

Editors' Summary

THE BROOKINGS PANEL on Economic Activity held its sixty-third conference in Washington, D.C., on March 27 and 28, 1997. This issue of *Brookings Papers on Economic Activity* includes the papers and discussions presented at that conference. In light of the great increase in U.S. immigration and trade since the 1960, the first paper estimates the impacts of these two factors on the labor market outcomes of U.S. natives. The second paper examines the effects of systematic monetary policy on the economy, disentangling these effects from the effects of other shocks, such as OPEC oil price increases. The third considers public resistance to the indexation of long-term contracts, using survey data from the United States and from Turkey—a country with high and variable inflation. The fourth examines to what extent and by what means families are able to smooth year-to-year variation in the earnings of the household head. The fifth paper addresses recent criticisms of the procedures used by the Bureau of Labor Statistics in accounting for quality change in the Consumer Price Index. And the sixth assesses the performance and prospects of Brazil's stabilization and economic reform under the Real Plan.

OVER THE PAST two decades, the United States has experienced high rates of immigration and a rapid growth of imports from less developed countries (LDCs). Over this same period, the earnings of less skilled U.S. workers have declined markedly relative to the earnings of other U.S. workers. In the first paper of this volume, George Borjas, Richard Freeman, and Lawrence Katz analyze how these trends in immigration and trade have affected relative wages in the United States and, in particular, the extent to which they have contributed to the large decline in the relative wages of less skilled, low-paid U.S. workers. Such

questions underlie ongoing policy debates in this country and have been the subject of considerable economic research in recent years. The authors summarize the main facts on trade, immigration and relative wages, evaluate recent research in this area, and present their own model quantifying how immigration and trade impact the U.S. economy.

The authors first analyze immigration, which began to surge soon after 1965 amendments to the immigration laws, reversing a long downward trend in the proportion of the population that is foreign-born. The authors calculate that between 1970 and 1996, the foreign-born share of the population nearly doubled from a low of 4.8 percent to 9.3 percent. Its composition changed sharply too. Whereas in 1970, 68 percent of the foreign-born had come from Canada and Europe (down from 84 percent in 1960), by 1990 only 26 percent had come from these regions. The destination of immigrants was concentrated. In 1990, 75 percent of them lived in the six main immigrant-receiving states: California, New York, Texas, Florida, New Jersey, and Illinois. Over 33 percent lived in California alone. This wave of immigration represented a sizable shock to the labor supply in these regions.

The authors, along with most others who have studied relative wages, mainly use educational attainment as a proxy for skills, and also provide results using place in the income distribution as a skill proxy. Although not all immigrants are poorly educated, the authors show that they have been increasingly concentrated in the lower educational categories. By 1995 in California, with its large immigrant population, 90 percent of workers with fewer than nine years of schooling and 68 percent of workers with fewer than twelve years of schooling were immigrants. The authors also document that immigrants are widely employed in services and trade, as well as in manufacturing and agriculture; native workers in most sectors have faced competition from immigrants.

Borjas, Freeman, and Katz demonstrate why it is difficult to determine the effects of immigration on relative wages, reviewing several earlier studies along the way. They first point out the pitfalls of simply looking at the relative performance of high-immigration states like California. Doing so would be valid only if, across areas, immigrant flows were uncorrelated with economic conditions, and natives did not themselves migrate in response to immigration to an area. However, neither condition is met. To deal with this, the authors first turn to regressions that control

for forces that could be expected to change regional wage structures over time. But even with regressions that use education-specific supply shocks as the measure of immigrant penetration, and that net out relative wage changes that occur at the national level, as well as the impact of state economic activity on all natives residing in a state, they still cannot identify consistent effects of immigration on relative wages. They infer that immigration is not a major determinant of the regional structure of wages for natives.

In light of this negative finding, the authors consider whether native internal migration diffuses the effects of immigration from particular regions to the country as a whole. The experience of California, the major immigrant-receiving state, provides a clue that this mechanism may be important. From 1950 to 1970, before the surge of immigration, the fraction of U.S. natives who live in California rose rapidly. The fraction barely changed from 1970 to 1990, even though California's share of the total population kept growing. Over this period, its growth shifted from in-migration of natives to immigration. The authors suggest the flow of immigrants to California displaced the native net migration that would have otherwise occurred and thus diffused the economic effects of immigration from California to the rest of the country.

The authors support this suggestion with a cross-state regression that explains the change in a state's native population growth by the change in the state's immigration growth. This regression gives a substantial negative coefficient on the change in immigration growth. The authors go on to examine the response of native flows by particular skill groups, allowing for both the initial skill distribution of each state's work force and the rate at which this distribution was changing before 1970. Their results indicate that immigration does not alter the distribution of skill groups within a state. The response of native migration roughly counterbalances the immigrant shock by skill groups.

Having established that the effects of immigration on relative wages must be examined for the economy as a whole, rather than across regions, Borjas, Freeman, and Katz turn to an analysis of aggregate factor proportions in which they estimate the effects of trade and immigration simultaneously, recognizing that both can be analyzed as competing with native factors of production. They postulate a general constant elasticity of substitution aggregate production function, using skilled and unskilled labor as inputs. With this production technology, the relative wages of the two

types of labor depend on the relative supplies of each, and the size of the effect depends on the elasticity of substitution. Immigration and the labor embodied in trade thus affect relative wages by affecting the relative supply of each type of labor. To keep their analysis tractable, the authors use broad skill groupings of workers—such as high school dropouts versus others, or workers above versus workers below the twentieth percentile in the income distribution. They apply wage elasticities based on previous studies to the labor supply changes coming from immigration and trade to calculate the effects of these changes on relative wages for these skill groups.

The authors discuss some potential criticisms of this general model. The model assumes that the global economy is not so integrated that only world, rather than national, demand and supply conditions affect relative wages by skill class; they cite numerous studies supporting this assumption. To deal with ambiguities in assigning natives, immigrants, and foreign workers who produce U.S. imports to comparable skill groups, they use alternative educational categories and define skill categories by position in the native earnings distribution, as well as by education. They also discuss circumstances under which the full effect of trade on wages may not be captured by the labor content in the flow of traded goods, but argue that their estimates are unlikely to greatly understate trade effects by ignoring them.

The authors provide a range of results arising from the many alternatives they consider. For the effects of immigration, their main findings are robust across these alternatives. The important effects are concentrated on high school dropouts, the least skilled group in the native population. With their preferred relative wage elasticity of -0.322 , the inflow of immigrants since 1979 accounts for 44 percent of the decline in the relative earnings of native dropouts from 1980 to 1995. Using the place of workers in the earnings distribution rather than educational attainment to define skill groups provides somewhat lower, though still pronounced, estimates of the effects of immigration on low-wage workers. This difference arises mainly because with the earnings-based classification, the proportion of natives who are in the group remains unchanged, whereas with the educational classification, the share of natives who are dropouts declines over the same interval. Comparing higher skill groups, such as high school and college graduates, the effect of immigration on relative labor supplies is

too small to have an important effect on relative wages under any of the alternative estimates.

Turning to trade, the authors show that, under plausible assumptions about production technologies, trade with developed nations has had little effect on the skill distribution of labor supplies. They therefore concentrate on the effects of trade with less developed countries, which may have had substantial effects on the relative supplies of low-skill workers. In this analysis, they acknowledge the difficulty of measuring the relative labor content of goods involved in LDC trade: they can infer the output affected by trade at the level of three-digit industries; but within each industry, trade may supplant not the average firm, but relatively less efficient firms that use relatively less skilled workers. To deal with this possibility, they provide estimates using three alternative assumptions. In the low impact assumption, LDC imports displace production from firms that use the contemporary average skills and productivity of their industry. In the middle assumption, which the authors prefer, the imports displace production from firms that use the skills and productivity of the average firm in their industry as of ten or fifteen years ago. In the high assumption, LDC imports displace production that uses the skills and productivity of the industry's average firm in 1970. In all cases, exports are assumed to expand production using average current skills and productivity for the industry.

To evaluate trade effects, the authors first calculate the labor embodied in LDC imports and exports, disaggregating by industry and by country of origin or receipt and using the three alternative estimates of labor input by industry described above. The estimates are substantially affected by the alternative used. Using the high alternative—assumptions that the authors regard as extreme—growth in LDC trade accounts for 27 percent of the decline in the relative wages of high school dropouts. Under their preferred middle alternative, the growth in trade with LDCs since 1979 accounts for only 8 percent of the decline in relative wages of dropouts. The effect of trade on wages is a little more than half this large under the low alternative.

The authors draw several broad conclusions from this study. Considering the entire U.S. work force, the effects of immigration and trade flows on relative skill supplies have not been substantial enough to account for more than a small part of the overall widening of the wage distribution,

nor more than a modest part of the growing college-high school wage differential. They have been more important in contributing to the relative wage decline of high school dropouts since 1980. For this group, using the authors' preferred alternative for measuring trade impacts, immigration and trade together account for roughly half of the decline, with immigration by far the more important of the two.

MANY OBSERVERS have come to believe that monetary policy is the major, if not the dominant, source of economic fluctuations. Each of the four major recessions since 1965 has been associated with a monetary tightening. Yet a considerable body of recent research attributes relatively little of the overall variation in output to monetary shocks. This research, based on vector autoregressions (VARs), makes a sharp distinction between monetary policy innovations and the endogenous response of policy. In a typical specification, for example, policy is credited only with the economy's response to innovations—movements in the federal funds rate that cannot be forecast by other economic variables included in the system. Using this VAR methodology minimizes the chance that policy will be credited with causing movements in output when, in fact, policy is responding to output or to other variables that are causing the output fluctuations. However, it also does not credit policy with economic responses flowing from normal policy reactions to events. The standard VAR models are silent on the importance of endogenous responses of policy to the economy's behavior. Nor do they provide a basis for predicting the consequence of changing the policy rules governing monetary behavior. In the second paper of this issue, Ben Bernanke, Mark Gertler, and Mark Watson attempt to assess the importance of the endogenous component of monetary policy by restricting the way policy interacts with the economy, while not restricting other coefficients in the model. The authors focus on the role of oil prices in their analysis, both because oil prices have been subject to large exogenous shocks and because such shocks compete with monetary policy in statistical explanations of economic fluctuations.

The authors begin with a brief review of earlier work that assesses the importance of monetary policy and oil shocks, documenting that essentially all recessions of the past thirty years have been preceded by both oil price increases and a tightening of monetary policy. In order to distinguish the endogenous and exogenous movements in oil prices

and monetary policy and to disentangle the effects of these two variables, the authors estimate a five-variable VAR on monthly data that includes, in order, real GDP, the GDP deflator, an index of spot commodity prices, an indicator of the state of the oil market, and the level of the federal funds rate. Ordering the macroeconomic economic variables ahead of oil prices and the federal funds rate corresponds to the plausible assumption that the effects of the latter on the economy lag by at least one month. The authors try four alternative measures of the state of the oil market and find that the simplest—the nominal price of crude oil—implies anomalous responses of both output and prices to a shock. The other three measures give more sensible impulse response functions, implying that output falls and prices rise following a shock. In general, responses are modest in magnitude and statistically insignificant. In the authors' view, the most sensible results come from a measure constructed by James Hamilton, which ignores oil price increases that do not exceed the maximum value achieved in the preceding twelve months. A 10 percent shock to this measure results in a modest 0.45 percent cumulative loss in GDP over four years. They note, however, that the economic and statistical significance of oil price shocks is larger in the more elaborate models that they estimate subsequently.

Most observers believe that the reductions in output that have followed oil price increases are too large to be explained by oil alone, and that part of the output decline reflects the contractionary response of monetary policy. Indeed, in the basic VAR model an unexpected increase in the price of oil, using any of the measures, results in monetary tightening; part of the subsequent reduction in output is hence attributed to the reaction of the monetary authority. The authors quantify this response by means of a technique previously used by Christopher Sims and Tao Zha. This amounts to "shutting down" the response of the federal funds rate as estimated by the VAR, so that the federal funds rate follows the path that it would have taken in the absence of the exogenous shock to oil. The authors here assume that the other coefficients of the model are invariant to this hypothesized change in policy behavior, and note that this assumption is subject to the Lucas critique. Although they are sympathetic to Sims's view that this may not be a major problem for deviations from historical behavior that are neither too large nor too protracted, they suggest that the relevance of the critique is much stronger for financial markets than for other sectors

of the economy. This leads them to propose a modification of the Sims-Zha procedure that assumes that financial markets quickly reflect changes in the policy rule, forming rational expectations of interest rates in the changed environment. They assume that equations other than those relating to interest rates are invariant to the change in rule.

To implement these ideas, Bernanke, Gertler, and Watson let the federal funds rate affect macroeconomic variables such as output and prices only indirectly, through its effect on short- and long-term interest rates. Because they rule out other possible channels of influence for monetary policy, such as the exchange rate and the “credit channel,” they regard their results as a lower bound on the importance of monetary policy. They also follow the common practice of assuming that the other macroeconomic variables in their system are causally prior to market rates—that is, interest rates cannot affect output and prices within the month. For most of their analysis they also treat the federal funds rate as causally prior to market rates, in effect assuming no response of policymakers to movements in market rates within the month, on the grounds that market rates contain no information about the economy that is not already present in the other macroeconomic variables.

In order to incorporate the expectations theory in the rate equations, as is required in their method, the authors decompose short and long rates into two parts: expectations of future values of the funds rate and a term premium. Rather than estimate the weights on future expected funds rates, they assume the weights appropriate to a fixed discount rate of 4 percent. Given this assumption, it is easy to decompose any predicted change in the market rates into its two components. For example, to simulate the effects of an oil price shock under a counterfactual policy regime, they first specify an alternative path for the federal funds rate and calculate the change in the expectations component of interest rates implied by this modified behavior. With the time path of the expectations component of market rates determined, they can then trace out the impulse responses of each of the other variables, including the term premium itself. Because the term premium varies even with their rational expectations assumption, market rates do not move one for one with expectations.

Bernanke, Gertler, and Watson report a number of policy experiments with their seven-variable model. They first show that the basic

system incorporating short and long rates gives familiar predictions of the responses of output and prices to a federal funds rate innovation. The response of market rates is interesting: the short rate term premium is significantly negative immediately following a funds rate innovation, indicating that short rates respond less than implied by the expectations hypothesis. This discrepancy quickly disappears for short term rates, so that the expectations theory seems to be a reasonable approximation of reality. However, expectations about future short rates explain relatively little of the movement in the ten-year government bond rate, and there is some evidence that the long rate “overreacts” to short rates.

The most extensive exercise is the decomposition of the impact of oil shocks into direct effects and indirect effects that reflect endogenous monetary policy. The authors provide a base case that includes the estimated endogenous response of monetary policy and two scenarios intended to show how differently the economy would have performed in the absence of the policy response to the oil shock. One of these scenarios follows the Sims-Zha procedure, simply setting the funds rate at the value that it would have had in the absence of the oil shock, with the market rates following in accord with the unconstrained reduced-form estimates. The second, “anticipated policy,” scenario applies the authors’ methodology described above. Short and long term premiums are assumed to respond as estimated, but the expectations component of rates is made consistent with the counterfactual course of the federal funds rate. Both scenarios exhibit the qualitative behavior one might expect in the absence of policy tightening—that is, higher paths for output and price. The effects of induced policy seem large; in their absence, most of the output loss from the oil shock disappears and higher rates of inflation persist instead of turning down after a couple of years, as they do in the base case. The two scenarios show roughly similar departures from the baseline. However, market interest rates are systematically lower in the anticipated policy scenario than in the Sims-Zha scenario. When the endogenous response of the term premium is also shut down, so that market rates do not respond at all to the oil shock, endogenous policy is given less credit but is still responsible for two-thirds to three-fourths of the total output decline. The authors find similar results when they consider shocks to commodity prices or output rather than to oil.

The authors conduct these counterfactual simulations for each of the

three major oil price shocks followed by recessions. They find that the 1974–75 decline in output is largely due to nonoil commodity prices, which rose sharply before the recession, rather than to the oil price shock. In contrast, the oil price shocks in 1979 and 1990 and their associated endogenous policy responses do appear to explain the subsequent declines in output. In order to check the plausibility of their findings, the authors compare the impulse response of the economy to an oil shock and to a pure federal funds shock of a magnitude that mimics the effect of the oil shock on rates. The response of output is virtually identical in the two scenarios. The authors see this as support for the view that policy responses are the dominant source of the real effects of an oil price shock.

The importance that Bernanke, Gertler, and Watson attribute to policy, once they recognize the impact of endogenous policy responses, is in sharp contrast to the small role that they and others attribute to policy innovations alone. They conclude that analysts who focus only on policy innovations miss much of the contribution of monetary policy to stabilizing the economy.

ECONOMISTS HAVE LONG been puzzled by the scarcity of price indexation in long-term contracts. History is replete with episodes in which inflation or deflation have wreaked havoc by producing unforeseen and major redistributions of wealth between debtors and creditors. In the post–World War II period inflation has been pervasive and variable, and in most countries the public has displayed a strong antipathy to it. Yet, except in a few countries with extreme experiences, people have not taken the apparently simple expedient of tying their long-term financial commitments to a price index. In the third paper of this issue Robert Shiller briefly reviews the reasons why indexation might be expected to be the norm rather than the exception, discusses its historical precedents, and reports on an extensive survey of individuals in the United States and Turkey, two economies with quite different inflationary histories, in an effort to illuminate the puzzling absence of indexation.

It would be easy to understand the absence of indexation if inflation were predictable and stable. But, Shiller argues, throughout history price levels have been notoriously unstable over long periods of time. To illustrate this fact, he computes the standard deviations of ten- and

twenty-year changes in price levels for sixteen countries during the postwar period. For the twenty-year change, half of the countries have had standard deviations of over 500 percent, with six over 10,000 percent. Even the United States—the country with the third least variable price level, after West Germany and Japan—has a standard deviation of 60 percent. It does not take big surprises in the annual inflation rate to dramatically change the real value of a long-term contract. The power of compounding means that a 2 percent higher average annual rate of inflation lowers the real value of a twenty-year bond by one-third at maturity. Inflation uncertainty clearly makes long-term debt very risky in real terms.

Shiller suggests that indexing is virtually costless and hence, given historical experience and the entreaties of a long list of distinguished economists, he finds it puzzling that indexation has not become commonplace. He briefly describes the limited experience with the indexation of long-term contracts in the United States, where the first inflation-indexed federal government bonds were issued in January 1997, and describes the few short-lived private initiatives to issue similar bonds. Indexation in labor contracts appears to wax and wane depending on the rate of inflation. And Shiller finds little indexation in other private long-term contracts, such as alimony, child support, or private pensions. In his view, the U.S. experience is largely one of missed opportunities.

Shiller sees Turkey as a natural candidate to complement his study of the United States. Inflation in Turkey has been highly variable and has not been below 20 percent per year since the late 1970s. Although indexation for long-term contracts is common in many countries that have extremely high and variable inflation rates, in Turkey it is rare. While in major Turkish cities prices for real estate, apartment rentals, and the like are routinely quoted in U.S. dollars or deutsche marks, in small towns and rural areas such prices are typically given in Turkish lira. The Turkish government had never issued indexed debt before 1997. Nor is indexation important in other types of contracts. Shiller reports on interviews with divorce lawyers, bond dealers, and labor union officials, who state that indexation is almost never used for alimony, child support, corporate bonds, or labor contracts. Instead, debt and labor contracts are for the short term, and the courts are used to modify support payments, much as in the United States. Shiller's in-

interviewees judged that dollarization is used in about 10 percent of alimony and child support settlements, particularly for the wealthy, but that corporate bonds and labor contracts are never dollarized. They also suggested that fluctuation in the exchange rate is one important reason why dollarization is not common.

The centerpiece of Shiller's paper is a summary and analysis of his survey aimed at finding out public attitudes about inflation and indexation. Shiller sent questionnaires to 800 individuals in the United States and 400 in Turkey, all randomly selected from local telephone books. The response rates were 38 percent for the United States and 25 percent for Turkey. A great deal of care went into survey design; early versions of the questions were refined after preliminary informal interviewing in New Haven, Connecticut; and two different questionnaires were used for the U.S. sample, with different orderings of answers and, in some cases, with different wording, to minimize the effect of framing.

The survey asks an array of questions intended to check out the importance of plausible explanations for the absence of indexed contracts. These include the inability of individuals to understand indexed contracts and to do the mathematics required to make intelligent comparisons between different types of contract; math anxiety and aversion to complicated contracts; skepticism about the accuracy of official price indexes; exaggerated belief in the possibility of off-setting inflation by substituting less expensive for more expensive items; the absence of risk aversion; inaccurate beliefs about the magnitude of inflation risk; misperceptions about who is hurt by inflation; and skepticism about the government's behavior and the likelihood of its changing the rules.

Readers will have different views about which of the rich tableau of responses are most interesting or most surprising. For the most part, there is a remarkable similarity between U.S. and Turkish responses. Shiller finds that most of those surveyed do not seem confused about inflation or how indexation works, and do not have great difficulty in making the calculations necessary to compare indexed with unindexed plans. While there is a suggestion of money illusion on the part of some respondents, a much more important misconception is underappreciation of the uncertainty of inflation. Individuals give low estimates of inflation uncertainty relative to historical variation, particularly in Turkey. Another interesting theme is that people tend to think of inflation not as the cause of arbitrary redistributions from creditors to debtors,

but as an event that harms virtually everyone. They seem to believe that real incomes are eroded by high inflation, to the detriment of debtors, creditors, firms, and individuals alike. Shiller suggests that this may explain why it seems too much to ask that noncustodial parents automatically increase child support payments if inflation picks up a lot, and why workers find it reasonable that the real values of their pensions decline with inflation. He observes that this belief is consistent with experience; for fourteen of the sixteen countries he considers, unusually high inflation is correlated with unusually low rates of real output growth. Respondents also tend to believe that price indexes are not a reliable measure of how individuals will be affected by inflation, particularly when it is high, and they have some mistrust of the government's construction of such indexes. He concludes that the lack of enthusiasm for indexation has no single cause, but that a wide variety of thoughts about inflation lead to the belief that indexation is not a good idea.

Shiller is an unabashed proponent of indexation and provides a catalogue of ways in which the government could promote public acceptance of indexed debt. The boldest would be to eliminate long-term government nominal debt, replacing it entirely with indexed debt. He believes that if that were done, indexed debt would become the standard throughout the economy. Courts could routinely index alimony, child support, and personal damage settlements, but Shiller believes that in many of these cases it would be better to index to an income aggregate rather than to the CPI. Ironically, he does not see a strong case for institutionalizing indexation in labor markets, the one arena in the U.S. private sector where formal indexation has at times been significant. Nevertheless, he believes that government encouragement of most forms of indexed contract could lead to significant social benefits.

FOR YEARS the press has been full of stories about corporate downsizing and restructuring and increased foreign competition, all of which are said to contribute to a decreased sense of job security on the part of American workers. Such heightened anxiety about job loss is consistent with workers' actual earnings experiences. While the typical worker in the U.S. labor market has always experienced considerable year-to-year variation in earnings, earnings variation has trended up since the early 1970s. Peter Gottschalk and Robert Moffitt (*BPEA*, 2:1994), for

example, have estimated that the transitory component of the earnings of household heads rose by more than 40 percent from the 1970s to the 1980s. In the fourth paper of this issue Susan Dynarski and Jonathan Gruber reexamine the evidence on earnings variation and estimate the extent to which various mechanisms—including offsets from the incomes of other household members, cushions provided by tax and transfer programs, and dissaving out of wealth—insulate consumption from shocks to the earnings of household heads. They regard the consumption variation arising from earnings variation as the indicator of the welfare loss of households.

The authors begin by reexamining the importance of earnings variability during the period 1970 to 1991 for a nationally representative sample of households with male heads aged twenty to fifty-nine. Drawing on the Michigan Panel Study of Income Dynamics (PSID), a longitudinal survey which follows a cross-section of families over time, they extend the sample period used by Gottschalk and Moffitt and shift the focus to total labor earnings, rather than just wages and salaries. To measure an individual's transitory earnings in a given year, Dynarski and Gruber use regressions for the household head's earnings that include time dummies to remove variations that reflect aggregate fluctuations and a number of individual characteristics: education, marital status and change in that status, change in family size and in the proportion of the family comprised by children, and change in a measure of family "food needs." Controlling for these variables is presumed to remove the predictable changes in income over the individual's life cycle, as well as changes in income that are permanent. The removal of aggregate fluctuations allows the authors to focus on the smoothing of idiosyncratic shocks. The residual from the estimated equation for an individual is taken as a measure of that person's transitory income in a particular year; and the mean of squared residuals across individuals is used as the measure of aggregate transitory variation in a given year. The authors also run the earnings equation including individual fixed effects. Two findings from this analysis stand out. First, earnings variation has a strong countercyclical component, with peaks in the recessions of the mid-1970s, the early 1980s, and the early 1990s. Second, confirming Gottschalk and Moffitt's earlier findings, annual earnings variation has a strong upward trend; over the entire period, the variation of the transitory earnings of male heads of household rose by 76 percent.

How important fluctuations in the earnings of the head of household are to household welfare depends not only on the magnitude of those fluctuations but also on the size of changes in taxes, transfers, and unemployment insurance, changes in income from other members of the household, and the availability of saving or borrowing to spread the effects of income shocks across many periods. To estimate the combined effectiveness of these mechanisms in mitigating the effects of shocks, the authors directly estimate the response of changes in household consumption to shocks to the head of household's income, including the variables that they use in estimating transitory income. The inclusion of these variables implies that the coefficient on head's earnings itself should be interpreted as the response of consumption to transitory income. Hence the authors take a zero or small coefficient on change in head's earnings as evidence that one or more of the mechanisms for smoothing consumption are important. If the response of consumption is small, the growing variation of transitory earnings in recent years may, in fact, have little impact on the welfare of households.

Dynarski and Gruber recognize that their measure of transitory income does not achieve a clean distinction between transitory and permanent variations in income. If shocks to the level of income are transitory, the errors in the authors' differenced equation should be negatively correlated. If, however, errors in the differenced equation are independent over time, the authors' estimates of transitory income correspond to permanent changes in the level of income and their effects on the lifetime budget constraint of the household would be much larger. But they argue that this ambiguity is unimportant, since they look directly at the consequences for consumption of earnings fluctuations.

The authors make use of two data sources to estimate the consumption response to transitory earnings: the PSID, which includes a set of high-quality indicators of earnings and labor force attachment, but has limited information on household consumption; and the Bureau of Labor Statistics's Consumer Expenditure Survey (CEX), which contains a more complete accounting for consumption, but has samples for only two points in time. Earnings reported in such recall surveys include substantial measurement error. In the case of the PSID, for example, it is estimated that 15 to 30 percent of the cross-sectional variation in earnings and 20 to 25 percent of variation in first differences of earnings is measurement error.

Such errors lead to a downward bias in ordinary least squares estimates of the response of consumption to income, and hence to an overestimate of the extent to which households can shield their consumption from earnings fluctuations. The authors deal with this difficulty by means of an instrumental variable technique, which only uses the variation in current earnings that can be predicted by a variable that is independent of the measurement error. Their instrumental variable is the change in “imputed earnings,” calculated as the number of hours worked in the previous year times the current wage rate. They argue that change in this variable is likely to be a good instrument, with errors uncorrelated with the errors in the change in current earnings.

The authors’ results suggest that households are able to shelter consumption significantly from adverse shocks to the head’s earnings. In the case of the PSID, the response of both food and housing (the two available consumption variables) to changes in the head of household’s earnings is quite small. The combined elasticity is only 5 percent using ordinary least squares. Estimates using instrumental variables are larger, but still imply a total elasticity of less than 20 percent. Allowing for fixed individual household effects makes little difference. Using the CEX data, which cover a much wider range of consumption items, leads to broadly similar conclusions, but some interesting details emerge. The instrumental variable estimates of elasticities for food and housing are somewhat smaller than for the PSID, and the elasticities for medical care and insurance, vehicle maintenance and fuel, utilities, and entertainment are smaller still. The main surprise is the low estimate for entertainment. In accord with expectations, the authors find for both data sets that the elasticity of expenditures on food away from home is significantly greater than the elasticity of demand for food at home.

In contrast to the low elasticities for expenditures on most nondurables, the CEX data show that durable expenditures, comprising only 11 percent of consumption on average, have a larger absolute response than all nondurables taken together. For the instrumental variables estimates, the implied elasticity is eight times larger than it is for nondurables. The authors note that this result conforms to the view that a portion of durables purchases should be regarded as saving, providing future consumption of durable good services. Hence the variation in current consumption and utility is overstated by the change in current expenditures.

Dynarski and Gruber recognize that their own measure of transitory

income may include some permanent components. They observe that changes in hours are more likely to be transitory than changes in wage rates. Therefore they rerun their equations using these two sources of earnings variation as explanatory variables. For the PSID sample, the results show a striking difference between the two components, in accord with their priors. The response of food and housing consumption to wages is much larger than their response to hours. For the CEX data, the results are less clear. Food and housing, in fact, respond more to hours than to wages. However, both aggregate nondurables and durables have a larger response to wages, and overall the authors believe that the presumption that wage changes have a larger permanent component is confirmed. They find it striking, however, that even in the case of wage variation, most of earnings variation is smoothed: consumption changes by less than 30 cents for each dollar change in earnings from this source.

How important are the various potential sources of smoothing? Both the PSID and the CEX measure the wife's labor earnings and provide either observations on taxes and transfers or the information necessary to calculate them. This enables the authors to directly estimate the response of each to changes in the head's earnings. As in the consumption equations, change in head's earnings is instrumented by imputed income. Dynarski and Gruber find relatively little offset for lost earnings of the head through increased earnings of the wife, but find that transfers and taxes are important. The PSID data indicate that changes in government transfer income off-set about 12 percent of earnings variation, and taxes, including both income and payroll taxes, off-set about 35 percent of earnings variation. The CEX estimates are somewhat smaller: 5 percent and 26 percent, respectively. Taken together with the authors' estimates of the consumption response, these findings imply that 25 to 40 percent of the year-to-year changes in the head of household's earnings is smoothed by household saving; if durable goods expenditures are regarded as saving, the smoothing attributed to saving is about 15 percent greater.

Variations in the household head's earnings that arise from unemployment may be harder for households to smooth than variations arising from other sources, both because unemployment is likely to have a large effect on earnings and because it may be unplanned, resulting from involuntary rather than voluntary separation. To explore this possibility, the authors use unemployment as an instrument for earnings in their consumption equations. Lacking data that distinguishes layoffs from quits and infor-

mation about unemployment duration, they use a dummy for the transition from employment to unemployment for a sample of households where, *ex ante*, the head appears to be regularly employed and where the spell of unemployment is so long that it is not likely to have been planned. Using this constructed variable, they find that for most components of consumption the results are similar to those for general downward movements in earnings. Curiously, the estimated effect on durable goods expenditures is substantially smaller than the earlier estimates. The authors also examine how unemployment-related changes in earnings are off-set by spousal income, taxes, and transfers. Their only consistent finding is that unemployment insurance off-sets more of earnings variation from this source than most previous research has estimated. From 50 to 55 percent of each dollar of earnings loss due to unemployment is compensated by increased income flows, and only 20 to 25 percent of each dollar loss is reflected in dissaving.

How plausible is the proposition that households have sufficient wealth to provide this amount of smoothing? By matching households in the PSID and CEX samples with households from the Census Bureau's Survey of Income and Program Participation for the two years that contain information on asset holding and net worth, Dynarski and Gruber show that the median household has liquid assets equal to about 35 percent of the income loss from an unemployment spell, and that 36 percent of households have assets that are greater than their entire income loss. If one includes illiquid assets, wealth appears more than adequate to finance the degree of consumption smoothing that they estimate.

Even though the median household appears to have sufficient wealth to cover a substantial fraction of the income loss from unemployment, many households do not, and these might be expected show much larger reductions in consumption when the household head becomes unemployed. Grouping the households into three categories of educational attainment—high school dropouts, high school graduates, and college graduates—the authors find dramatic differences in wealth and hence, presumably, the capacity to smooth adverse income shocks. The median household headed by a high school dropout with a job separation has gross liquid assets amounting to only 5 percent of the resulting income loss; by contrast, the median household headed by a college graduate has gross liquid assets of 1.2 times the income loss, and over three-quarters of these household have total assets greater than 25 percent of the income loss. Thus education

may serve as a good proxy for wealth. When the authors estimate the consumption response to unemployment by educational group for the PSID, they find that the effects are much larger among households headed by high school dropouts, whereas there is essentially no effect of such shocks on the consumption of the highly educated. Using the CEX, the results for nondurables expenditures are similar, but somewhat muted. However, there is an enormous difference in the response of durables purchases across household types: there is essentially no change in purchases by households headed by the college educated and a drop of over 50 cents on the dollar for households headed by high school dropouts.

The finding that the typical household is especially able to smooth earnings shocks arising from variation in hours suggests that, for the entire economy, consumption variation should be less cyclical than income variation. Dynarski and Gruber find that this is so. However, they also find some anomalous results for the aggregate. Most striking, the growth in earnings instability over time is much lower for the college educated than for lower educational groups, yet the growth in consumption variation is much greater for the college educated. This, along with somewhat different timing in the change in aggregate income and consumption variation, leads the authors to conclude that the upward trends in both earnings and consumption variation are not causally related.

Dynarski and Gruber believe that their findings raise important issues for policy design. It is clear that the tax and transfer system plays an important role in consumption smoothing, in particular, for the unemployed. Any reform of the system should be attentive to this role. Second, while government insurance is helpful, it is far from sufficient to off-set the differential abilities of households to smooth consumption. For a substantial part of the population, the costs of even transitory earnings loss are likely to be severe.

THE CONSUMER PRICE INDEX (CPI), published monthly by the Bureau of Labor Statistics (BLS), is at the center of discussions about monetary policy and is used to adjust many private contracts and government programs for inflation. At the federal government level, the brackets of the personal income tax and the payments under social security and other retirement programs are indexed to the CPI. In recent years, a number of economists have questioned whether the procedures used by BLS in computing the CPI adequately capture quality changes

in goods and services, including the quality changes inherent in new products, and whether they properly allow for the substitutions that consumers make in the goods and services that they buy. If, as this questioning suggests, the CPI has a substantial bias, it is not a suitable guide for policy and provides inappropriate adjustments of contracts for inflation. Last year, the Advisory Commission to Study the Consumer Price Index, which was formed in response to these concerns, presented its final report, in which it estimated that the CPI has had an upward bias averaging 1.1 percent a year. While there is agreement about some sources of bias identified in the report, and the BLS is already making efforts to correct them, there is much less agreement about the 0.6 percent a year that was estimated to come from insufficient quality adjustment. In the fifth paper of this volume, Brent Moulton and Karin Moses first appraise the advisory commission's estimates of quality bias and then analyze the quality allowances implicit in the BLS procedures for replacing items in the monthly surveys that provide the raw price data for the CPI.

The commission estimated that for nineteen out of twenty-seven CPI item categories, price increases were overstated because quality change was underestimated. Moulton and Moses observe that the information the commission brought to bear in making these estimates differed widely across categories. In six of the nineteen categories, it reviewed existing studies of bias for specific items and drew inferences about related items in the category. In another four categories, it conducted original research or presented back-of-the-envelope calculations of likely bias. In the other nine categories, it simply described potential sources of bias and offered estimates of their magnitudes. The authors summarize the commission's estimates for all twenty-seven categories and discuss a number of them in detail, explaining why they find some persuasive but are doubtful of others.

For two major components—appliances, which includes home electronics, and medical care—Moulton and Moses accept the commission's conclusion of upward bias arising from inadequate allowance for quality changes. They regard the commission's estimates for personal computers, television, video equipment, and related items as well documented and note that the BLS is improving the sampling of new products and developing hedonic methods to adjust for quality in these areas. They also agree that BLS methods are likely to underestimate

quality improvements in medical care, although they are wary of the commission's estimates of the bias for this category because they were based largely on extrapolation from studies of only two medical conditions. They note that the BLS has recently changed its methods to address some of the issues in pricing medical care, but add that difficult measurement issues remain and will continue to be the subject of BLS research.

The authors criticize the commission's estimates of bias in several other categories. The commission attributes a bias of 20 percent in the pricing of fresh fruits and vegetables over the period 1967–96 to the failure of the CPI to properly value increased seasonal availability and variety. The authors provide their own model, based on assumed price elasticities, to show that the increased consumption of new seasonal items would have to be implausibly large to be consistent with such a high bias estimate. For the shelter category, which has a huge weight (28 percent) in the overall CPI, they use detailed information, such as changes in apartment size, to question the commission's estimate of a 0.25 percent a year bias in prices. In fact, they conclude that a small downward bias is more likely. For new vehicles, the commission estimates a bias of 0.6 percent a year, based on treating the entire increase in the lifespan of cars as an unmeasured quality improvement. The authors note that many improvements that are related to durability have been explicitly accounted for, so that allowing separately for increased lifespan would double count some amount of quality changes.

In the apparel category, Moulton and Moses question the commission's reliance on Robert Gordon's study of Sears catalogue prices to estimate CPI bias. They note that the catalogue study only measures price changes for items that remain identical from year to year, whereas CPI research finds that price changes are correlated with the introduction of new fashions or varieties. Gordon's methodology essentially attributes all price increase associated with the introduction of new fashion lines to quality improvement. As evidence that this effect is important, they observe that Gordon's price index for women's apparel, where fashion changes are most common, did not change from 1984 to 1993, although the indexes for men's, boys,' and girls' clothing rose between 14 and 17.5 percent over the period. The authors also provide evidence that the commission overstates the quality effects arising from the introduction of credit card machines at gas pumps and from the

delay in bringing cellular phones into the CPI sample. In the latter case, they apply demand elasticity estimates from Jerry Hausman to the consumer expenditure share of cellular phones to calculate a bias of about 0.02 percent a year in the overall CPI from this delay. In their view, the fact that ignoring one of the most important new products in recent years biased the CPI by only this amount casts doubt on many of the larger numbers in the commission's report.

In the overall scheme of collecting monthly price data for the CPI, changes in the items sampled take place through three distinct avenues. Essentially new items, such as video-cassette recorders and cellular phones, that do not readily fit existing item categories, are usually introduced during the *major revisions* of the CPI, when market basket weights for all items are recalculated and item classifications are revised. Between major revisions, one-fifth of individual items and outlets are scheduled to be replaced each year by regular *sample rotation*. And on an unscheduled but frequent basis, items that become unavailable to data collectors from one month to the next are replaced by *item replacement* procedures. In the second half of their paper, Moulton and Moses describe the item replacement procedures used by the BLS and estimate how much quality change has been implicit in their application. Their analysis does not encompass the sample changes that take place with regular sample rotation, where there is little presumption of quality change, nor with the introduction of essentially new items in major revisions.

Item replacement is quantitatively important. Each month, some 80,000 sample prices are collected, providing the raw data for that month's CPI. But about 30 percent of the items that were due to be in the sample throughout a given year become unavailable at a particular outlet and are replaced with items deemed to be similar by the data collector. On the basis of information about the replacement item, one of several available procedures is used to introduce it into the CPI calculations. The choice of procedure determines the implicit quality change that accompanies the replacement. To take the simplest case, if a replacement item is deemed not to be identical to the item it replaces, a procedure may be chosen that ignores all of the difference between the last price of the old item and the price of the new item when it enters the sample. In this case, all of the observed price difference is implicitly taken to be quality change and no price change is recorded

in the CPI. In general, some portion of the observed price difference is treated as an implicit quality change and the remainder appears in the CPI as a price change in that month.

By examining the actual raw price data collected for old and replacement items and which procedure was applied to each replacement item, Moulton and Moses tabulate how much of the price difference observed in the raw data was treated as quality change and so ignored in calculating the CPI. Two final steps in their analysis are important to their quantitative results. First, in addition to aggregating over all observations, they also aggregate over subsets of observations truncated to remove outliers—that is, raw price changes that appear to be too large to represent quality change in an item and may instead arise from an inappropriate substitution of a dissimilar item by the data collector. They consider two truncations: eliminating all observations when a raw price increases or decreases by a factor of 5 or more or by a factor of 2 or more. Second, in processing the raw data they use both arithmetic aggregation, which parallels the procedure used in aggregating price changes in the CPI, and logarithmic aggregation, which, under many assumptions about the generation of the data, is more appropriate for measuring quality effects captured by BLS procedures.

The authors present an extensive analysis of data for 1995 and also report some results from earlier studies based on data for 1983 and 1984. For 1995, using all the data and arithmetic aggregation, they calculate that BLS procedures for item replacement led to the CPI rising by 1.76 percent less than it would have if all of the recorded price difference on replacement items had been recorded as price change in the CPI.

To answer the different question—how much quality change is implicitly being allowed for by these procedures?—the authors reason that calculations using the truncated data to remove outliers or using logarithmic aggregation may be more appropriate. Outliers may well arise from inappropriate substitutions, which should not be counted as quality change. This problem is minimized with logarithmic aggregation, since with many observations, large positive and negative outliers should roughly cancel out. With arithmetic aggregation, their estimates of the quality change allowed for are 1.10 percent and 0.54 percent, using the less and more stringently truncated samples, respectively. With logarithmic aggregation, their estimates of quality change allowed for are

0.44 percent with the full sample, and 0.40 percent and 0.28 percent with the two truncated samples. Though the range is substantial, each of these estimates indicates that BLS procedures for item replacement have been capturing a noticeable amount of quality change in the market basket that makes up the CPI. However, these calculations do not address the issues raised in the first part of the paper, which concern the possibility of significant bias from other aspects of the methodology that the Bureau of Labor Statistics uses to calculate the CPI.

BRAZIL'S ECONOMIC PERFORMANCE over the years has been volatile, even by Latin American standards. It has enjoyed extended periods of rapid growth and has also stagnated for long stretches. It has long accommodated double-digit annual inflation rates, but has also experienced destabilizing bouts of hyperinflation. On many occasions, Brazilian governments have tried special stabilization plans aimed at curbing runaway inflation while maintaining growth. Most recently, the Real Plan of 1994 has brought inflation down from triple-digit rates in 1993-94 to expected single-digit rates this year, while continuing real expansion of the economy. In the sixth paper of this issue, Rudiger Dornbusch examines Brazil's past performance, assesses the potentials and risks of the Real Plan, and suggests how Brazil can improve its growth prospects.

Dornbusch's historical review emphasizes the bouts of inflation in Brazil's past and its governments' attempts to deal with them. Thoroughgoing indexation of wages and price contracts, promoted both by law and by long practice, is a central feature of the economy. It normally makes inflation easy to live with, but also makes it very costly to bring inflation under control when it becomes disruptive. This has led Brazilian economists to seek "heterodox" policies that would coordinate a stop to the wage-price spiral through incomes policies, while simultaneously controlling demand. However, in Dornbusch's view, Brazil's low pain threshold is another key feature of the economy and it explains why heterodox programs such as the Cruzado Plan of 1986 and its numerous successors failed. Rather than applying restrictive demand policies to reinforce incomes policies, policymakers saw the initial respite provided by the incomes policies as occasions to stimulate demand.

Against this background, the Real Plan avoided reliance on an incomes policy and instead created the real as a new currency linked to

the dollar. At the outset, wages were converted to reais at a level that required no catchup to past price inflation, and were indexed to inflation going forward. This, together with an initial appreciation of the real, abruptly stopped the triple-digit inflation. Many dimensions of economic performance have since improved, and the new policies have been politically popular. Inflation has continued to slow, with the consumer price index rising by only 10 percent in 1996. Real output has grown and real wages have risen rapidly, especially for the poorest workers. In a country with extreme disparities between rich and poor, the ratio of the wages of the richest 10 percent to those of the poorest 10 percent dropped from 72 to 49 between 1993 and 1995, reversing the trend toward growing inequality that had persisted since the 1960s.

While applauding these achievements, Dornbusch finds other aspects of Brazil's economic performance troublesome. A sizable real appreciation of the currency heads his list of concerns. He warns that worldwide, large real appreciations have almost invariably ended in external crises when events have hampered the rollover of debt and the ability to finance current account deficits. Just how much appreciation has occurred and how much is tolerable are both matters of dispute. Estimates of the extent of Brazil's real appreciation differ widely, depending on what measure is used. Dornbusch cites a number of alternatives, ranging from a modest 6 percent by taking the industrial price index for São Paulo relative to Brazil's trading partners, to near 50 percent by comparing the rise in the ratio of consumer prices to wholesale prices in Brazil, a ratio often taken as a proxy for the price ratio of nontradables to tradables.

He also notes that although Brazil has started on economic reforms, it still has a long way to go. Many of these reforms would require real depreciation in order to sustain employment growth. Capital markets and foreign trade have already been substantially liberalized, and imports and capital inflows have expanded. Other reforms, such as privatization, firm restructuring, and government downsizing, could eventually improve productivity and permit higher real wages. But, as with trade reform, they are likely to require lower real wages in the short run in order to reemploy the workers released by the reforms and the rise in imports.

Dornbusch is also concerned that, under the Real Plan, Brazil's expansion has been driven by too much consumption. To help curb

inflation, the government has allowed real interest rates to rise to very high levels. This has encouraged capital inflows, but investment as a share of GDP remains relatively low. The current account deficit, which was modest to start with, is growing and is projected to reach 5 percent of GDP in 1998.

Dornbusch offers a colorful description of the conflict faced by policymakers who have the social objectives of high real wages and employment levels but are constrained by the size of the sustainable foreign deficit—a conflict that may soon, if not already, confront policymakers in Brazil. He describes an outcome that meets the external constraint with full employment but an unacceptably low real wage and labels it the IMF equilibrium. An outcome with full employment and a high real wage he calls the Latin equilibrium, because it involves overborrowing to evade (for a time) the foreign deficit constraint. And he sees a temporary retrenchment that maintains a high real wage but accepts unemployment for a time as typical of the year before an election, just before an expansion starts. For Brazil, he envisages two potential alternative responses: trade protection or borrowing in the hope that time will somehow resolve the conflict, perhaps through a surge in productivity that reconciles real wages and competitiveness.

Despite his misgivings about the present course of policy, Dornbusch does not expect Brazil to suffer the fate that befell Mexico when the peso became overvalued. Rather, he fears that Brazil may muddle through for an extended period when it could instead be fostering rapid growth. Such growth would follow from policies that encouraged more saving and investment and less consumption; a lower real exchange rate, even if this invited somewhat more inflation than at present; and continued free market reforms to enhance competitiveness and encourage productivity growth.