The NBER Digest
NATIONAL BUREAU OF ECONOMIC RESEARCH, INC.
September/October 1980

A Near-Century of Price Behavior

NBER Research Associate **Robert J. Gordon** of Northwestern University has developed a single econometric equation that explains most of the annual variation in the rate of inflation for the eighty-nine years from 1890 through 1978. It also explains price behavior during the years from 1929 through 1945, a period that has commonly been omitted from previous studies because of the distortions caused by the Depression and World War II. Gordon's research is described in **A Consistent Characterization of a Near-Century of Price Behavior,** *Working Paper No. 455.*

The inflation equation is derived from a simple aggregate supply equation that makes the rate of price change depend on the rate of change of nominal GNP, on the level of detrended real GNP, and on expected price changes. Gordon's test of the equation shows that four other factors had effects on inflation over the eighty-nine-year period—the National Recovery Act during the Great Depression, the World War II price controls, the Nixon controls, and the relative prices of food and energy.

A major finding in Gordon's research is that the most commonly used explanation of price change, known as the Expectational Phillips Curve, or EPC, is inadequate. In the EPC framework, price changes are related to expected inflation and the *level* of real GNP or unemployment. Gordon found that price changes are much more closely related to the *rate of change* in nominal GNP. Throughout the period, there has been a remarkably consistent relationship between changes in nominal GNP and changes in prices, with two thirds of a change in nominal GNP taking the form of a change in real output, and one third showing up in prices. The greater importance of the rate of change in output, as opposed to the level of output, supports earlier findings by Gordon and several other economists.

Gordon's study also shows that a marked shift occurred around the time of the Korean War in the way people form expectations about future inflation. Prior to that time, expectations followed a regressive pattern that is consistent with a gold standard. That is, if prices rose 8 percent in one year, it would be reasonable to expect them to reverse and fall 8 percent a short time later. Since the early fifties, expectations have been of the extrapolative variety appropriate to the postwar fiat money standard. In that environment, it is rational to base expectations about future inflation on the current level of inflation and the recent trend.

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In developing the equation relating inflation to nominal GNP growth, real output, and expected inflation, Gordon made adjustments for four special problems. One was the choice of a proxy for the expected inflation rate. Because of the shift in monetary standards, it was important to allow for changes in the variables affecting expectations and in the relative weights of these variables. The second problem was what to do about the periods when the government interfered with the price setting process. Gordon dealt with the NRA and the World War II and Nixon controls by including separate dummy variables for the three episodes, allowing each to have a temporary effect but forcing their long-run effect to be zero. He also included variables for the relative prices of food and energy, the main external shocks that affected real output and inflation.

World War I presented a different type of problem. While there were no price controls, Britain left the gold

standard in 1914, a move that affected the price setting structure in the United States. Gordon tested the significance of the change by allowing the coefficients of the structural variables to shift during the war years. Finally, Gordon had to contend with the fact that people are smart enough to know that special factors sometimes influence inflation. For instance, the end of wars in 1918 and 1945 obviously made past prices poor predictors of future ones, and people undoubtedly adjusted their expectations accordingly. To reflect the assumption that people form expectations intelligently, Gordon constructed the lagged price-change term used as one of the expectations proxies so that it was "net" of the contributions of wartime excess demand as well as the dummy variables for the NRA, the controls periods, and food and energy prices.

The application of Gordon's equation to the data from 1890 through 1978 establishes that about one third of a change in the nominal GNP growth rate flows through to the inflation rate. The finding suggests that the payoff from restrictive demand policy may be much greater than most people have recently believed. For example, an artificial experiment that reduces nominal GNP growth from 6 percent to zero causes the inflation rate to drop by 1.8 percentage points the first year, 1.8 points the second year, and 1.7 points the third year, for a cumulative reduction of 5.3 percentage points after just three years. AE

Consumption and Transitory Income

Would an income tax cut provide a strong stimulus to consumption of food and other nondurables? Yes, according to one view, tax cuts stimulate consumption and are a major tool of countercyclical stabilization policy. Another view, however, holds that consumers do not respond automatically to every change in their aftertax income. Rather, their response depends on whether the change in income is seen as permanent or temporary.

Based on an analysis of two thousand households surveyed by the University of Michigan's Panel Study of Income Dynamics, NBER Research Associate **Robert E. Hall,** Stanford University, and NBER Research Fellow **Frederic Mishkin,** University of Chicago, find that the impact of a tax cut would be unambiguous for only 20 percent of households (*Working Paper No. 505,* **The Sensitivity of Consumption to Transitory Income: Estimates from Panel Data on Households**). These households are viewed as being liquidity constrained; their circumstances are such that every dollar of additional income would be consumed. The remaining 80 percent of families do not adjust consumption on a one-for-one basis to changes in income. Rather, they consider the sources of change in their income and react vigorously only to those changes they believe signal permanent alterations in their economic well-being.

The Hall-Mishkin finding confirms a variant of the lifecycle-permanent income theory of consumption. According to that theory, consumers form estimates of lifetime resources and then adopt plans for spreading those resources over the remaining years of their lives. In estimating the probable distribution of future resources, consumers are assumed to make use of all available information—that is, they operate on "rational expectations."

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Hall and Mishkin view household income as having two components—a lifetime one that fluctuates with changing earning prospects and a transitory one that includes any special temporary windfalls or interruptions in income. In the Hall-Mishkin model, permanent income is something the household infers from what it knows about the lifetime and transitory components. This distinction between lifetime and permanent income is not always seen in the literature.

Hall and Mishkin argue that a temporary increase in income does influence consumption. Transitory increases in income augment wealth to some degree, so permanent income rises by the capitalized value of the change in wealth. Put somewhat differently, current consumption depends upon the annuity value of the stream of future income predicted on the basis of the current value of transitory income as well as on lifetime income.

If a tax cut is viewed as lasting, consumption of food and nondurables would unquestionably rise. Consumption would also go up if the cut is regarded as temporary, but the rise in expenditures would not be especially large. Hall and Mishkin calculate that every additional dollar of aftertax lifetime income would raise spending for food by ten cents. An additional dollar of aftertax transitory income, however, is estimated to raise food expenditures by only about four cents. Hence, if the public viewed a tax cut as an enduring change in the country's tax structure, expenditures for food and other nondurables might rise by nearly four times as much as they would if the public saw the reduction merely as an antirecession device. SR

Interrupted Work Careers

Married women who interrupt their careers for a time return to work at a lower real wage than their wage when they left, according to NBER Research Associate **Jacob Mincer** of Columbia University and **Haim Ofek** of Old Dominion University. In *Working Paper No. 479,* **Interrupted Work Careers,** Mincer and Ofek find this result among a group of married women aged 30–44 in 1967 who were surveyed over a period of eight years, and whose prior work histories, including wages, were recorded. The authors find that the length of the interruption determines the extent of decline in real wages. For example, average real wages drop from $1.92 per hour to $1.75 per hour for women out of the work force for a year or two, but from $1.73 per hour to $1.27 per hour for women away from work for five to six years. Wages do rebound fairly quickly when the woman returns to work, though, especially in the first five years back. In the group of women under study, real wages one year after an interruption averaged $2.61 per hour; five years after an interruption, the average real wage was $3.10 per hour.

More generally, Mincer and Ofek find that wages after an interruption grow at roughly 2.5 percent per year of total work experience. Less than half of this wage growth can be explained by tenure on the present job; the balance is due to previous experience and training. Economists generally refer to an individual's education, training, and experience as investments in human capital. Within that framework, Mincer and Ofek describe the observed decline and rebound of wages as a depreciation and restoration of human capital. This restoration of human capital is only efficient, of course, if reconstructing occupational skills is less costly (to workers and employers) than constructing them anew.

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Mincer and Ofek take the experience of immigrants to the United States as further evidence of the phenomenon of depreciation and restoration of human capital. "Recent studies of wages of immigrants to the United States reveal comparable patterns of decline and increase in occupational status before and after their arrival..." the authors note. "According to 1970 census data, 22.6 percent of the men arriving in the United States between 1965 and 1970 (and in the labor force in 1970) experienced an initial occupational decline..." Among the English-speaking immigrants, 11 percent experienced this downward mobility; of those from less developed countries, over 25 percent experienced it.

Of course, the women sampled interrupted their careers for different reasons than the immigrants, and those reasons are significant. For example, within an eight-year panel period, an average interruption is found to last for 2.7 years, roughly the length of time associated with migration (within the United States) and ill health. Layoffs, on the other hand, lead to shorter than average interruptions; childbearing leads to longer interruptions. Using wages as the indicator, the authors find that interruptions associated with layoffs, ill health, and migration result in a greater than average depreciation of human capital.

They find, further, that the length of absence from the work force relates inversely to one's level of education and positively to one's preinterruption wage. Mincer and Ofek feel that the evidence indicates that "lower wages earned by intermittent workers are not only a result of lost experience during the interruption and less investment (in human capital) during the preinterruption periods, but also a result of deterioration of earning power due to nonuse." The authors observe another interesting fact: while immigrants' wages eventually equal, and often surpass, those of natives, the women who interrupt their careers never fully restore their earning potential.

Family Hospital and Physician Expenses

According to a recent NBER study by **Bernard Friedman** of Northwestern University, the average family has relatively low annual medical expenses, while a small proportion of families incur extremely high annual costs. In *Working Paper No. 510,* **Distributions of Family Hospital and Physician Expenses,** Friedman analyzes data provided by Aetna Life and Casualty on families of federal employees who filed health insurance claims in 1977. (Households headed by individuals over age 65 are excluded from the sample.)

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He finds that the average total expense per year for

an insured adult is $490. However, nearly 60 percent of the adults had expenses of $50 or less, and less than 2 percent had expenses of $5,000 or more. Although the Aetna data do not identify the claims filed according to family size, Friedman estimates family expenses using data on individuals. Friedman estimates that a two-adult, two-child family has average annual medical expenses of $1,328. More than half of such families, however, have expenses of $500 or less. On the other hand, about 5 percent of these average-size families account for approximately 30 percent of the total amount of expenses covered by the insurance, spending $5,000 or more per year on medical expenses.

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