82	16	1	15
1971	50	3 - 173	10	1	9
1972	27	−1 - 57	9	2	7
1973	61	5 - 140	8	4	4
1974	52	21 - 105	5	4	1
1975	45	26 - 69	8	8	0
1976	37	10 - 67	4	4	0
1977	47	22 - 62	10	8	2
1978	71	47 - 126	8	7	1
1979	63	40 - 116	10	10	0
1980	75	−4 - 110	11	10	1
Total		−9 - 173	99	59	40
Average	53[b]		9	5.3	3.6

a. The year of acquisition refers to the application date rather than the actual approval date.
b. This figure is an average of the individual premiums.

SOURCE: Data accumulated from applications received.

Acquisitions are made either through cash payments or stock exchanges. Nearly all of the acquisitions in the early 1970s involved the exchange of stock. In the 1970-72 period, for example, 31 of the 35 acquisitions were made in this manner. Since 1973, however, over 90 percent of the MBHC acquisitions involved cash payments, and all of the non-SMSA (or rural) bank acquisitions involved cash.[3]

The type of market area in which the acquired bank operated did not dominate in the choice of banks or premiums paid (see table 2). Forty-eight acquired banks operated in SMSAs, while the other 51 operated in non-SMSA counties. The average premium paid for the group of SMSA affiliates was 56 percent, compared with a 50 percent premium for the average non-SMSA bank.

II. Theoretical and Operational Considerations

Many factors affect the premiums paid for bank acquisitions. Assuming that MBHCs are profit-maxi-

2. The year of acquisition refers to the application date rather than the actual approval date. Acquisitions involving formations of bank holding companies and ones in which two or more banks were simultaneously acquired were omitted. In addition, a few acquisitions were omitted because of incomplete information.

3. *SMSA* stands for standard metropolitan statistical area, and *non-SMSA* indicates a county located outside metropolitan areas.

Table 2 Premiums and Acquisitions by Type of Market

	SMSA		Non-SMSA	
Year[a]	Average premium, percent	Acquisitions	Average premium, percent	Acquisitions
1970	46	7	42	9
1971	68	5	31	5
1972	41	2	22	7
1973	54	5	73	3
1974	36	2	63	3
1975	48	5	40	3
1976	37	4	–	–
1977	40	7	64	3
1978	82	4	59	4
1979	74	3	58	7
1980	88	4	68	7
Total		48		51
Average	56[b]	4.4	50[b]	4.6

a. The year of acquisition refers to the application date rather than the actual approval date.
b. This figure is an average of the individual premiums.

SOURCE: Data accumulated from applications received.

mizers, they should be concerned primarily with the future earnings of their acquisition candidates. Future earnings are likely to depend on an array of factors, including the bank's past earnings, caliber of management, deposit composition, competitive structure of the market, and growth of the local area. The earnings of the acquiring MBHC, size of the acquisition candidate, type of market, and current branch law also should affect the acquisition price relative to the bank's book value.

Acquisition strategies vary among MBHCs. Some MBHCs are more likely to acquire well-managed and highly profitable banks and make few changes in policies and operations. Others have a tendency to acquire less profitable banks and then make significant changes to increase earning potential. In either case, banks with higher earnings would be expected to receive higher prices, presumably because a sale would not be consummated unless the buyer offered the seller at least the opportunity cost, or the present value of the expected future-earnings stream of the bank. If a MBHC objective were to maximize profits, it would not pay a price beyond the expected-earnings capacity of the bank. For these reasons, the future-earnings rate of acquired banks would be expected to influence the premium offered by a MBHC. For empirical work, a bank's average rate of return on assets during the past three years is used as one indication of its future-income stream.

The earnings of MBHCs might affect the acquisition price. During prosperous years, business organizations may have a greater propensity to expand operations, because their cash flow is greater and because expectations for the future may seem brighter. Higher rates of return by MBHCs, therefore, should increase the demand and the price for bank acquisitions. The rate of return on the average stockholders' equity one year prior to the acquisition is used to measure the MBHC's earnings. (While earnings may vary significantly from year to year, data limitations for earlier acquisitions prohibit the use of additional years in the measure.)

The cost of *de novo* market entry should be a determinant of the premiums paid for banks. A MBHC has two alternatives for entry into a market: establishing a new bank or branch or acquiring an existing institution. Experience suggests that it usually takes three to five years for a new branch to cover costs and probably longer for a new bank. The "going-concern" value of such factors as location, established customer relationships, and community involvement should affect the value of a bank beyond its book value, by an amount related to the cost of expansion via *de novo* entry. Once a banking relationship is established, it is difficult to entice customers to change banks. Recognizing the valuable market-entry franchise, MBHCs have generally considered it to be more advantageous to acquire established banks. Assuming that the going-concern value of an established institution does not increase proportionately with size, the acquisition premiums would diminish as the size of the acquired bank increases.

The deposit composition of a bank often reflects the costs incurred for funds and the type of bank customers. Demand deposits have been a relatively inexpensive and stable source of funds for banks. Regulation Q prohibits the payment of interest on demand deposits, and, prior to this year, banks basically held a monopoly position on third-party payment accounts. The Depository Institutions Deregulation and Mone-

tary Control Act of 1980, however, permits banks and thrift institutions to offer negotiable order of withdrawal (NOW) accounts. From a functional standpoint, NOWs are effectively interest-bearing checking accounts. As customers substitute NOW accounts for demand deposits, banks will incur higher costs. Nevertheless, throughout the 1970s banks enjoyed this low-cost source of funds. A larger percentage of demand deposits, moreover, indicates a larger proportion of business customers, as banks often require commercial-loan customers to maintain compensating balances in demand accounts. Over 59 percent of the demand deposits in the United States were owned by businesses throughout the 1970s.[4] A large base of business customers is generally advantageous for a banking organization to become a leading competitor in a given market. In proposed bank-acquisition applications MBHCs often cite that the holding company would enable the bank to offer improved services, such as higher lending limits, trusts, international banking, and industrial revenue financing. It is thus presumed that MBHCs would prefer to acquire banks with a larger proportion of demand deposits; such acquisitions would provide relatively less expensive funds and a relatively larger business customer base.

The type of market may affect the premiums paid by MBHCs to acquire banks. If MBHCs perceive metropolitan areas to be more attractive than rural areas, banks acquired in SMSAs would receive higher premiums. The fact that MBHCs did pay higher average premiums to purchase SMSA banks was not statistically significant. When considered with other variables, the type of market may well affect the acquisition premiums; thus, a variable for SMSA and non-SMSA markets is included in the analysis.

As with other business organizations, banks are more likely to gain additional business in high-growth areas. MBHCs, which are legally empowered to acquire banks throughout Ohio, have an incentive to make acquisitions in the rapidly expanding market areas. In fact, MBHCs may forego short-run earnings to augment their deposit base and long-run profits. The county growth factor is measured as the difference between a county's deposit growth and the state's deposit growth for the five-year period prior to the acquisition. A priori, the growth factor is expected to have a positive effect on the acquisition price.

While local economic conditions mainly determine deposit growth for a market as a whole, bank management influences relative deposit growth.[5] Some banks consistently have grown faster than their competitors, a fact that can be attributed to aggressive management. If MBHCs are concerned about growth, they may well prefer to acquire banks with aggressive management. Such a preference would bid up the price of banks that have gained deposits at a faster rate than their competitors. To capture this potential influence, the analysis includes the bank's deposit growth for five years divided by the market's deposit growth for five years. It is presumed that faster-growing banks in a given market would receive higher premiums.

Business firms prefer to operate in less competitive market areas, since it is usually less difficult to earn profits in such markets. To approximate the competitiveness of an area, researchers generally use the three-firm concentration ratio (the percentage of deposits held by the three largest organizations in a given market). While this measure may not always reflect the actual competitive conditions in a market, it does provide a general view of the competitive environment. It is assumed that the concentration ratio would have a positive impact on the premiums paid for banks.

It is theoretically unclear what effect a more liberal branching law would have on the premiums paid for bank acquisitions, because a number of opposing forces would seem to occur simultaneously. Ohio's new branching law, passed in April 1978 and effective January 1, 1979, permits *de novo* branching by a commercial bank within its home-office county and

4. Board of Governors of the Federal Reserve System, "Gross Demand Deposits of Individuals, Partnerships, and Corporations," *Annual Statistical Digest: 1970-79,* p. 150.

5. For purposes of this study, banking markets are approximated by SMSAs in urban areas and by counties in rural areas. While it is recognized that individual market areas often do not coincide with these political boundaries, data limitations prohibit the use of more precise market delineations.

into all contiguous counties.[6] A MBHC could open a new branch through a bank affiliate instead of acquiring an existing bank in an adjacent county. This expansion alternative may have reduced the demand to acquire existing banks. On the other hand, the less restrictive branching law enhances the flexibility of a MBHC to enter and expand in new markets, which tends to increase the demand for bank acquisitions. A MBHC could acquire a bank and use its new branching power to expand operations into contiguous counties. In addition, the number of potential buyers increased greatly when statewide bank mergers, acquisitions, and consolidations became legal in 1979. MBHCs obviously were aware of many more potential bidders when negotiating bank acquisitions after 1978. On balance, the demand for bank acquisitions probably increased because of the changed branching law.

Supply factors probably also were affected by the liberalization of Ohio's branching law. Stockholders of banks may have become less willing to sell to a MBHC, because one advantage of being a member of a holding company has been eliminated with the branching law change. Higher prices may have been necessary to induce bank stockholders to sell. On the other hand, the current branching law increases the threat of entry by new competitors in a local market area, since banks in adjacent counties have become potential entrants. *De novo* entry generally is associated with increased competition and lower earnings. This potential outcome may have encouraged stockholders to sell at a lower price than otherwise would have been the case. Given the uncertainty of demand and supply factors, it is unclear what the effect of a more liberal branching law would be on acquisition prices.

III. Test and Results

To explain the variance among the premiums paid for bank acquisitions by MBHCs, the following relationship is specified:[7]

$$P = f(ME, BE, BS, DC, MD, GBM, GCS, CONC, BL, T),$$

where P = premium = acquisition price/book value of bank,
ME = MBHC's earnings = net income/average stockholders' equity (one year),
BE = bank earnings = net income/average assets (three years),
BS = deposit size of bank (millions of dollars),
DC = deposit composition of bank = demand deposits/total deposits,
MD = market dummy (SMSA = 1; non-SMSA = 0),
GBM = bank deposit growth/market deposit growth (five years),
GCS = county deposit growth − state deposit growth (five years),
$CONC$ = three-bank concentration ratio,
BL = branching law dummy (1978, 1979, and 1980 = 1; other years = 0),
T = time dummy (each year).

The Sample

Using a cross-sectional multivariate regression analysis, the relationship explained 40 percent of the variance in the premiums paid for 99 bank acquisitions in Ohio between 1970 and 1980 (see table 3). Five of the ten variables specified in the equation were statistically significant.

As expected, both earnings variables were significant. When MBHCs earned a higher average rate of return on stockholders' equity, they paid higher premiums for bank acquisitions, presumably because the demand was greater. Similarly, banks earning a higher average rate of return on assets required a higher price to induce stockholders to sell. MBHCs paid significantly higher premiums for banks earning higher average rates of return on assets three years prior to the acquisitions.[8]

Banks located in SMSA markets received significantly higher premiums. In addition, MBHCs paid higher premiums to acquire more rapidly growing banks in a market area or banks that operated in more rapidly growing areas. Acquired banks operating in counties that experienced faster deposit growth than

6. For a discussion of the impact of the branching law change in Ohio, see Whalen (1981).

7. Because the study entails a cross-sectional analysis over an 11-year period, a time variable is included as a control. If the time variable is not significant given the other variables examined, it enhances the validity of using a cross-sectional analysis over time.

8. Average rates of return on assets for one, two, and five years prior to the acquisition also were tested and found significant.

Table 3 Regression Results Explaining Premium Variability

Variable	All bank acquisitions		SMSA bank acquisitions		Non-SMSA bank acquisitions	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
MBHC earnings (1 year)	0.02169	2.90[a]	0.04188	2.34[b]	0.01706	1.50
Bank earnings (3 years)	0.32002	4.33[a]	0.19471	2.12[b]	0.35758	3.23[a]
Bank deposit composition	0.42490	1.45	0.57539	1.68[c]	0.31471	0.67
Market dummy	0.10598	1.73[c]				
Bank deposit growth/market deposit growth (5 years)	0.06935	2.86[a]	0.04413	1.82[c]	0.19170	1.55
County deposit growth – state deposit growth (5 years)	0.00295	2.32[b]	0.00481	3.15[a]	0.00207	0.97
Three-bank concentration ratio	0.00225	1.25	0.00432	1.77[c]	0.00105	0.43
Bank deposit size	–0.00078	1.45	–0.00146	2.83[a]	0.00458	2.45[b]
Branching law change	0.13006	1.29	0.29466	2.52[b]	–0.03151	0.20
Time dummy	0.00005	0.00	–0.00562	0.35	0.00890	0.42
Constant	0.43529		0.22978		0.28868	
F-value	7.45[a]		7.68[a]		4.42[a]	
Adjusted R^2	0.40		0.57		0.40	

a. Denotes significance at 1 percent level.
b. Denotes significance at 5 percent level.
c. Denotes significance at 10 percent level.

SOURCES: Condition and income reports of banks and annual reports of MBHCs.

the state as a whole received significantly higher premiums. Banks that registered faster deposit growth than the market area as a whole also reaped significantly higher premiums.

While other variables in the equation—deposit size, percentage of demand deposits, and market concentration—had the expected signs, none of them was statistically significant in the pooled SMSA and non-SMSA bank sample.

Type of Market

Some observers of the MBHC movement suggest that the type of market affects the factors that are important when considering bank acquisitions. SMSA markets usually are substantially larger than non-SMSA (or rural) markets. MBHCs generally have entered urban markets by acquiring larger banks with a relatively smaller share of market deposits. The average acquired SMSA bank had deposits of $52 million, with market deposits of less than 5 percent; the average acquired non-SMSA bank had deposits of $33 million, with market deposits of 25 percent. Many of the largest banks in urban areas already were affiliated with MBHCs, including many lead banks acquired with the formation of the holding companies. Because of competitive factors, regulators traditionally have discouraged acquisitions of banks with a large proportion of market deposits, particularly in large and rapidly growing market areas.

The substantial differences between SMSA and non-SMSA conditions for acquisition suggest that the explanatory factors of all other variables may be obscured when the two groups are pooled. Therefore, the sample of 99 MBHC acquisitions was divided into two groups: SMSA banks and non-SMSA banks. Independent variables are expected to have the same relationship with the premiums paid for both groups of banks. However, growth factors and the branching law change should have a greater impact on the premiums paid for SMSA banks. MBHCs generally have acquired banks in urban areas that are relatively small compared with their competitors. Out-of-county branching presumably would be more important for banks in metropolitan areas, since these market areas generally consist of more than one county.

The results indicate that the relationship explained 57 percent of the variance in the premiums paid for SMSA banks and 40 percent for non-SMSA banks,

compared with 40 percent for all of the acquired banks (see table 3). Eight of the nine variables, including bank size, percentage of demand deposits, market concentration, and branching law change, were significant when premiums paid for only the SMSA banks were tested. In contrast, only two variables—bank size and bank earnings—were significant for the non-SMSA bank sample.

MBHCs paid significantly higher premiums for smaller banks in SMSAs. Acquisitions of the largest banks in SMSAs were discouraged, which probably tended to increase the premiums paid for smaller banks. Foothold entry into SMSAs is relatively attractive, as expansion is presumably easier in larger markets.

Market concentration, deposit composition, and the branching law change had a significant impact on the premiums paid for bank acquisitions in SMSAs. Banks with a higher percentage of demand deposits and operating in more concentrated markets received significantly higher premiums. In addition, MBHCs paid significantly higher premiums for SMSA banks following the passage of the liberalized branching law in April 1978. Banking markets in urban areas typically extend beyond a single county, and much of the growth in Ohio's SMSAs in the past decade has been outside the central-city counties. The new branching law enables banks to branch throughout an entire market area, thereby better serving their customers and enhancing their deposit base. Given a greater opportunity for expansion, the demand for SMSA banks probably has increased; at the same time, growth-oriented banks probably have become less willing to sell.

Earnings of the MBHCs and banks and deposit growth variables were also significant in explaining the premiums paid for SMSA banks. The time dummy was the only variable that was statistically insignificant.

The specified relationship explains 40 percent of the variance in the premiums paid for banks in non-SMSA counties. Only two of the nine variables—bank earnings and deposit size—were statistically significant. Larger rural banks with higher earnings received significantly higher premiums. This differs with SMSA market acquisitions, in that bank size was inversely related to the premiums paid for banks. Since banks acquired in rural areas were generally much smaller than banks acquired in urban areas, economies of scale presumably outweighed the going-concern aspect of an acquisition. While the other variables in the equation (including growth measures) generally had the expected signs, none of them significantly affected the premiums. MBHCs apparently are concerned primarily with the earnings and market position of the banks that they acquire in rural areas.

IV. Future Acquisition Premiums

Future premiums for bank acquisitions may be predicted based on past experience and anticipated changes in the significant explanatory variables in the model. The premiums paid for both SMSA and non-SMSA banks were significantly affected by the earnings of the banks and their deposit size at the time of acquisition. Several other variables, including MBHC earnings, deposit growth, deposit composition, market concentration, and branching law, also had a significant impact on the premium paid for the SMSA banks.

Premiums would change drastically if the values of the explanatory variables changed by one standard deviation from their means (see table 4). For example, a SMSA bank would be expected to receive a price 2 percent below book value if the following conditions were present:

1. the bank earned 0.39 percent on its average assets over the last five years;
2. the acquiring MBHC earned 11.12 percent on its average stockholders' equity in the past year;
3. demand deposits accounted for 23 percent of the bank's deposits;
4. the bank's deposit growth was approximately equal to the market's deposit growth;
5. the deposit growth for all of the banks in the county was only 2.1 percent above the deposit growth for all of the banks in the state;
6. the three largest banking organizations in the market accounted for 50.1 percent of the total market deposits;
7. the bank had total deposits of $119.8 million prior to acquisition.

The ability of the specified relationship to predict premiums for non-SMSA banks is lower given that only two of the variables were significant in explaining past premiums. Nevertheless, the model indicates that if a non-SMSA bank had deposits and earnings one stan-

Table 4 Premiums Affected by Hypothetical Changes in Significant Variables[a]

Variable	Mean value	Change of one standard deviation from mean value	Hypothetical value	Reduction in premium, percent of book value
	SMSA banks			
MBHC earnings (1 year)	13.29%	−2.17%	11.12%	9
Bank earnings (3 years)	0.80%	−0.41%	0.39%	8
Bank deposit composition	33.87%	−11.20%	22.67%	6
Bank deposit growth/market deposit growth (5 years)	1.64	−1.63	0.01	7
County deposit growth − state deposit growth (5 years)	26.2%	−24.1%	2.1%	12
Three-bank concentration ratio	64.2%	−14.1%	50.1%	6
Bank deposit size (millions of dollars)	$51.7	$68.1	$119.8	10
	Non-SMSA banks			
Bank earnings (3 years)	0.94%	−0.37%	0.54%	13
Bank deposit size (millions of dollars)	$32.7	−$20.9	$11.8	10

a. The branching dummy was not included, because it had only a one-time effect.

SOURCES: Condition and income reports of banks and annual reports of MBHCs.

dard deviation below the mean values of the other acquired banks, it would be expected to receive a premium of 27 percent (or 1.27 times book); this premium compares with the average premium of 50 percent paid by MBHCs to acquire non-SMSA banks in Ohio since 1970.

Premiums paid for bank acquisitions in the near future are likely to decline in light of recent developments. Competition among banks and other financial institutions has intensified in 1981. The introduction of NOW accounts will probably have a negative impact on bank earnings. Evidence suggests that the vast majority of the NOW-account balances at banks was attributed to a shifting of demand deposits to these interest-bearing third-party payment accounts. In addition, banks are encountering increased competition for consumer loans, as thrift institutions begin to use the recently granted authority to offer credit cards and extend installment loans. For the time being, thrift institutions continue to maintain the authority to pay 0.25 percent more than banks for most types of time and savings deposits.

The impact of the Depository Institutions Deregulation and Monetary Control Act of 1980 on individual banks will vary widely according to the competition offered by thrift institutions in the market.[9] A greater amount of thrift competition increases the probability of lower bank deposit growth. Individual banks may find it more difficult to gain a large percentage of deposits in these markets. Moreover, aggressive thrift competition may well cause the concentration of banking deposits in markets to fall. These expected changes would tend to exert downward pressure on bank-acquisition premiums.

On the other hand, if interstate bank acquisitions or branching is permitted, many more organizations would wish to acquire banks in Ohio. The demand for bank acquisitions probably would increase, thereby exerting upward pressure on the price of banks. This apparently was the case just a few years ago when liberalization of Ohio's branching law was anticipated.

V. Conclusion

Many banks in Ohio have been acquired by MBHCs since 1970, and nearly all of the acquired banks received a price that included a premium above book

9. For a discussion of competition among financial institutions, see Watro (1980b).

value. The premiums depended on the earnings of the MBHC; the earnings of the bank and its deposit size, composition, and growth; the deposit growth in the local area; the market concentration; and the branching law change. Each of these factors significantly affected the premiums paid for SMSA banks, but only the bank's earnings and its deposit size had a significant impact on the premiums paid for non-SMSA banks. The premiums paid for either type of bank were not significantly affected over time, given the other variables specified in the model.

Although caution must be exercised in predicting future bank prices, it appears that premiums paid for bank acquisitions could decline in the future. Increased competition from thrift institutions generally would tend to reduce bank earnings and deposit growth. However, this negative impact on bank premiums could be offset by increased demand for bank acquisitions if interstate banking were permitted.

References

1. Darnell, Jerome C. "What Is Your Bank Worth?" *Magazine of Bank Administration,* vol. 49, no. 6 (June 1973), pp. 25-31.

2. Frieder, Larry A., and Vincent P. Apilado. "The Performance of Multibank Holding Companies in Light of Valuation Theory and Financial Regulation," *Proceedings of a Conference on Bank Structure and Competition,* Federal Reserve Bank of Chicago, May 1980, pp. 122-55.

3. Piper, Thomas R. "The Economics of Bank Acquisitions by Registered Bank Holding Companies," Federal Reserve Bank of Boston, Research Report No. 48, March 1971.

4. Piper, Thomas R., and Stephen J. Weiss. "The Profitability of Bank Acquisitions by Multibank Holding Companies," *New England Economic Review,* Federal Reserve Bank of Boston, September/October 1971, pp. 2-12.

5. ———— . "The Profitability of Multibank Holding Company Acquisitions," *Journal of Finance,* vol. 29 (March 1974), pp. 163-74.

6. Varvel, Walter A. "A Valuation Approach to Bank Holding Company Acquisitions," *Economic Review,* Federal Reserve Bank of Richmond, vol. 61 (July/August 1975), pp. 9-15.

7. Watro, Paul R. "Market Share Gainers and Losers," *Economic Commentary,* Federal Reserve Bank of Cleveland, May 19, 1980.

8. ———— . "Competition between Thrift Institutions and Banks in Ohio," *Economic Commentary,* Federal Reserve Bank of Cleveland, July 14, 1980.

9. Whalen, Gary. "Bank Expansion in Ohio," *Economic Commentary,* Federal Reserve Bank of Cleveland, April 6, 1981.

The High-Employment Budget: Recent Changes and Persistent Shortcomings

by Owen F. Humpage

The high-employment budget measures federal government receipts, expenditures, and the associated surplus or deficit that would result if the economy always operated at its potential or full-employment level of output.[1] Conceptually, the high-employment budget enables one to distinguish discretionary fiscal policies, which indicate changes in federal tax and spending laws, from automatic (or induced) budget developments, which reflect changes in economic activity. Economists frequently have used the high-employment budget in setting and analyzing fiscal policies. Unfortunately, many measurement and conceptual problems plague the high-employment budget and greatly circumscribe its ability to distinguish between discretionary and automatic fiscal-policy responses. In an effort to standardize and to improve the high-employment budget, new estimates have been prepared jointly by the Bureau of Economic Analysis of the Department of Commerce, the Council of Economic Advisers, the Board of Governors of the Federal Reserve System, the Office of Management and Budget, and the Department of the Treasury (de Leeuw et al. 1980). The revisions, however, do not address the fundamental shortcomings of the high-employment budget. This article explains the high-employment budget concept, summarizes the new estimating procedure, and reviews the persistent problems that greatly restrict the measure's usefulness.

I. In Theory

Federal taxing and spending policies influence economic activity. A reduction in federal tax rates in the absence of any offsetting change in federal spending raises the budget deficit and, presumably, aggregate demand.[2] Simultaneously, however, a change in economic activity automatically alters the federal budget. By reducing personal incomes and corporate profits, an economic slowdown tends to lower federal income-tax and payroll-tax receipts; at the same time, it tends to raise spending for such programs as unemployment compensation and food stamps. An economic slowdown consequently increases the budget deficit. Frequently, this interaction between the budget and economic activity creates difficulties in interpreting federal fiscal policy. An increase in the federal budget deficit, as conventionally measured, does not necessarily imply that fiscal author-

1. This article uses the terms *high employment* and *full employment* interchangeably. In recent years, government publications have substituted *high employment* in places where *full employment* previously appeared. This change is meant to dramatize the uncertainty in calculating full employment. The problem is discussed in the Potential GNP and Full Employment section.

2. This apparently innocuous statement is the source of a great deal of controversy, particularly among strict Keynesians, monetarists, and rational expectations' advocates. In the short run, if resources are not fully employed, and if policy changes are not completely anticipated, a deficit-financed change in fiscal policy would raise real output and employment. In the long run, if resources are fully employed, or if fiscal policy is fully anticipated, deficit-financed fiscal policies may result only in a higher price level and a substitution of public for private spending.

Owen F. Humpage is an economist with the Federal Reserve Bank of Cleveland.

ities are actively undertaking stimulative fiscal policies. In fact, if a decline in economic activity is sharp enough, a rising budget deficit could mask a perverse shift toward restrictive discretionary fiscal policy. In 1974, for example, economic activity slumped, and the deficit widened by $4.0 billion (national income and product account basis). This shift toward fiscal stimulus, however, was the automatic budget response to the weakening economy. Discretionary policy, as measured by the high-employment surplus (HES), shifted $15.0 billion toward restraint. In theory, therefore, by distinguishing between discretionary and automatic budget changes, the HES allows one to analyze the response, timing, and strength of discretionary fiscal policy and to compare the relative contributions of discretionary and automatic budget responses to stabilization over the business cycle.[3] One therefore can determine whether discretionary fiscal policy is a stabilizing or destabilizing force over the business cycle.

In addition to distinguishing between discretionary and automatic fiscal-policy changes, the HES conceptually provides an estimate of long-term credit-market conditions associated with continuation of current fiscal policies. The federal government must borrow to finance its deficit, yet, in doing so, it reduces the amount of savings available in the economy to finance private investment. A high-employment deficit, therefore, indicates the amount of private savings being diverted from private investment at full employment. The consequences of federal borrowing need not be serious, unless the government borrows large sums for extended periods of time. Then, the primary effect of deficit-financed fiscal policies may be only to displace an equal amount of private investment—a phenomenon called "crowding out." Whereas a budget deficit, automatically induced by a decline in gross national product (GNP) below its potential or full-employment level, will be self-correcting as the economy moves back to full employment, a high-employment deficit requires an offsetting change in fiscal policies to avoid crowding out when the economy reaches its potential level of output.

3. The actual deficit on a national income and product account basis, less the HES, equals that portion of the deficit attributable to automatic budget responses.

Although the HES concept traces back at least to the Committee for Economic Development in the 1940s, it was used most widely in the early 1960s, after its introduction in the 1962 Annual Report of the Council of Economic Advisers. During the 1970s, however, the HES largely disappeared from the analysis of fiscal policy, because of fundamental problems involving its measurement and interpretation. These problems are reviewed below.

II. In Practice

Although the HES is a fairly simple theoretical concept, it is very difficult to measure with the degree of precision necessary to render unquestionable conclusions about fiscal policy. Since the initial popularity of the HES measure in the early 1960s, economists have developed increasingly more sophisticated statistical procedures for estimating such things as potential GNP growth and the associated components of the high-employment budget. Besides incorporating these developments, the new technique for estimating the HES improves the measure in three other important ways: (1) it guarantees that the actual, and estimated, high-employment surplus or deficit is equal when the economy is at full employment; (2) it removes the business-cycle influence on a wider range of expenditures; and (3) it standardizes the official government estimates of the HES (see appendix 1). Nevertheless, many problems persist and greatly restrict the usefulness of the HES for analyzing fiscal policy.

Inflation

One reason for the HES's wane is that it does not achieve a complete dichotomy between discretionary fiscal-policy actions and automatic budget responses. Movements in nominal potential GNP produce changes in the HES with the overall effect of making discretionary fiscal policy appear more restrictive than it actually is. This problem is particularly severe during periods of high and accelerating inflation; it stems, in part, from the asymmetric impact of inflation on budget receipts and expenditures. Although inflation increases both receipts and expenditures, receipts tend to rise faster than expenditures, because of the general progressiveness of the federal tax structure

and because of lags in adjusting most expenditures to rising prices. The method of estimating the HES does not yet correct for this difficulty. Actual prices are used in the calculation of full-employment tax bases, and full-employment expenditures are not deflated for actual price-level changes. Consequently, inflation increases the HES and gives the appearance of a shift in discretionary fiscal policy toward restraint. In fact, however, discretionary policy is unchanged; the budget is responding automatically to the inflationary growth of nominal income.

Even if inflation were not a problem, the HES would not completely distinguish discretionary from automatic budget responses. Real economic growth along the potential GNP trend line also will increase the HES, falsely indicating discretionary policy restraint. Normal economic growth raises income levels and, under the progressive federal tax structure, tends to raise effective tax rates. The bias induced by real growth on the HES may be more severe than that induced by inflation, because real growth will not affect high-employment expenditures.

The asymmetric impacts of inflation and real growth leave the level of the HES an unreliable indicator of discretionary policy and long-term crowding out. Changes in the HES, however, remain useful indicators of the direction and relative magnitude of changes in discretionary fiscal policy, provided that comparisons are restricted to relatively short time periods.

Potential GNP and Full Employment

The accuracy of HES estimates depends on the accuracy of the potential GNP and the full-employment unemployment rate estimates that underlie the HES calculations. Potential GNP attempts to measure the output capable of being produced when the economy is using all resources at its full-employment level. Basically, a potential GNP series is generated by first calculating a full-employment level of the factors of production, usually labor or labor plus capital, and then multiplying this level by a long-term trend rate of productivity growth. Full employment originally meant the lowest unemployment rate attainable under the existing institutional setting without accelerating inflation. No simple, stable correlation, however, exists between unemployment rates and inflation rates. Moreover, the changing age-sex composition of the labor force experienced during the 1970s further complicated interpretation of unemployment rates. Therefore, the full-employment unemployment rate is now defined by *assuming* that the 4.0 percent unemployment rate experienced in 1955 represented full employment and by adjusting this figure for subsequent changes in the age-sex composition of the work force. Similarly, full employment of the capital stock is defined in terms of a capacity utilization figure observed in previous years when the economy *seemed* to be operating at potential GNP.

If the foregoing definitions of potential GNP and full employment seem to be imprecise, it is because the concepts themselves are rather vague. Indicative of this fact is the continuing debate surrounding the proper methodology for calculating potential GNP. The Council of Economic Advisers (CEA), for example, originally calculated potential GNP using labor as its only input. Similarly, the potential GNP estimates underlying the current HES calculations assume that labor is the only input, making adjustments for changes in the age-sex composition of the labor force (de Leeuw et al. 1980). In 1977, the CEA revised its estimating technique to account for the growth of the capital stock and changes in the age-sex composition of the labor force (Clark 1977). Despite these revisions, the CEA's initial projections of potential GNP continuously have over-estimated potential GNP, resulting in subsequent downward revisions. These over-estimates primarily reflect the inability of researchers to explain the decline in the trend rate of productivity growth and accurately to forecast future productivity trends. Rasche and Tatom (1977) have argued that the CEA's estimates of potential GNP greatly overstate the level of potential GNP, because they do not include energy as a factor of production. Rasche and Tatom contend that the sharp rise in energy prices after 1973 greatly lowered productivity growth and potential GNP. Penson and Webb (1981) have criticized the conventional estimates of potential GNP for focusing solely on highly aggregated supply conditions. Penson and Webb estimate potential GNP using a general equilibrium approach, which accounts for the inter-relationships among the production sectors and the demands for output and inputs.

Under these alternative models, potential GNP estimates for 1970, for example, range from $1,124.9 billion according to the CEA's original estimates to $1,077.8 billion according to Penson and Webb's methodology.[4] Moreover, the estimated rate of potential GNP growth for 1970 ranges from 4.0 percent for the CEA to 1.0 percent under Penson and Webb.

A similar debate surrounds the numerical valuation of the full-employment unemployment rate for labor. The unemployment rate is important not only in the calculations of potential GNP, but it also figures directly into the cyclical adjustment of high-employment government expenditures (see appendix 1). The Council of Economic Advisers recently defined full employment as a 5.1 percent unemployment rate, but other economists have argued that the rate may be as high as 6 percent to 6.5 percent.

The calculation of the HES requires an estimate of *nominal* potential GNP, but the CEA's calculations of potential GNP are in real terms. To adjust the data, therefore, the CEA's estimates of potential GNP are multiplied by actual current prices as measured by the GNP price deflator. The practice can be questioned, however, because it implicitly assumes that current price patterns are applicable at full employment. In fact, current absolute price levels almost certainly will be different, and relative price patterns also may be significantly altered. As Penson and Webb (1981) indicate, changing price patterns as the economy moves toward full employment may alter potential GNP.

The inability to measure precisely the level of potential GNP discredits estimates of the HES, whereas the inability to measure accurately the growth rate of potential GNP casts doubts on the reliability of estimates of the change in the HES. Frank de Leeuw et al. (1980) investigated the sensitivity of the HES to alternative estimates of potential GNP by constructing an alternative HES series based on a moving average of actual GNP. They found that over short periods of time the assumptions about potential GNP had little influence on changes in the HES; they cautioned, however, that over longer periods the alternative assumptions about potential output could cause divergent patterns in the changes of the resulting HES series. Table 1 presents the HES series under alternative definitions of the full-employment unemployment rate. Although the HES levels are very different under the alternative full-employment assumptions, the changes in the respective series are similar. It appears, therefore, that problems in defining potential GNP and full employment disrupt the

4. The comparative estimates are found in Penson and Webb (1981, p. 9). Because Penson and Webb have not yet extended their estimates of potential GNP beyond 1971, more recent comparative data were not used.

Table 1 HES under Alternative Assumptions of the Full-Employment Unemployment Rate

Billions of dollars, NIPA basis

Calendar year	Levels of HES			Changes in HES		
	At 5.1%	At 6.1%	Difference[a]	At 5.1%	At 6.1%	Difference[a]
1977:IQ	$−9.7	$−25.5	$−15.8	$+12.6	$+11.7	$+0.9
IIQ	−18.1	−33.9	−15.8	−8.4	−8.4	0
IIIQ	−32.7	−48.8	−16.1	−14.6	−14.9	−0.3
IVQ	−31.6	−48.1	−16.5	+1.1	+0.7	+0.4
1978:IQ	−28.3	−45.5	−17.2	+3.3	+2.6	+0.7
IIQ	−14.2	−31.9	−17.7	+14.1	+13.6	+0.5
IIIQ	−10.9	−29.4	−18.5	+3.3	+2.5	+0.8
IVQ	−9.6	−28.7	−19.1	+1.3	+0.7	+0.6
1979:IQ	−4.6	−24.5	−19.9	+5.0	+4.2	+0.8
IIQ	+5.1	−15.1	−20.2	+9.7	+9.4	+0.3
IIIQ	−2.3	−23.4	−21.1	−7.4	−8.3	−0.9
IVQ	−7.1	−29.0	−21.9	−4.8	−5.6	−0.8
1980:IQ	−17.1	−39.5	−22.4	−10.0	−10.5	−0.5
IIQ	−21.5	−44.4	−22.9	−4.4	−4.9	−0.5
IIIQ	−21.2	−45.0	−23.8	+0.3	−0.6	+0.9
IVQ	−13.4	−37.8	−24.4	+7.8	+7.2	+0.6

a. Level or change at 5.1 percent unemployment less level or change at 6.1 percent unemployment rate.

SOURCE: Board of Governors of the Federal Reserve System.

usefulness of the HES but do not greatly impair interpretations of short-run changes in the HES, especially if they are expressed as ratios to changes in potential GNP.

Endogeneity

Richard Kopcke (1981) has raised a further criticism of the HES and its interaction with potential GNP. Kopcke correctly argues that the level of potential output is not independent of fiscal policy, and conventional measures of HES that do not account for this endogeneity render false readings of discretionary fiscal policy. To illustrate his point, Kopcke considers the effects of inflation-induced increases in corporate taxes.[5] Since the mid-1960s, such taxes have raised the cost of capital to firms, reduced investment in plant and equipment, lowered productivity, and, consequently, trimmed potential GNP. The effect has been to lower the HES, i.e., to make discretionary fiscal policy seem more stimulative than it actually is.

As supply-side economists are currently contending, the channels through which fiscal policy influences potential GNP may be more extensive than Kopcke chooses to illustrate. High marginal tax rates, generous unemployment compensation, extensive welfare payments, and liberal trade-adjustment assistance may cause individuals to work less. Consequently, these factors may raise the high-employment unemployment rate and lower potential GNP. Similarly, high marginal tax rates also may reduce savings relative to consumption and cause large amounts of resources to be devoted to tax avoidance, resulting in less investment and lower potential output. Persistent federal deficits also may lower potential GNP growth if they raise investors' uncertainty about inflation and reduce investment.

These examples illustrate that the feedback between the HES and potential GNP may be quite extensive, suggesting that large distortions may exist in the conventionally calculated HES. While the distortions would certainly affect the HES, changes in the measure could remain a useful short-run indicator of the direction of fiscal policy despite the feedback problem.

5. See also Kopcke (1980).

Dynamic Considerations

The HES is meant to be a summary measure of discretionary fiscal policy, but the ultimate indication of how fiscal policy affects the economy is the change in a target variable, say real GNP or the unemployment rate, induced by a change in fiscal policy. A given fiscal policy, however, will have an initial effect (the impact multiplier) and an associated chain of induced (or multiplier) effects extending over subsequent time periods. Moreover, different fiscal policies may have different impact and multiplier effects. The HES does not deal adequately with these aspects of fiscal policy.

Much of the discussion about the HES as a summary measure of discretionary fiscal policy centers on its usefulness as a proxy for the impact multipliers associated with fiscal policy. Economists, however, often argue that various fiscal policies have different impact multipliers; for example, a $10-billion government purchase probably has a larger impact multiplier than a $10-billion grant to state and local governments. Moreover, the simple "balanced-budget theorem" argues that equal increases (or decreases) in expenditures and receipts will have a net expansionary (or contractionary) influence on the economy. The HES, however, treats all dollars of fiscal stimulus as equal. It does not distinguish between different initial effects of alternative types of expenditures or taxes. Consequently, economists have argued that various full-employment receipts and expenditure categories should be weighted by their impact multipliers. One serious problem with this approach is in determining the weights to associate with specific fiscal policy. The weights depend on one's model of how the economy reacts to discretionary fiscal policy, and economists are not in total agreement on this score. Moreover, the weights may change over time as other economic variables change.

The second difficulty with this approach points to a more general problem associated with using the HES as a measure of fiscal policy. The HES is a static concept, whereas the assessment of fiscal policy involves important time-dimensional aspects. Consider, for example, the hypothetical multipliers presented in figure 1. Equal one-time expenditures for government purchases and grants to state and

local governments may produce multipliers as depicted by lines A and B, respectively. The total impact of these policies on real GNP equals the shaded area under the lines. While the contours of the lines are different, the areas associated with similar dollar amounts of fiscal stimulus are the same. Moreover, many economists believe that fiscal policy has no long-run impact on real economic variables. A deficit leads to real crowding out in the long run, so that fiscal policy alters only the *composition* of real output (smaller private sector, larger government sector), not the *level* of real output. In figure 1, accordingly, the multipliers turn negative. The contours of fiscal-policy multipliers also depend on many other factors, chiefly, the degree of restraint or ease in monetary policy, the nation's degree of international "openness" and its exchange-rate regime, and the state of expectations.

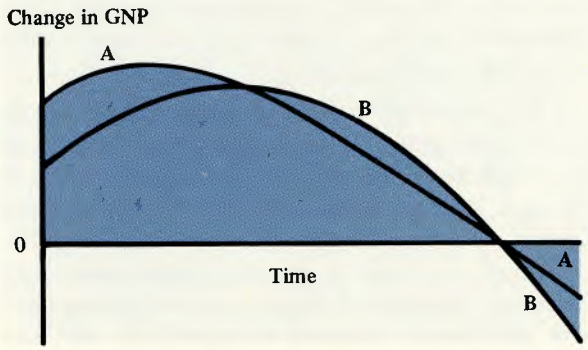
Because the HES is a static concept, it is not sensitive to these considerations. Is a temporary decline in the HES stimulative in a long-term sense when crowding out occurs? Can a string of full-employment deficits, growing by a constant dollar amount, be considered expansionary in the longer term? Weighting the HES by impact multipliers would seem to exacerbate the problem. In figure 1, for example, weighting by impact multipliers would imply that the policy associated with line A is more stimulative than the policy associated with line B. Yet it is *not* in a long-term sense.

Budget Shortcomings

One reason that the HES is limited as a satisfactory summary measure of discretionary fiscal policy is that the federal budget itself is not a comprehensive record of all government fiscal programs. Adrian Throop (1981) has criticized the HES concept for this reason. The HES excludes various on- and off-budget federal loans and loan guarantees. The average interest rate of these government-sponsored loans is less than the going market rate, thereby conferring a subsidy on the borrowers. Throop correctly argues that the value of this subsidy should be included in the HES, because it influences economic activity. The rapidly growing use of loans and loan guarantees in recent years makes Throop's criticisms all the more relevant.

On the other hand, Throop argues that federal interest payments on the national debt should not be included in the HES, to the extent that they represent the inflation premiums required by lenders to hold government obligations. These payments offset the reduced value of the debt held by the public and therefore have no net influence on real economic activity. Moreover, Throop argues that, because these premiums are saved by lenders to maintain the real value of their net worth, the funds are returned to the capital market. Consequently, federal borrowing to finance inflation premiums has no impact on funds available to finance private credit demands. Without this adjustment, the HES overstates the degree of long-term crowding out associated with fiscal policy.

Fig. 1 Fiscal-Policy Multipliers



III. In Conclusion

Although the revised high-employment budget calculations provide some needed improvements, they do not address the persistent fundamental problems that have impaired the measure's usefulness. As indicated in the foregoing text, these problems greatly distort the HES as a summary statistic for discretionary fiscal policy and raise serious questions about the ability of changes in the HES to indicate anything but the general direction of the initial thrust of discretionary fiscal policy over very short time intervals.

On a more fundamental level, however, one may question the basic usefulness of distinguishing between discretionary and automatic fiscal policies, or even the ability to do so. In an inflationary environment,

for example, taxes automatically increase. Yet, might not the decision of Congress not to offset inflation-induced tax increases more correctly be viewed as a discretionary decision to allow taxes to rise? Similarly, many expenditure programs are adjusted automatically to higher rates of inflation, while others are routinely increased for the same purpose by acts of Congress. Is distinguishing the former as automatic, and the latter as discretionary, meaningful or useful? In an inflationary environment where such adjustments are frequent and pervasive, distinctions between discretionary and automatic budget changes become greatly blurred.

The analysis of fiscal policy is a complicated task, not adequately captured in a single summary statistic. One must consider not only the total dollar value, and types, of major policy changes, but also the implied federal borrowing requirements against the backdrop of current and future economic developments. Over the last decade, there has been a rapid increase in the use of large econometric models capable of representing the basic relationships among sectors of a complex economy. Resources probably are more wisely spent in developing and analyzing sensible fiscal policy simulations on large econometric models than in attempting to reduce the multi-dimensional problem of assessing fiscal policy to a single statistic, such as the HES.

Appendix 1 Calculating the High-Employment Budget—Old and New Methods

Both the "traditional" and the new methods of calculating the high-employment budget rely on the Council of Economic Advisers' estimate of potential GNP. Under the traditional method, potential GNP was multiplied by the actual GNP deflator to arrive at a nominal value. Next, to arrive at full-employment receipts, potential GNP had to be allocated among the various income-earning sectors of the economy, since each can be taxed at a different rate. Consequently, income shares at full employment for the various national income components (e.g., corporate profits or wages and salaries) were assumed to equal observed values in past years of full employment. Multiplying current-dollar potential GNP by the income shares yielded the corresponding full-employment tax bases. Average full-employment tax rates next were calculated for the appropriate income categories, and the corresponding full-employment receipts equaled the tax rates times the bases. Total full-employment receipts equaled the sum of the components. Under the traditional methodology, all spending categories were treated as discretionary expenditures, except unemployment compensation, which was adjusted to eliminate changes in benefit payments associated with cyclical variations in the unemployment rate. The HES equaled high-employment receipts minus high-employment expenditures.

The new high-employment-budget calculations depart from the traditional approach in three basic ways.[1] In one major change, a "grossing-up" procedure is used to calculate full-employment income shares, tax bases, tax receipts, and expenditures. Grossing-up ensures that the estimated full-employment values of variables equal their observed actual values at full employment. The traditional approach cannot guarantee this result. In a second major departure from the traditional approach, the new method increases the number of expenditure categories that are adjusted for their sensitivity to the business cycle. In addition, more sophisticated statistical methods are used under the new procedure.

To understand the new high-employment budget estimation technique, consider the following process for isolating the business-cycle influences on a variable. One might hypothesize that

$$(1) \quad X = \alpha_0 + \beta_1 T + \beta_2 G + \epsilon \ ,$$

where X = the variable to be explained, such as income shares or federal expenditures,
α_0 = a constant term,
T = a time trend,
G = a variable measuring the business cycle, such as the GNP gap or the unemployment-rate gap,[2]
β_1, β_2 = hypothesized (unknown) measures of the effect of a change in T or G, respectively, on X,
ϵ = the error term.

1. The following is a summary of the methodology discussed in de Leeuw et al. (1980).

2. The potential GNP gap equals potential GNP less actual GNP; the unemployment-rate gap equals the full-employment unemployment rate less the actual unemployment rate.

This equation can be estimated to obtain statistical approximations of α_0, β_1, β_2, and ϵ, defined as $\hat{\alpha}_0$, $\hat{\beta}_1$, $\hat{\beta}_2$, and $\hat{\epsilon}$, respectively. The statistically estimated equation 1 provides two values for the variable X. First, it offers an estimate of actual X defined as

$$(2) \quad \hat{X} = \hat{\alpha}_0 + \hat{\beta}_1 T + \hat{\beta}_2 G \ .$$

Second, by setting G equal to zero, equation 2 provides an estimate of full-employment X, defined as

$$(3) \quad \hat{XF} = \hat{\alpha}_0 + \hat{\beta}_1 T \ .$$

This is the traditional approach to estimating $\hat{XF}$. Notice that $\hat{XF}$ need not equal actual X when the economy is at potential output. From equations 2 and 3 we obtain

$$(4) \quad \hat{XF} = \hat{X} - \hat{\beta}_2 G \ .$$

At full employment $\hat{XF} = \hat{X}$, but from the estimated equations 1 and 2

$$(5) \quad \hat{X} = X - \hat{\epsilon} \ ,$$

so that

$$(6) \quad \hat{XF} = X - \hat{\epsilon} \ .$$

There is no guarantee that at full employment the estimated value $\hat{XF}$ will equal the observed value X because of the residual term $\hat{\epsilon}$.

Under the new method of calculating HES, an additional step (grossing-up) is introduced. *Grossing-up* simply refers to adding the difference between an estimated preliminary full-employment value ($\hat{XF}$) and the estimated actual value ($\hat{X}$) to an *observed* actual value (X) to obtain the final full-employment estimate of X. Therefore, define this final full-employment value of X as

$$(7) \quad XF = (\hat{XF} - \hat{X}) + X \ .$$

At full employment, $G = 0$ in equation 2, and thus $\hat{XF} = \hat{X}$ and $XF = X$. Grossing-up ensures that the observed actual values of X equal the final full-employment estimates when the economy is at full employment. Since equation 7 can be written as

$$(8) \quad XF = \hat{XF} + \hat{\epsilon} \ ,$$

it follows that grossing-up is important if the residual term ($\hat{\epsilon}$) equals a non-zero value for extended periods of time. If $\hat{\epsilon}$ usually equals zero, grossing-up is not necessary.

The statistical approach summarized by equation 1, along with the grossing-up procedure indicated by equation 7, is the general form used to calculate full-employment income shares for the components of national income. The components are wages and salaries, other labor income plus employer contributions for social insurance, corporate profits, proprietor's income, interest and rental income, and a residual component equal to GNP less national income.

The estimated income shares are used to generate corresponding full-employment tax bases. First, the full-employment income shares (analogous to XF in equation 7) are multiplied by current-dollar potential GNP to provide preliminary estimates of the respective tax bases ($\hat{TBF}$). Next, the *estimated* actual income shares (analogous to $\hat{X}$) are multiplied by actual nominal GNP to yield *estimated* actual tax bases ($\hat{TB}$). As will be shown below, the resulting difference between the estimated full-employment tax base and the estimated actual tax base ($\hat{TBF} - \hat{TB}$) is used to generate tax-revenue gross-ups for the respective income categories.[3]

First, however, tax elasticities for the respective tax categories are calculated. All elasticities are specified as the percent changes in tax receipts resulting from a 1 percent change in the respective tax base. Because the base elasticity of any tax depends on the source of the change in the tax base, the elasticities used in the HES calculations often are complex-weighted averages of many effects.[4]

The various tax elasticities can be multiplied by the percentage change in the appropriate tax base to generate a change in the respective tax receipts. That is,

3. The calculations are supplemented with separate estimates for dividends, personal income less net interest, and corporate capital consumption adjustment.

4. For example, the elasticity of personal tax receipts with respect to changes in the base (personal income) caused by more workers is 1; it is greater than 1 when the base change reflects additional income per worker.

(9) $\ln \widehat{RF}_i - \ln \widehat{R}_i = \eta_i (\ln \widehat{TBF}_i - \ln \widehat{TB}_i)$,

where $\ln \widehat{RF}_i - \ln \widehat{R}_i$ approximates the percentage difference between full employment and actual taxes for the income category i; η_i is the respective tax elasticity equal to $\frac{\Delta \ln R_i}{\Delta \ln TB_i}$; $\ln \widehat{TBF}_i - \ln \widehat{TB}_i$ approximates the percentage deviation between the actual and full-employment tax base.[5]

The estimated changes in tax receipts for the various income categories are used to gross up actual tax revenues to the full-employment level. Total high-employment receipts equal the sum of the components.

The new technique for estimating HES also adjusts a broader range of expenditure categories for business-cycle fluctuations than the traditional method. Now the cyclical components are removed from a wide range of benefit payments—unemployment compensation, old age and survivors' insurance, disability, food stamps, aid to families with dependent children, medicaid, and veterans' education. In most cases, the cyclical adjustments rely on previously completed studies done by various government agencies, and usually they rely on the gap between the observed unemployment rate and a full-employment unemployment rate (5.1 percent in 1980) to make the business-cycle adjustments. The grossing-up procedure described above is applied to expenditures; full-employment expenditures equal actual observed expenditures plus the difference between the preliminary estimate of full-employment expenditures and estimated actual expenditures (see equation 7). The HES equals total high-employment receipts less total high-employment expenditures.

5. Changes in the natural logarithm can be used to approximate small percentage changes.

References

1. Clark, Peter K. "Potential GNP in the United States, 1948-80," *U.S. Productive Capacity: Estimating the Utilization Gap.* St. Louis: Center for the Study of American Business, Washington University, December 1977, pp. 21-67.

2. de Leeuw, Frank, et al. "The High-Employment Budget: New Estimates, 1955-80," *Survey of Current Business,* vol. 60, no. 11 (November 1980), pp. 13-43.

3. Kopcke, Richard W. "Potential Growth, Productivity, and Capital Accumulation," *New England Economic Review,* Federal Reserve Bank of Boston, May/June 1980, pp. 22-41.

4. ———. "Is the Federal Budget Out of Control?" *New England Economic Review,* Federal Reserve Bank of Boston, forthcoming.

5. Penson, John B., Jr., and Kerry Webb. "Gross National Product at Full Employment," *Economic Review,* Federal Reserve Bank of Kansas City, vol. 66, no. 6 (June 1981), pp. 3-15.

6. Rasche, Robert H., and John A. Tatom. "Energy Resources and Potential GNP," *Review,* Federal Reserve Bank of St. Louis, vol. 59, no. 6 (June 1977), pp. 10-24.

7. Throop, Adrian W. "Gauging Fiscal Policy: I," *Weekly Letter,* Federal Reserve Bank of San Francisco, January 9, 1981.

8. ———. "Gauging Fiscal Policy: II," *Weekly Letter,* Federal Reserve Bank of San Francisco, January 16, 1981.

Working Paper Review

Mark S. Sniderman, **"The Welfare Implications of Alternative Unemployment Insurance Plans,"** Working Paper 8101, April 1981, 20 pp. Bibliography.

Following is an abstract of a working paper recently released by the Federal Reserve Bank of Cleveland.

A penumbral issue in the unemployment insurance financing literature is the relationship between experience rating, public and private unemployment insurance (UI) systems, and individual welfare. A public insurance system can never be perfectly experience-rated if the government desires people with different layoff probabilities to hold identical insurance policies. A corollary proposition is that a private insurance system, if information is perfect, would always feature fully rated plans, but the characteristics of these plans may frustrate other public policy goals (e.g., income transfer or maintenance).

Though virtually all previous research points out the moral hazard aspects of the UI system, little attention has been paid to the efficiency-equity trade-off introduced by government control of the insurance contract. This paper introduces this issue explicitly. Full experience rating for each firm is tantamount to complete exposure for the firm to the vagaries of the business cycle. Firms may be willing to bear this exposure when UI is part of an implicit labor contract with its employees, and employees likewise may be willing to pay for the risk shifting through wage adjustments. For some firms, however, the degree of exposure necessary to insure all workers legally may contribute to insolvency. Incomplete experience rating is one method of achieving risk pooling among firms and limits the exposure of high-turnover firms. Incomplete experience rating is a form of market intervention by government for the benefit of high-risk firms and employees. Incomplete experience rating is controversial where UI is concerned, in part because of the adverse incentives it provides firms and employees. A great deal more is known about the distribution of the turnover risk *ex ante* than is the case in many other insurance markets.

A proper concern of state governments is the solvency of UI plans operating within state jurisdictions. Perfectly experience-rated private UI plans are likely to structure premiums and indemnities differently than public UI plans, partly because public plans are less concerned about solvency. Public plans in principle can be perfectly experience-rated, but such plans would entail different costs per dollar of insurance for high- and low-risk individuals. Though economically justifiable, these differences may be difficult to defend politically. Yet, once governments attempt to provide "adequate" benefits, or "proportional" benefits, perfect experience rating must be replaced by some pooled-equilibria-contracting pattern. A monopoly UI system based on pooling (imperfect experience rating) forces some people to purchase less than optimal insurance coverage, while others may purchase more than is optimal.

Copies of the paper are available on request to the Federal Reserve Bank of Cleveland, Research Department, P.O. Box 6387, Cleveland, OH 44101.

Federal Reserve Bank of Cleveland
Research Department
P.O. Box 6387
Cleveland, OH 44101

Address correction requested

ADDRESS CHANGE

☐ Correct as shown

☐ Remove from mailing list

Please send mailing label to the Federal Reserve Bank of Cleveland, Research Department, P.O. Box 6387, Cleveland, OH 44101.