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Inflation Dynamics and the Distribution of Income

A basic tenet of economics is that productivity growth is the source of growth in real per capita income for the typical — that is, median — American worker. However, in **Where Did the Productivity Growth Go? Inflation Dynamics and the Distribution of Income** (NBER Working Paper No. 11842), authors **Ian Dew-Becker** and **Robert Gordon** raise doubts about that tenet when they demonstrate that shifts in the income distribution have prevented the typical American worker and household from enjoying the gains of the recent upsurge in productivity growth.

The first half of this decade has witnessed a sharp contrast between strong output growth, on the one hand, and slow employment growth on the other. Taken together, these contrasting factors have resulted in the 2001–4 "explosion" in U. S. labor productivity growth, a trend in productivity growth faster than in any previous sub-period of the postwar era.

Yet who received the benefits of this productivity growth explosion? Median household income fell by 3.8 percent from 1999 to 2004 and grew cumulatively at an annual rate of only 0.9 percent per year from 1995 to 2004, much slower than the growth rate of non-farm private business (NFPB) output per hour over the

same period of 2.9 percent. Similarly, the median real wage for all workers over 1995–2003 grew at 1.4 percent per year, less than half the rate of productivity growth. The failure of the productivity growth revival to boost the real incomes and wages of the median family and median worker

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calls into question the standard economic paradigm that productivity growth automatically translates into rising living standards.

Using IRS micro data on 5 million individual tax returns, the authors show that over the entire period 1966–2001, as well as over 1997–2001, only the top 10 percent of the income distribution enjoyed a growth rate of real wage-and-salary income equal to or above the average rate of economy-wide productivity growth. To translate the tax data into a form comparable with aggregate data on real labor income, the authors adjust for changes in untaxed benefits and in hours per worker. The ratio of untaxed benefits to taxed wages and salaries is assumed, pending further research, to change at an equal annual rate for each percentile of the income distribution.

Similarly, hours per worker

are assumed to change at the same rate across the income distribution. Subsequent research by Peter Kuhn and Fernando Lozano (NBER WP No. 11895, summarized in the July 2006 *NBER Digest*) shows that the frequency of long work hours has increased for the top quintile of wage earners and decreased for the bottom quintile. Taking this research into account would imply that the rate of increase of labor income per hour in the top percentiles would be somewhat slower than of total labor income.

Median real wage-and-salary income in the tax data barely grew at all. Average wage-and-salary income kept pace with productivity growth, but only because half of the income gains went to the top 10 percent of the income distribution, leaving the remaining half for the bottom 90 percent.

The authors' most surprising result from the large IRS micro data set is that over the entire period 1966–2001, only the top 10 percent of the income distribution enjoyed a growth rate of total real income (excluding capital gains) equal to or above the average rate of economy-wide pro-

ductivity growth. Those in the bottom 90 percent of the income distribution fell behind or were even left out of the productivity gains entirely.

Stating their main results differently, the authors note that the top 1 percent of the income distribution accounted for 21.6 percent of real total income gains during 1966–2001 and 21.3 percent during the productivity revival period 1997–2001. Another way to describe these results is that the top one-tenth of one percent of the income distribution earned as much of the real increase in wage-and-salary income from 1997–2001 as the bottom 50 percent.

In addition to this microanalysis, the authors explore whether faster productivity growth reduces inflation, raises nominal wage growth, or raises profits. They find that an acceleration or deceleration of the productivity growth trend alters the inflation rate by at least one-for-one in the opposite direction. This is an impact of the change in the rate of trend productivity growth and dies out if trend productivity growth stabilizes at a new level, as happened in 1995–2005. Symmetrically, the post-1965 acceleration of inflation was caused in part by the infamous "productivity slowdown." Simulations of the authors' model suggest that the 1965–80 slowdown in productivity growth boosted inflation on average by 1.3 percentage points during the 1965–80 simulation period, while the 1995–2005 revival of productivity growth held down inflation on average by 1.2 percentage points over the 1995–2005 period. These results pose challenges for monetary policy by showing that the moderate behavior of inflation over the past decade has been a byproduct of a one-time acceleration of productivity growth that may now be reversing its direction.

The authors believe that economists have placed too much emphasis on "skill-biased technical change" and paid too little attention to the sources of increased "skewness" at the very top, within the top 1 percent of the income distribution. They distinguish two complementary explanations, the "economics of superstars," that is, the earnings of sports and entertainment stars, and the escalating compensation of CEOs and other top corporate officers. These sources of divergence at the top, combined with the role of de-unionization, immigration, and free trade in pushing down incomes at the bottom, have led to the wide divergence between the growth rates of productivity, average compensation, and median compensation.

— Les Picker

TV, Fast Foods, and Childhood Obesity

A number of population measures suggest that childhood overweight has increased since the early 1960s. In explaining this, researchers have tended to focus on environmental factors that affect energy intake and expenditure. When energy intake is greater than energy expenditure, children gain weight. More time spent watching television or computer screens is believed to result in less time spent in physical activity, which would decrease energy expenditure. Eating more food, or food that contains more calories, increases energy intake. Since the 1950s, fast food restaurants have offered convenient, reasonably priced, calorie dense food that tastes good. Their growing popularity has led some researchers to ask whether their existence contributes to childhood overweight.

In **Fast-Food Restaurant Advertising on Television and its Influence on Childhood Obesity** (NBER Working Paper No. 11879), **Shin-Yi Chou, Inas Rashad,** and **Michael Grossman** use data from an advertising tracking service and two surveys to estimate the effect of fast food advertising on the weight of individual children. They take into account the number of hours of advertising by fast food restaurants on local broadcast television, each child's age, race, gender, and the number of hours of television watched each week, household income, whether the child's mother is overweight, and her employment status. Also included are variables for the state in which the child lives, including the per capita number of fast-food and full-service restaurants, the inflation-adjusted price of legally sold cigarettes, the existence of smoking bans, and the inflation-adjusted price of food prepared at home and purchased from full service and fast-food restaurants.

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has no significant impact on overweight for either children aged 3–11 or teenagers aged 12–18. When time watching television is excluded, then the "advertising messages seen significantly increase a child's probability of being overweight." The authors find that a half hour increase in advertising in a week increases the probability of being overweight by 1.6 percentage points for boys, and by 1.1 percentage

points for girls aged 3–11. For teenagers, the probability of being overweight increases by 3.2 percentage points for girls and 0.6 percentage points for boys. In terms of body mass index (BMI), an additional half hour of advertising is estimated to increase a boy's body mass index by 2 percent and a girl's body mass by 1 percent.

For 3–11 year olds, BMI increases with age, but the probability of being overweight decreases. Hispanic boys and Black girls are more likely to be overweight. Children from higher income families are significantly less likely to be overweight. Mother's weight is a "strong predictor of a child's body mass index and the probability of being overweight." For teenagers, mother's weight is "strongly associated" with the probability of being overweight as is "being a black female."

The authors discuss several policy options for limiting fast food advertising including banning it and eliminating it as a tax-deductible business expense. Based on their results, eliminating deductibility would increase advertising costs by 54 percent and reduce the number of overweight children and adolescents by 5 and 3 percent respectively.

— Linda Gorman

A Field Experiment in the Consumer Credit Market

Classical models of consumer choice presume individual rationality: that is, that consumers make important decisions by weighing costs, benefits, and preferences. Psychology, in contrast, emphasizes the importance of context and cognitive limitations. Preferences are considered to be malleable, and limited rationality makes problem solving conflicted and error-prone. A growing body of evidence from laboratory psychology experiments supports this view of consumer choice. It suggests that choices can be manipulated by framing the context, visual cues, and other factors that change the presentation of the choice but not its content or inherent value.

Economists are often skeptical about the external validity of findings from laboratory experiments. In **What's Psychology Worth? A Field Experiment in the Consumer Credit Market** (NBER Working Paper No. 11892), authors **Marianne Bertrand, Dean Karlan, Sendhil Mullainathan, Eldar Shafir,** and **Jonathan Zinman** design a set of marketing treatments for consumer banking in order to mimic the "cues" and "frames" that have been shown to influence consumer choice in the laboratory. With the cooperation of a bank in South Africa, they devise a field experiment to test various psychological factors that might influence borrowing behavior. For example, they vary whether the lender's rate was compared to a competitor's (thereby establishing a reference level), and whether this comparison was presented as a loss or a gain. They also experiment with suggested loan uses and with the addition of photographs to the loan offer letter, because psychology has found that visual cues can be used to arouse emotions that are conducive to consumption. None of the marketing treatments changed the economic terms of the loan offer; they only varied the fashion in which the loan offer was presented. Consumers in this study were experienced borrowers, with the median client securing three prior loans from the lender.

The authors find that a firm can exploit consumers' psychological biases, thereby increasing demand without lowering prices. The authors stress three key features of their findings. First, while several of the psychological manipulations they attempted affected demand, several did not, suggesting that psychological effects are very context-sensitive and may require experimentation to pin down. To a degree, this is not unlike the experimentation that firms engage in to pin down the "optimal price" for a product or service.

Second, the magnitude of these psychological effects is large, with each statistically significant intervention equivalent to drops in the monthly interest rate ranging from one percentage point (most often) to

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sometimes as much as four percentage points.

Finally, by using these psychological factors as competitive tools, firms may be able to raise demand without suffering from adverse selection, all the while dulling the incentives for price competition. While the implications of these findings are directly relevant to the marketing of consumer goods and services in the for-profit sector, they may also be relevant for the design of socially oriented programs, such as health care or retirement savings plans. Through increased focus on the marketing of their programs, governmental agencies may achieve broader participation without having to solely rely on greater financial incentives.

Since the framing of any initiative, program, or product can be just as important as the actual terms of the offer, attention should be paid to understanding these effects in the formation of public policies. The authors

suggest that standard economic models may be missing some important, but complex, drivers of choice, requiring a deeper understanding of the specific contexts in which a particular psychological driver is likely to be relevant and the specific contexts in which it is not.

— Les Picker

The Earned Income Tax Credit Raises Employment

The Earned Income Tax Credit (EITC), a federal program that provided 22 million American families with children a total of $34 billion in cash assistance in 2003, accomplishes its stated goals. It not only provides low-income workers, including many who are poor, with extra income through tax refunds. This largest federal cash transfer program also successfully meets its explicit goal of encouraging low-income parents to go to work by, in effect, lowering their tax rate and providing a financial bonus for that work effort. It has been especially effective in encouraging single parents, particularly women, to obtain employment.

In **Behavioral Responses to Taxes: Lessons from the EITC and Labor Supply** (NBER Working Paper No. 11729), NBER researchers **Nada Eissa** and **Hilary Hoynes** review a large number of economic studies of the EITC and conclude that the main lesson from the accumulated evidence is that real responses to taxes are important. The second lesson is that, while the EITC stimulates people to join the work force, there is no evidence that it prompts them to work fewer hours. This difference, the authors write, "has several important implications for the design of tax-transfer programs and the welfare evaluation of taxation."

The cost of the EITC is offset in part, they note, by a reduction in the number of single mothers receiving welfare. Moreover, the EITC now lifts more children out of poverty than any other government program. In 2002, it removed 4.9 million people, including 2.7 million children from poverty. Advocates see it as promoting the values of both family and work. Traditional welfare programs, according to their critics, do the opposite.

The EITC began in 1975 as a modest program aimed at offsetting the Social Security payroll tax for low-income families with children. The design of the credit was the result of a vigorous public debate around the disincentive effects of a Negative Income Tax (NIT) proposed by the Nixon Administration. The NIT would allow a transfer that is taxed away at a constant flat rate for all taxpayers. To offset the resulting disincentive effects, the EITC was made available only to workers; the maximum credit was earned, and the credit was phased out only after an untaxed region.

Eissa and Hoynes note that a taxpayer's eligibility for the earned income tax credit depends on the taxpayer's earned income (or in some cases, adjusted gross income) and the number of qualifying children who meet certain age, relationship, and residency tests. The taxpayer must have positive earned income, defined as wage and salary income, business self-employment income, and farm self-employment income. Also, the taxpayer must have adjusted gross income and earned income below a specified amount. In 2004, for example, the maximum allowable income for a taxpayer with two or more children was $34,458. Finally, the taxpayer must have a qualifying child under age 19, or 24 if a full-time student. Or, the child must be permanently disabled and residing with the taxpayer for more than half the year.

The tax credit is refundable, so that taxpayers with no federal tax liability, for example, would receive a tax refund from the government for the full amount of the credit

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after they file their tax forms. The refund can be spaced out in paychecks throughout the year. But in 2000, less than 5 percent of EITC recipients availed themselves of this provision.

In tax year 2004, the EITC maximum subsidy rate for the lowest-income families was 34 percent of allowable income for taxpayers with one child and 40 percent for taxpayers with two or more children. At a somewhat higher level of income, the maximum credit was $2,604 for families with one child and $4,300 for those with more than one child. At a still higher income level, the credit phases out at a rate of 16 and 21 percent. Most EITC tax returns are located in the phase-out region of the credit. Among full-time year-round workers, those earning the minimum wage receive the maximum credit, while those earning $15 an hour would be ineligible.

Over time, the EITC has been expanded, with the most significant changes arising from the Tax Reform Act of 1986 and the Omnibus Reconciliation Act of 1993. Between 1990 and 1996, the cost of the pro-

gram more than doubled in real terms. The popularity of the program is shown by the fact that 18 states, as of 2004, have state EITCs that supplement the federal credit.

The largest group of EITC recipients is single mothers, typically in their early thirties with a high-school diploma, and with fewer than two children. Among this group, the EITC is expected to lead to higher rates of employment though fewer hours worked by those already working (through the cash transfer and the lower returns to work in the phase-out range). The expansions in the credit have led to dramatic declines in average tax rates, from 14.5 percent in 1985 to a negative 4.1 percent in 2000; that is, the IRS provided a subsidy equivalent to 4.1 percent of income. The evidence consistently suggests that such EITC expansions raise employment rates. One study finds that 60 percent of the 8.7 percentage point increase in annual employment of single mothers between 1984 and 1996 is attributable to the EITC with its expansion. There is no evidence, however, that the credit leads to reduced hours worked for those already in the labor market. Eissa and Hoynes survey the various explanations for the different responses on participation and hours, including measurement error, the inability of workers to choose continuous hours of work, and the lack of knowledge of the structure of the EITC schedule.

In the case of married mothers, the EITC has indeed led to a small reduction in labor market participation — about 1 percentage point, according to another study by Eissa and Hoynes. This occurs because the credit is based on family earnings and income. If, for example, the husband is the primary earner, and these earnings place the family in the phase-out range of the EITC, then the family gets the credit even if the wife remains out of the labor force. And, if she goes to work, her earnings will decrease the credit. The real boost in family income may be much smaller than the nominal extra earnings and therefore may provide an incentive for the second earner to move out of the labor force. At $10 an hour, for example, the tax rate for married women could be 41 percent of her earnings. These are extremely large marginal tax rates for low- to moderate-income families.

— David R. Francis

Macroeconomic Derivatives

Economic derivatives, which invite investors to purchase options based on macroeconomic activities, have been traded for less than four years. The payoff from these options depends on macroeconomic outcomes, such as growth in GDP and non-farm payrolls, inflation, the international trade balance, retail sales, and business confidence. In this market, "digital" or "binary" options are traded, which means that traders purchase a security that is worth $1 if, for instance, monthly employment growth was between 100,000 and 125,000 jobs — otherwise, the security is worth nothing. The prices of these options provide market-based measures of investors' expectations about the likelihood of various outcomes. These active "macro markets" (see www.economicderivatives.com for more information) potentially allow for better allocation of risk and for enhanced investor protection against macroeconomic risks.

In **Macroeconomic Derivatives: An Initial Analysis of Market-Based Macro Forecasts, Uncertainty, and Risk** (NBER Working Paper No. 11929), **Refet Gurkaynak** and **Justin Wolfers** analyze the data derived from the first few years of this new market, focusing on the forecasts for non-farm payrolls, initial unemployment claims, retail trade, and business confidence. Their main finding is that the central tendencies of market-based forecasts are at least as accurate, and in fact somewhat superior to, the "consensus" or "survey" forecast derived by taking the average estimate from a survey of forecasters. In addition, the authors report that financial market responses to economic news are better captured by market-based expectations than by the survey-based measures; again, this suggests that the financial market outcomes are better at capturing investor expectations. Further, these researchers find that some behavioral anomalies present in survey-based expectations, such as predictable forecast

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errors, are notably absent from market-based forecasts.

Gurkaynak and Wolfers note that the economic derivatives market establishes prices for options based on numerous and varied outcomes. Thus, the economic derivatives market allows researchers to derive not only a single "best" forecast, but also a measure of the uncertainty around such a forecast. Previously researchers had analyzed data on disagreement among forecasters, hypothesizing that disagreement was a reasonable

proxy for uncertainty. While uncertainty actually measures the likelihood and extent to which the economic outcome might differ from the central estimate, disagreement only measures how much the central estimates offered by different forecasters differ. Gurkaynak and Wolfers compare the measure of uncertainty that is implicit in the economic derivatives data to the measure of disagreement that can be extracted from the survey data. They find that, while there is some correlation between the two, on a release-by-release basis, disagreement is not a particularly good proxy for uncertainty.

Beyond capturing uncertainty, economic derivatives provide detailed information on the market's assessed likelihood of a full range of outcomes occurring. Historically, it has been quite rare to find such "density forecasts." Gurkaynak and Wolfers proceed to analyze their data in terms of the efficacy of these option prices as density, or probability, forecasts. If the price of an option paying $1 if a specific economic outcome occurs is twenty cents, does this suggest that

the chance of the outcome occurring is 20 percent? Their findings suggest that the answer is yes, and that economic derivatives yield efficient density forecasts, which they note is a rarity.

When applied to market-based measures, the researchers' density-forecast-efficiency tests jointly test efficient pricing and the absence of risk premiums. Yet it might seem reasonable that risk aversion would lead investors to bid up the prices of particular options, so as to insure against particularly bad outcomes; this would lead a risk premium to drive a wedge between prices and probabilities. The researchers' finding that economic-derivatives-based densities are efficient thus indicates that risk premiums in this market are probably small. This also allows them to investigate the degree to which the pricing of economic derivatives can be used to estimate investors' risk aversion.

The fact that risk premiums in this market are generally small also brings home the point that while these markets currently provide some

protection against "event risk" — the possibility that a portfolio's value may change sharply when economic data are released — until these markets are expanded to allow taking positions on longer-term outcomes, they do not provide much protection against macroeconomic downturns.

By using the institutional structure of economic derivatives to study risk and risk aversion, Gurkaynak and Wolfers surmise that economic derivatives are promising instruments for economists who would like to consider the relationship between investor's beliefs, risk attitudes, and asset prices. They conclude by noting that their paper is "an initial exploration [that] showed that economic derivatives correctly capture subjective beliefs and provided some applications of this information. Having these subjective probabilities will facilitate future research to study how expectations are formed and how they relate to actions, as well as to analyze agents' responses to occurrence of events of different prior subjective probabilities."

— Matt Nesvisky

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