

STATISTICS FOR PUBLIC FINANCIAL POLICY

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ARTHUR BURNS,¹ Chairman of the Federal Reserve Board, sat back in his paneled office on Constitution Avenue, puffed his pipe pensively, and reflected on the forthcoming meeting of the Fed's Open Market Committee. What should they decide about purchase or sale of government securities in the open market, and about the many other instruments of policy available to the Committee?

Whatever the decisions might be, their consequences would affect wages paid to the steel worker in Gary, Ind., and the movie extra in Los Angeles; they would also affect the profits and the expansion plans of the largest steel company and the smallest corner grocer; and they would affect the prices paid for apples, automobiles, and xylophones by everyone.

¹ The names, for concreteness, are those of February 1971, when this was written. They may change, but the issues will continue.

At about the same time, Paul McCracken, Chairman of the Council of Economic Advisors, sat back in his office in the Executive Office Building, a less elegant, but more historic (and hard by the White House) office than that at the Federal Reserve. What should the Council recommend to the President about Federal spending and other fiscal actions? The Council cannot, of course, move in the independent and decisive ways open to the Federal Reserve, but its recommendations and arguments can be highly influential upon the views of the President, the Congress, and all Federal agencies dealing with economic matters.

Whatever the Council's recommendations might be, their implementation too would have effects on wages, profits, prices, and other economic quantities. My pocketbook and yours are linked inextricably to such decisions at the levels of great power and great wealth.¹

The links, however, are complicated, they change over time, they have many interconnections, and some of their effects are very difficult to measure accurately and quickly. Economics is the science that tries to understand these complex matters.

FISCAL AND MONETARY ACTIONS

To discuss governmental economic policy at all, we must have some idea of goals and some idea of possible actions to try to achieve those goals. Three sorts of goals are widely accepted for the national economy:

- (1) High employment
- (2) Relatively stable prices
- (3) Rising output of goods and services

It might be objected that these three goals contain mutually contradictory elements, and there have long been doubts (sharply increased recently) about working toward a rising output of goods and services, especially as it is usually measured by the Gross National Product (GNP).

Now what about actions? In this essay we shall consider two kinds of actions:

- (1) *Monetary actions.* These are actions that change the amount of money and credit available to the economy. For example, a purchase of securities in the nation's money market (Wall Street) by the Federal Reserve will tend to increase the total available money and credit. (You should keep in mind that money includes the total of all checking accounts in banks.) Monetary actions are primarily under the control of the Federal Reserve System, and of the Treasury.

¹ A high official of the Office of Management and Budget recently quipped that his office is the only one in existence where 0.1 means one hundred million dollars.

- (2) *Fiscal actions.* These are broad-scale acts of Government spending and taxation. They relate to the much-argued issue of government deficit financing.

In recent years a debate has been hotly raging over monetary versus fiscal actions as the more effective means of achieving important economic goals. The fundamental Keynesian viewpoint that has now become part of the mainstream (President Nixon has been quoted as saying "I am a Keynesian") concentrates almost exclusively on the direct influence of fiscal actions, primarily of government spending. Some economists, of whom Milton Friedman of the University of Chicago is perhaps the best known, argue for monetary actions as more effective and more predictable.

We shall here completely omit some aspects of this debate, in particular the difficult underlying economic theory and such institutional arguments as the ease of taking monetary actions relative to fiscal—the former can be effected by a single agency, while the latter require the whole political process of interaction between the Executive and Legislative segments of the government. (Fiscal proponents might rebut by emphasizing the democratic desirability of having major decisions go through the political process, even at the inherent cost of clumsiness and time lost.) Rather, we shall indicate how statistical methods have permitted insight into a direct empirical comparison of the two kinds of government action.

MEASUREMENTS AND PROCEDURE

An essay of this character, brief and for a wide audience, can hardly hope to provide more than a surface glimpse of a highly technical topic. Yet it is important, I feel, that such glimpses be given frequently and in many ways. Economics, like war, is too important to be left entirely to the specialists.

What we shall describe is a small part of a correlation study. (See the essay by Whitney for a description of the correlation notion.)

As an indicator of economic well-being we shall use the Gross National Product. The GNP shows, in a word, the total goods and services sold in the market place during some specified period.

As a measure of monetary actions, we shall use the money stock, defined as currency and demand bank deposits held by nonbank individuals and firms.

As a measure of fiscal actions, we shall use government spending.

These three quantities are known each quarter, and the analysis is based, in fact, on quarter-to-quarter *differences*. Thus, suppose that in a certain quarter

- (1) GNP increases by \$400 million
- (2) Money stock increases by \$800 million
- (3) Government spending decreases by \$50 million.

Then in correlating the money stock and GNP, we would use the pair of numbers (800, 400) for that particular quarter-to-quarter change; in correlating spending and GNP, we would use the pair (-50, 400).

RESULTS

Scatter diagrams showing such relationships for the 68 quarters from 1953 to 1969 are shown in Figure 1. The major point to notice is that changes in GNP and those in the money stock are more closely related than changes in GNP and those in spending.

In fact the computed correlation coefficients are:

Between GNP and the money stock: 0.66

Between GNP and spending: 0.44.

The first of these is clearly larger than the second; this says that we can predict changes in GNP (by straight-line prediction) much better by using changes in the money stock than by using changes in government spending.

Another way of looking at this is in terms of the "scatter" or variability of GNP changes around the straight line that best fits the cluster of data in the left hand graph of Figure 1, as against the corresponding variability in the right-hand graph. The relevant quantities here are the squares of the correlation coefficients, 0.44 for changes in GNP and the money stock, and 0.19 for changes in GNP and government expenditures. If we measure

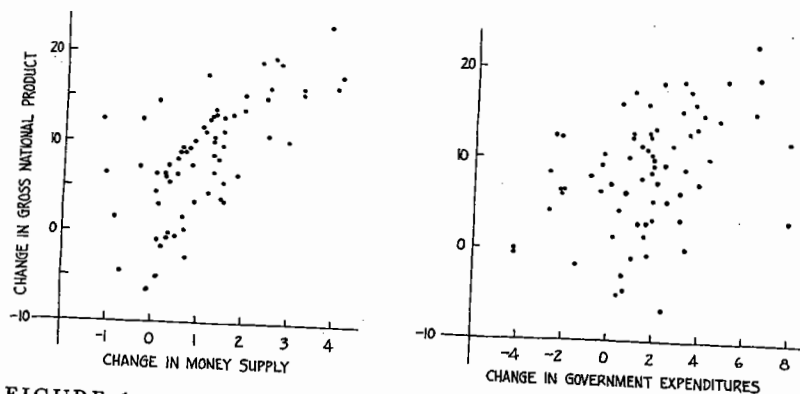


FIGURE 1

Comparison of correlation between changes in gross national product and those in money supply with correlation between changes in GNP and those in government expenditures (figures are in billions of dollars)

variability in terms of proportional decrease in a technical quantity called "variance," then changes in the money stock permit a 44% decrease in variability of changes in GNP, while changes in spending permit only a 19% decrease in that variability.

The full technical analysis was much more detailed and complex than that described above. For example, the full analysis carefully considered time lags: a change in spending now might not affect GNP for two quarters, or the effect of changes in money stock may require four quarters. The refinements, however, did not change the general result: *change in GNP is much more accurately predictable from change in the money stock than from change in spending.*

QUALIFICATIONS

For economic studies, unlike studies in most of the natural sciences, true experiments are generally impossible. We cannot play God, manipulating economic variables this way and that just to see how the economy responds. Economists are as a rule forced to do the best they can with data of the kind discussed earlier—data that arise in the natural course of our changing world.

Under these circumstances it is difficult to establish causation. To say that two quantities are positively correlated is not to say that artificially increasing one would increase the other. For example, imports of gold and the annual number of marriages are positively correlated over years (because both reflect economic health), but suddenly increasing gold imports by government action would scarcely be expected to change the number of marriages.

On the other hand, even when evidence is primarily correlational, people frequently do come to conclusions of causation. A current example is the relationship between smoking and health (see the essay by Brown). When people ascribe causation based on a correlational study there is additional information—usually a reasonable theory of the mechanism behind the effect, an unusually high, consistent, and specific correlation, or some other piece of connective evidence.

A significant part of the debate between those favoring monetary actions and those favoring fiscal ones stems from the causation problem. Other aspects of the debate turn on the accuracy of the data and on possible artifacts of the data.

This debate, and similar ones, are bound to continue. One prediction can safely be made, however: the continuing debate will use statistical tools such as correlation coefficients. There is no choice in empirical quantitative argument. Statistical methods are essential, whether or not they are explicitly described.