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Program Report

Financial Markets and Monetary Economics

Benjamin M. Friedman

Financial markets are an integral part of the modern economy. The many and varied activities of financial markets both mirror and induce events in the economic system at large. Only rarely, however, do they serve as ends in themselves. Instead, they facilitate earning and spending, saving and investing, accumulating and retiring, transferring and bequeathing—all activities at the core of economic life. In principle, people could do all of these things without financial markets. In practice, well-functioning financial markets enable people to do them more efficiently, and few economic events take place without financial counterparts. Financial markets constitute an essential vehicle through which the millions of different participants in the nonfinancial economy continually interact with one another.

The primary objective of NBER's Program in Financial Markets and Monetary Economics is to pursue research that will further understanding of how financial markets and nonfinancial activity interact in the modern economy, and in particular, how activity in the financial markets can and does fundamentally affect what happens elsewhere in the economy. In addition, some of the research undertaken within the program seeks to contribute to knowledge about more specific aspects of financial behavior per se. Because financial markets are an area of economic activity in which the structure of institutions and the constraints that they face are an important influence on behavior, a keynote of much of this research is the attempt to incorporate, as explicitly and realistically as possible, relevant institutional and regulatory features of the market settings under examination.

The Changing Roles of Debt and Equity Financing

The current centerpiece of the program is a project studying the changing roles of debt and equity in financ-

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This issue of the **Reporter** highlights the Bureau's program of research on financial markets and monetary economics. Next, Patric Hendershott discusses his work on inflation and housing. Then, Harvey Rosen's work on taxes and housing is presented. A third summary by Alan Auerbach analyzes the effects of corporate taxes on investment. Following the quarterly Economic Outlook Survey are a section of biographical sketches, news of NBER conferences, and other NBER news and reports. Short summaries of recent NBER Working Papers constitute the final section of the **Reporter**.

ing U.S. capital formation, sponsored by the American Council of Life Insurance. The project began in 1979 and will continue for three years.

The rapid evolution both of the U.S. financial markets and of the nonfinancial economic climate has raised a broad range of important theoretical and empirical questions for which no good answers currently exist. In recent years, widespread fears that U.S. capital formation would be inadequate to meet accepted public policy objectives—including not only overall economic growth targets but also specific goals in such areas as environmental protection and energy self-sufficiency—have led first to claims of a potential saving–investment imbalance and then to suggestions of a mismatch not in the totals but in the intended specific forms of financial capital transfer. Problems of private debt versus equity financing, and of long versus short maturity within the debt structure, have

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featured prominently in these discussions. The relevant implications for public policy that promotes capital formation involve not only the amount but also the structure of taxation of business profits and private returns to investment. In addition, implications of the risk structure of securities, including the prospect that risk-free government debts could "crowd out" risky private liabilities (not to mention equities), have also raised issues that directly involve both aggregative fiscal and debt management policies.

Even at the most fundamental level, however, both the theory and the measurement of the performance of the financial markets are currently inadequate to contribute answers for the central questions raised in these public policy discussions. The chief objectives of the NBER project on debt and equity financing are: (1) to interpret theoretically and evaluate empirically the respective roles played by debt and equity in financing capital formation in a world of rapid (and unpredictable) price inflation, complex and continually evolving patterns of intermediation, increasing internationalization of financial flows, powerful tax incentives and disincentives, and pervasive regulatory and other institutional constraints and (2) to assess the practical opportunities for public policy to exploit a richer understanding of the underlying economics of debt and equity finance so as to promote an adequate rate and desirable balance of U.S. capital formation and, at the same time, enhance financial stability.

Researchers who have participated by contributing papers to the project in its first year include Zvi Bodie (Boston University), David Bradford (Princeton), William Brainard (Yale), John Cragg (British Columbia), Martin Feldstein (Harvard), Benjamin Friedman (Harvard), Roger Gordon (Princeton), David Hartman (Harvard), Edward Kane (Ohio State), Burton Malkiel (Princeton), Robert Merton (MIT), Stewart Myers (MIT), Gerald Pogue (CUNY), Vance Roley (Council of Economic Advisers), Robert Shiller (Pennsylvania), John Shoven (Stanford), and Lawrence Weiss (Yale). A small sampling of the papers completed to date follows.

Zvi Bodie's paper, "Purchasing Power Annuities: Financial Innovation for Stable Real Retirement Income in an Inflationary Environment" (NBER Working Paper No. 442), explores the desirability and feasibility of purchasing power annuities (PPAs)—that is, retirement annuities offering some kind of consumer price level indexation. After investigating the inadequacies of conventional and equity-based variable annuities in an inflationary environment, Bodie assesses the suitability of money market instruments hedged with commodity futures contracts as the asset base for PPAs and considers the possibility of having life insurance companies and private pension plans offer them to the public. The empirical evidence of the past twenty-six years indicates that the real (inflation adjusted) earnings rate that these financial institutions should use in pricing PPAs is, at most, zero.

Roger Gordon and Burton Malkiel's paper, "Taxation, Bankruptcy, and Corporation Finance," analyzes the effect of the federal tax structure on corporate financial policy, using a model in which both uncertainty and the possibility of costly bankruptcy are relevant conditions. Their analysis yields five principal conclusions: (1) As

long as firms are competitive, explicit incorporation of bankruptcy costs is essential if a model is to explain the observed corporate financial structure. (2) Direct evidence exists to show that bankruptcy and reorganization costs are substantial and that "me first" rules are not adhered to in settlements of Chapter X and XI bankruptcy cases. (3) Ignoring any effect of inflation on risk premiums, inflation per se cannot explain the recent poor behavior of the stock market. Also, given that the existing tax system is not indexed for inflation, it would appear that efficiency costs created by the system might even decline when the inflation rate increases. (4) The efficiency costs arising from tax incentives to increase debt-equity ratios are substantial—perhaps as high as \$3–6 billion a year, or approximately 10 percent of corporate tax revenues. (5) Debt-equity ratios historically increased steadily from World War II until 1974, and have declined only slightly since then. We might infer from this rise an increasing optimism (or decreasing pessimism) about future prospects until the early 1970s.

Edward Kane's paper, "Accelerating Inflation and the Distribution of Household Savings Incentives," describes how accelerating inflation has led households in different economic and demographic classes to reallocate their "transactable savings." Kane used cross-sectional data from the 1962 and 1970 Survey of Consumer Finances to estimate both the composition of accumulated household saving and prospective rates of return on this saving. His analysis shows that accelerating inflation has, in the presence of comprehensive ceilings on deposit interest rates, altered the savings incentives of different types of households. The effect has been to bias *small* savers toward leveraged investments in tangible assets (especially real estate) and *large* savers toward stocks and marketable bonds. Small savers with disadvantaged access to credit are simply victimized. This analysis helps to explain a number of anomalous features of the 1975–79 macroeconomic recovery, particularly the dominant role of consumer spending, the unprecedented expansion of household debt, the boom in housing, and the declining ratio of savings to personal income. Moreover, these results underscore the unintended consequences of trying to reconcile deposit rate ceilings with accelerating inflation. This combination of policies has distorted the sectoral composition of spending (crowding out many dollars of productive business investment) and has aggravated inequities in the distribution of income and opportunity.

The project on debt and equity financing will continue to be a major focus of the financial markets and monetary economics research program in 1980, when it will also be a part of NBER's 1980 Summer Institute, and again in 1981, when a conference will provide the opportunity for some of the researchers participating in the project to discuss their findings with an audience largely drawn from business and government.

The Structure of Interest Rates

During the summer of 1979, Olivier Blanchard (Harvard), Benjamin Friedman, David Jones (Northwestern), James Pesando (Toronto), William Poole (Brown), and Robert Shiller came together for a one-month workshop

on the structure of interest rates in the context of approaches to interest rate determination that emphasize the role of expectations.

One example of the research done in connection with this workshop is James Pesando's paper, "On Forecasting Interest Rates: An Efficient Markets Perspective" (NBER Working Paper No. 410). Pesando's paper reviews, from an applied forecasting perspective, the properties of short- and long-term interest rates in an efficient market. His analysis emphasizes that efficient markets do not preclude economic agents from successfully forecasting movements in short-term interest rates. For brief forecast intervals, however, ex ante changes in long-term rates are sufficiently close to zero that economic agents are not likely to improve upon the no-change prediction of the martingale model. Economic agents, in effect, are not likely to succeed in forecasting *short-term* movements in long-term interest rates. An analysis of three sets of Canadian interest rate forecasts provides results consistent with these theoretical implications. Further, these results parallel those obtained in recent studies of recorded forecasts in the United States.

The Determination of Long-Term Interest Rates

In a separate project undertaken within the financial markets and monetary economics program, Benjamin Friedman is investigating the role that the long-term capital market plays in influencing not only the behavior of the financial markets but also nonfinancial economic activity, including physical capital formation. The key focus of this research is the exploitation of a supply-demand framework according to which interest rates are explicitly determined in the market in which bonds are bought and sold. Hence, any factor that influences interest rates—expectations of price inflation, for example, or investors' available cash flows, or businesses' external funds requirements—does so only by affecting some lender's demand for bonds or some borrower's supply of bonds (or both). Approaching interest rate determination in this way provides different answers to familiar questions about, for example, the effects of monetary and fiscal policies. Friedman has implemented this approach for the market for bonds issued by borrowers in the private sector, and he is now extending his analysis to the market for federal government securities.

The Individual Investor in the Corporate Equity Market

Wilbur Llewellyn (Purdue), in another project, is investigating the behavior of individual investors in corporate equities. Because of its key role in the process of capital allocation in the economy, the corporate equity market has been the subject of intense study in the literature of finance and economics. Most investigations to date have concentrated on the price-setting mechanism for the shares of large corporations and have focused on the investing activities of institutional investors—primarily for reasons of data availability. In contrast, Llewellyn's research focuses on the role of individual investors in the equity market, including their trading behavior and portfolio performance, the character of their investment decision processes, and their contributions to market liquidity

and efficiency for small as well as large firms. The objective of this research is to gain new insights into the workings of the market in order that public policy decisions about such issues as market structure, brokerage commission rates, and corporate disclosure requirements can be made on a more informed basis.

Speculative and Obligational Markets and the Business Cycle

Finally, in another project undertaken within the Program in Financial Markets and Monetary Economics, Robert Shiller is investigating the behavior of speculative and obligational markets in the context of macroeconomic fluctuations. Speculative markets (such as the stock market) are impersonal, and they clear continuously. Obligational markets (such as the labor market) are "relational"; they appear often not to clear. An understanding of what accounts for the behavior of these two categories of markets is essential to an understanding of the business cycle. The efficient markets paradigm suggests that prices in speculative markets change only in response to "new information" about the present value of the assets. Shiller's research seeks empirical evidence to show in what ways this paradigm fails, in that short-run price movements show too much volatility and long-run movements too much magnitude, to be accounted for entirely by new information. Shiller is building a theoretical model of speculative markets in which prices are not "efficient" since "smart money" does not have the resources to completely determine prices. In addition, he is attempting to establish theoretically, and verify empirically, the macroeconomic implications of new theories of human behavior and "private law" in obligational markets.

Research Summaries

Inflation, Housing, and Productivity

Patric H. Hendershott

The favorable tax treatment of owner occupied housing and the resulting misallocation of the nonfinancial capital stock of the United States has long been recognized. In some recent work, Sheng Hu and I have been investigating the impact of inflation on this allocation. We estimate that the demand for housing has been greatly stimulated, while the stock market, and thus corporate demand for capital goods, has been depressed. As a result, the misallocation of the capital stock and the resulting economywide productivity losses have increased greatly.

Inflation and the Demand for Owner Occupied Housing

Housing economists appear to have turned one hundred and eighty degrees in the past few years in their

views regarding the impact of inflation on housing demand. In the early 1970s, the impact of inflation on monthly payments (and, to a lesser degree, on down payments) was the focus of attention. Because of the widespread use of the fixed payment mortgage, inflation "tilted" real monthly payments upward during the early years of the mortgage, resulting in a sharp increase in the ratio of the initial monthly payment to current income. As a consequence, housing was too expensive for those who would have been able to purchase houses or more housing in the absence of the tilt.¹ The graduated payment mortgage (GPM) was advocated as a means of reversing this tilt, and the Federal Housing Authority (FHA) implemented a GPM program in 1975. Further, the Emergency Home Purchase Assistance Act of 1974 authorized the extension of mortgage credit at below-market interest rates when inflationary conditions were having a severely disproportionate negative effect on the housing industry.

In recent years, attention has shifted to the impact of inflation on the underlying equilibrium demand for housing.² The argument that housing is too expensive reflects the perception that financial constraints induced by inflation hold effective housing demand below the equilibrium level. However, the underlying equilibrium demand for housing is stimulated by inflation because the real aftertax financing rate, and thus the user cost of capital, declines. Recent (1976-79) levels of sales and production of single family housing and increases in housing prices suggest that the positive impact of inflation on the underlying equilibrium demand for housing has far outweighed the negative impact created by financial constraints. This should not be surprising because the financial constraints probably bind only potential first-time home buyers who have not already reaped extraordinary capital gains on housing that would allow large down payments and thus, relatively small monthly payments. In contrast, the stimulation to equilibrium demand applies to both existing homeowners and to potential first-time buyers.

The user cost of capital for owner occupied housing tends to be low because the implicit rents from the unit are not taxed, while some expenses (interest and property taxes) are deductible in computing the personal income tax base. Moreover, this user cost tends to decline in response to increases in anticipated inflation because real aftertax debt yields fall.³ Estimates of user costs for owner occupied housing and corporate structures in 1964 and 1978 are listed in table 1. The 1964 data illustrate the relationships among user costs in a noninflationary period. The costs for housing are lower because of preferred tax treatment, and the costs are lowest for those in the highest tax brackets because of the partial deductibility of expenses. The 1978 data reflect

¹See P. H. Hendershott and K. E. Villani, Regulation and Reform of the Housing Finance System, *American Enterprise Institute for Public Policy Research*, for a brief discussion of this argument.

²See P. H. Hendershott and S. C. Hu, "Inflation and the Benefits from Owner Occupied Housing," NBER Working Paper No. 383, August 1979, and the references cited therein.

³On the cause of the decline in real afterdebt yields, see P. H. Hendershott, "The Decline in Aggregate Share Values: Inflation, Taxation, Risk, and Profitability," forthcoming as an NBER Conference Paper.

TABLE 1: User Costs of Capital, 1964 and 1978

(Percents)

	1964	1978
Owner Occupied Housing:		
15 Percent Tax Bracket	9	5
30 Percent Tax Bracket	8	2
45 Percent Tax Bracket	7	0
Corporate Structures	15	27

SOURCE: The underlying data are from P. H. Hendershott and S. C. Hu, "Inflation and Extraordinary Returns on Owner Occupied Housing: Some Implications for Economic Stabilization and Efficiency," a revision of *NBER Working Paper No. 383*, August 1979, Appendix, Table A4, and "An Optimal Feasible Replacement Model of Investment: Application to Orders for Producers' Equipment," a paper presented at the Conference on the Economic Effects of Federal Taxes, Brookings Institution, October 18, 1979.

the decline in real aftertax debt yields; the decline is largest in the highest tax brackets. (The fall in user costs would have been greater, but there was a relatively rapid rise in the price of structures.) Given the enormous decline in user cost, the extraordinary increase in the demand for housing in recent years is hardly surprising.

Equity Yields, Stock Prices, and the Demand for Corporate Capital

A sharp rise in the demand for one good necessarily leads to reduced demands for some other goods. In this case, the reductions appear to have been initially in the demand for corporate equities and subsequently in the demand for corporate capital goods. The decline in the user cost of capital for housing created the potential for extraordinary returns on incremental investment in housing. (That is, the marginal product exceeded the user cost.) Households reduced equity purchases in order to buy housing; monthly mortgage payments replaced monthly mutual fund purchases. In effect, the required real return on equity shares increased and stock prices fell.⁴ Gradual adjustment to the higher desired housing stock and the periodic increase in anticipated inflation (and thus decline in the user cost) has caused a "temporary" increase in the required return on equity and decline in stock prices to last for a decade.

The differences between the changes in the user costs for residential and corporate nonresidential structures (see table 1) largely reflect the increase in the required return on corporate equity generated by inflation and the large debt financing of owner occupied housing. All user costs have tended to rise with the relative increase in the price of structures and to fall with the decline in real aftertax debt rates. Corporate investments, however, are heavily financed by equity. Thus, the rise in the real cost of equity has far outweighed the decline in the real cost of debt. (The increased understatement of tax depreciation due to historic-cost valuation during a period of rising inflation has also contributed to the increase in the user cost for corporate structures.) The net result has been to nearly double the user cost for corporate

structures and the sluggishness of investment in such structures in the 1970s.

Too Much Housing

The above analysis has a most important implication. Because of inflation and the unfavorable taxation of corporate capital, Americans are now investing resources in housing that has a net (of depreciation) marginal product of near zero and are foregoing the construction of corporate structures that promise a return of 20 percent. The economywide productivity losses from the misallocation of real capital in favor of housing are enormous. A relatively conservative estimate is an annual loss of \$12 billion in 1978 dollars, a loss that has more than tripled in about a decade.⁵ With a real discount rate of 4 percent, the present value of the loss is \$300 billion.

Steps might be taken to lessen this productivity loss by reducing the taxation of corporate capital, although political realities appear to rule out any increase in the taxation of housing. One obvious example is the Conable-Jones bill, which would greatly accelerate the tax depreciation of corporate investments. The net result would be a reduction of about four percentage points in the user costs for corporate plant and equipment.⁶ On the other hand, widespread use of tax-exempt securities to finance owner occupied housing would greatly increase the subsidy to housing by reducing its financing rate and thus the user cost of capital. One estimate of the impact of unlimited issuance of tax-exempt mortgage revenue bonds is a doubling of the quantity of tax-exempt debt outstanding and an increase of \$3 billion in the productivity loss due to the misallocation of real capital in the economy.⁷ (Legislation to prohibit increasing these bonds was introduced in April 1979, but approval was still pending as of the end of the year.)

Housing and the Measurement of Inflation

In spite of the obvious increase in benefits accruing to homeowners in recent years, the rise in the homeownership component of the consumer price index (CPI) would lead one to believe that increases in housing costs are rapidly eroding our standard of living. Of greatest interest here is the financing component of homeownership costs. This is measured in the CPI as the product of the nominal beforetax mortgage rate and the price of a standard house. Because the mortgage rate has risen significantly since 1973, this component of the CPI has more than doubled and has increased more than twice as rapidly as the remainder of the index. There is a striking discrepancy between the measured real increase in financing costs and the earlier expressed view that extraordinary returns have been available on investment in housing.

⁵P. H. Hendershott and S. C. Hu, "Government Induced Biases in the Allocation of the Stock of Fixed Capital in the United States," in *Capital, Efficiency and Growth*, ed., G. M. von Furstenberg (Cambridge, Mass.: Ballinger Publishing Co., 1980), chapt. 4.

⁶P. H. Hendershott and S. C. Hu, "An Optimal Feasible Replacement Model of Investment: Application to Orders for Producers' Equipment," a paper presented at the Conference on the Economic Effects of Federal Taxes, Brookings Institution, October 18, 1979.

⁷P. H. Hendershott, "Mortgage Revenue Bonds: Tax Exemption with a Vengeance," a paper presented at the Conference on Efficiency in the Municipal Bond Market, January 24, 1980, and *NBER Working Paper No. 447*, February 1980.

⁴P. H. Hendershott, "The Decline in Aggregate Share Values: Inflation, Taxation, Risk, and Profitability," forthcoming as an *NBER Conference Paper*.

The user cost analysis suggests that the appropriate measure of financing costs is the product of the real aftertax mortgage rate and a house price series. Instead of more than doubling since 1973, a component based upon such a rate would have been roughly constant, since the mortgage rate actually declined from 0.75 percent to 0.50 percent. The CPI, as currently computed, rose by 50 percent in the 1974-78 period; with the interest cost of the mortgage computed appropriately, the rise would have been about 40 percent. That is, the CPI has overstated inflation by nearly 20 percent.

Another gauge of how well homeowners have actually fared during recent years is a comparison of the realized real annual rate of return on their homeowner equity with the return that they expected to earn when they purchased their house. If one assumes that a household purchased the "optimal" size house at the end of 1972 (given expectations regarding expected inflation), financed the purchase with a 75 percent mortgage, and then sold the house and repaid the mortgage at the end of 1978, the ex post real annual rate of return (after accounting for brokerage fees) would have exceeded the expected real return by seven and a half percentage points.⁸ Such discrepancies have characterized the period since 1964.

⁸P. H. Hendershott and S. C. Hu, "Inflation and the Benefits from Owner Occupied Housing," NBER Working Paper No. 383, August 1979, Appendix, Table A2.

The Federal Income Tax and Housing

Harvey S. Rosen

Due in part to skyrocketing housing prices in recent years, a good deal of attention has been focused on public policy toward housing.¹ Among the most important government influences on housing are the provisions of the Internal Revenue Code. Homeowners in the United States are permitted to deduct local property taxes and payments of mortgage interest in the computation of their income tax. At the same time, imputed rent—the value of the services provided by a home—is excluded from taxable income. If the income tax base were comprehensively defined, net imputed rent would be included in taxable income. In other words, the net return on housing would be taxed just like the net return on any other asset. In effect, the federal tax system can be viewed as subsidizing owner occupied housing.

The subsidy is controversial, and a number of proposals have arisen to modify or eliminate it.² In order to discuss policy alternatives intelligently, it is necessary to estimate the impact of the tax laws on individuals' housing decisions. The purpose of this article is to report on estimates of this impact that have been made as part of the Bureau's Program on Taxation.

The first step in estimating the tax effects on homeownership decisions is to assess the impact of the relevant provisions on the effective price of housing services. To do so, one begins by noting that if the homeowner were taxed like other investors, he or she would have to report as income the gross imputed rent on the house. And like other investors, he or she would be allowed deductions for maintenance, depreciation, interest, and property taxes as expenses incurred in earning this income. The difference between gross imputed rent and these expenses (net rent) would be included in taxable income.

However the homeowner does *not* have to include gross imputed rent on his or her tax return, although he or she is permitted deductions for mortgage interest and property taxes. Thus, taxable income is understated by the difference between depreciation and the sum of net rent, mortgage interest, and property taxes. The higher one's marginal tax rate, the greater the tax saving associated with this reduction in taxable income.

To gain an idea of the order of magnitude of this tax saving, it may be useful to consider a specific numerical example. Suppose that the interest rate is 10 percent, property taxes are 1.5 percent of the value of the house, and depreciation and maintenance are 2.25 percent and 1.25 percent of the value of the house, respectively. Then, the gross rent on a \$100,000 house is \$15,000 [= (.10 + .015 + .0225 + .0125) × 100,000]. Of this amount, \$11,500 is either excluded from taxable income or deductible [(.10 + .015) × 100,000]. If the individual's marginal tax rate is 30 percent, this lowers his or her tax bill by \$3,450. The effective cost of housing is thus lowered by 23 percent (= 3450/15000).

Once the effect of the income tax system on the effective price of owner occupied housing is estimated, the next problem is to assess the sensitivity of housing decisions to changes in that price. There is, of course, a presumption in economic theory that, other things being the same, if the price of owner occupied housing is lowered, more of it will be demanded. The interesting question for policy purposes is how much the quantity demanded will increase. In an attempt to answer this question, I recently analyzed the housing behavior of a cross section of American families since 1970.³ The results suggest that if the favorable federal tax treatment of owner occupied housing were eliminated, the proportion of households in the population owning homes would fall by about 4.4 percentage points. Moreover, the amount of housing consumed by those who already owned homes would fall by

¹ Between 1973 and 1977 the median value of owner occupied housing units increased by about 50 percent, according to the U.S. Department of Commerce, Annual Housing Survey; Current Housing Reports, Series H-150, 1975-79.

² See, for example, Henry Aaron, *Shelters and Subsidies* (Washington, D.C.: the Brookings Institution, 1972); 70-73.

³ See H. S. Rosen, "Housing Decisions and the U.S. Income Tax," *Journal of Public Economics*, 11 (February 1979); 1-23.

about 15 percent.⁴ The tax provisions, then, seem to have substantial impacts on behavior.

The reader who is familiar with recent developments in the housing market will notice an important omission in the preceding analysis: capital gains are not mentioned. In a world of rising house prices, the annual cost of owner occupied housing is lowered by an amount equal to expected capital gains. Due to various provisions in the tax code, these gains are, for all intents and purposes, untaxed. This exclusion adds another inducement to invest in owner occupied housing.

Although omission of expected capital gains might be reasonable in analyzing data from the early seventies, it is certainly clear that for the more recent period, these gains should be taken into account. Kenneth Rosen and I have analyzed U.S. time-series data on the choice between renting and owning for the postwar period in a model that explicitly included expected capital gains in the cost of owner occupied housing.⁵ The results were more or less in line with those that emerged from the cross-sectional data. It was estimated that if the income tax advantages for homeownership were removed, the incidence of homeownership would fall in the long run by about 4.0 percentage points.

Much work remains to be done to improve our understanding of the impact of taxes on housing decisions. Better measures of the financial risks associated with homeownership need to be calculated. More attention should be focused on the potential short-run wealth redistribution effects of changing the tax laws. I suspect, however, that additional econometric study will bear out the substantive result that the implicit subsidy has an important effect on individuals' housing decisions. The natural question then becomes whether or not the policy is socially desirable.

One view is that the subsidy is inefficient because it results in too much consumption of housing. By lowering the effective price, it induces some consumption of housing that is valued less than the costs to society. There are two main counterarguments to this position. One is that owner occupied housing is associated with desirable spillover effects—good maintenance of property, and so on—and therefore should be subsidized. The other is that the subsidy may be a useful way to encourage an important form of saving. It is hoped that future research will be able to shed some light on the relative merits of these arguments.

⁴ The tax induced changes vary by income class because both the size of the subsidy and the magnitude of the behavioral response depend upon income.

⁵ H. S. Rosen and Kenneth T. Rosen, "Federal Taxes and Homeownership: Evidence from Time Series," *Journal of Political Economy*, forthcoming. For a useful theoretical analysis of the impact of inflation on the cost of housing, see Patric H. Hendershott and Sheng Cheng Hu, "Inflation and the Benefits from Owner Occupied Housing," NBER Working Paper No. 383, August 1979.

Corporate Taxes and Investment

Alan J. Auerbach

A number of issues arise when one attempts to evaluate the impact of taxes on corporate investment. Some issues are related to the general characteristics of the U.S. tax system and others are more closely tied to the treatment of corporations within this system. It is important to understand these issues, as there has been widespread concern of late over the adequacy of domestic capital formation, especially since most nonresidential investment in the United States is undertaken by corporations.

Because our tax system is not integrated, corporations are taxed independently of their shareholders. This suggests that to gain a true picture of the way in which taxes affect corporate behavior, one must study the combined effects of the relevant corporate and personal taxes.

Taxes and the Cost of Capital

This need to study a corporation and its owners together is most apparent in the study of the firm's financial policy. Looking only at the corporation, one may conclude, as Modigliani and Miller did years ago, that if there is no corporate income tax and no risk of bankruptcy, neither the debt-equity ratio nor the rate of retention of earnings will affect a firm's value. Thus, leaving aside questions of bankruptcy, with a positive rate of tax the firm should finance entirely with debt.

Taking the view that the corporation acts in the interests of its taxpaying shareholders, one sees a different picture. Given the preferential rate of tax given to capital gains, it is hard to explain convincingly the observed magnitude of dividend payouts without considering the possibility that the marginal equity value of a corporation's potential investment projects is sufficiently *below* their cost to neutralize this apparent tax advantage.

If one accepts the hypothesis that firms will pay dividends only if doing so maximizes stockholder wealth, a number of results follow that are at variance with some fairly common perceptions.¹ First of all, the marginal personal tax rate on equity income is the capital gains rate, or its accrual equivalent, regardless of the firm's retention rate. Second, it is not in the firm's interest to maximize the value of its securities. Instead, the appropriate objective is to maximize weighted sum of debt and equity, these weights depending on stockholder tax rates. Third, even aside from the risk of bankruptcy, my analysis shows that there is no reason that the firm will prefer financing only with debt, especially if one recognizes the existence of progressive personal tax schedules. These results, taken together, suggest the ways in which corporate and personal taxes influence the cost of capital used by the firm in its investment planning.

Of course, this formulation of the cost of capital begs an important question: Who are the firm's shareholders,

¹ A. J. Auerbach, "Wealth Maximization and the Cost of Capital," *Quarterly Journal of Economics* (August 1979), also forthcoming as an NBER Reprint.

and how is their composition affected by the firm's financial and investment policies? In a world with taxes and uncertainty, the owners of a firm (its clientele) are likely to depend on the policies it pursues, and this endogeneity makes the firm's objectives more cloudy. Who shall it satisfy? In ongoing research, Mervyn King and I have been exploring this problem, looking at the effects of the financial policy of firms when potential stockholders differ with respect to the taxes they face and their attitudes toward risk.² Our results suggest how a firm's value and the pattern of ownership of its shares depend on the riskiness of its debt and equity.

Inflation and the Composition of Investment

Under inflationary conditions without a tax system that is correctly indexed, there may be distortionary effects on the choice of asset durability. Even if the time pattern of depreciation for tax purposes corresponds to economic depreciation, use of historic cost bases in calculating deductions will, with inflation, introduce a bias. This bias favors investment in long-lived assets, in the sense that the effective tax rates on such assets are lower than those on less durable assets.³

Naturally, the current tax treatment of investments is much more complicated to analyze than the case where depreciation deductions are based on economic depreciation. Despite the fact that inflation per se discriminates against short-lived assets such as equipment and favors investments in longer-lived assets such as structures, the net result of our present tax law is a lower effective tax rate on equipment than structures, even at inflation rates as high as 12 percent. This apparent anomaly results from the gradual introduction over the years of a number of provisions that have applied only to equipment. These include: (1) the shortening of depreciation lifetimes and the introduction of the investment tax credit in 1962; (2) the limiting of structures to the use of the 150 percent rather than the double-declining balance method of depreciation in 1969; (3) the further shortening of depreciation lifetimes for equipment through the Asset Depreciation Range (ADR) System, introduced in 1971; and (4) the increase in the investment tax credit to 10 percent in 1974.

Aside from the expected increase in investment in business equipment, undesirable side effects have stemmed from this cascade of alterations in the tax law. Lawrence Summers and I studied the investment tax credit, using the DRI model of the U.S. economy.⁴ We found that this increase in equipment investment since the early 1960s has been largely at the expense of other types of investment, both in housing and in nonresidential structures. The implied "bang per buck" (the increase in investment per dollar of government revenue loss) is extremely low in present value terms. Moreover, our results suggest

that the continued tax law amendments have destabilized investment and overall output over the years we studied.

New Tax Incentives

Many have responded to the perceived increased tax levied on capital income in the corporate sector as a result of inflation with proposals for new tax incentives for such investment. Aside from the determination of how big such a stimulus should be, the key questions here concern the form such a stimulus should take and how it should be applied to different investments. This last issue goes under the heading of "tax neutrality," and there has been no lack of research or confusion concerning what constitutes a neutral tax incentive.

One problem with the usual approach to this question is the tendency to focus only on investment and the direct effect of capital income taxes, rather than seeing such taxes as part of a much broader tax system. Viewing the neutrality issue as part of a comprehensive problem of optimal tax design, one sees the limitations of attempting to arrive at neutral investment incentives in a piecemeal fashion, ignoring other taxes. In general, the appropriate neutrality condition depends on these other taxes.⁵

Even where one feels compelled to consider investment incentives separately from other tax policies, uncertainty remains about the kind of tax structure that will lead to an efficient allocation of capital. Two fundamentally different criteria have been suggested repeatedly in the literature, and no consensus appears to have been reached. One view suggests that the tax system should be designed in such a way that the present value of taxes associated with an initial dollar investment be independent of the form of this investment. The second view calls for the independence of the effective tax rate, which is based on each investment's internal rate of return. This controversy recalls earlier debates about the appropriate social discount rate and the use of internal rate of return versus present value rules in investment decisions.

My research suggests that using the internal rate of return is the correct approach for a wide variety of cases, regardless of the form and service pattern of the investments in question. The present value approach, at least as it has been formulated in the past using the consumption rate of discount, appears to be inappropriate and to lead to distortionary outcomes.⁶

A case in point is the Conable-Jones proposal to shorten depreciation lifetimes to ten years for structures and five years for most equipment and to liberalize the investment tax credit. A previous Bureau study has shown that for a wide range of inflation rates, this scheme would provide a reasonably neutral treatment of different assets in terms of the present value criterion described above.⁷ The story is very different if one looks at effective tax rates.

² A. J. Auerbach and M. A. King, "Corporate Financial Policy, Taxes, and Uncertainty: An Integration," NBER Working Paper No. 324, March 1979.

³ A. J. Auerbach, "Inflation and the Choice of Asset Life," *Journal of Political Economy* (1979), also NBER Reprint No. 31.

⁴ A. J. Auerbach and L. H. Summers, "The Investment Tax Credit: An Evaluation," NBER Working Paper No. 404, November 1979.

⁵ A. J. Auerbach, "The Optimal Taxation of Heterogeneous Capital," *Quarterly Journal of Economics* (November 1979).

⁶ A. J. Auerbach, "Tax Neutrality and the Social Discount Rate: A Suggested Framework," NBER Working Paper No. 457, February 1980.

⁷ Martin Feldstein, "Adjusting Depreciation in an Inflationary Economy: Indexing versus Acceleration," NBER Working Paper No. 395, September 1979.

In a paper Dale Jorgenson and I wrote that examines different tax proposals, including one of our own, we found the Conable-Jones scheme to be distortionary, even more so than the present system.⁸ Under a moderate rate of inflation, such as 6 percent, many types of equipment investment would actually be subsidized—they would have negative effective corporate tax rates. At the other extreme, most investment in structures would continue to face tax rates not far below the statutory rate of 46 percent.

An alternative scheme we examined is the "first-year capital recovery system." This would replace the current system of depreciation allowances with a schedule of first-year deductions for each asset. The deductions would be calculated so as to make the present value of depreciation deductions roughly the same as if depreciation allowances mirrored economic depreciation and were indexed for inflation. Because this present value is calculated with a real aftertax discount rate, the effective tax rate of the typical investor need not be influenced by fluctuations in the inflation rate.

Conclusions

Investment remains a volatile component of GNP; perhaps, to a great extent, observed fluctuations in capital formation can only be attributed to changing attitudes. Nevertheless, empirical evidence has shown that taxes, assessed directly or through inflation, do exert an important influence on investment decisions. However, be-

cause the tax system is neither integrated nor indexed, the way in which taxes affect investment is complex. Any analysis that attempts to evaluate the effects of prospective changes in the tax system must also be complex.

Economic Outlook Survey

First Quarter 1980

Victor Zarnowitz

According to the median forecast from the latest survey of professional economic forecasters, taken by the American Statistical Association and NBER, the economy's total output (real GNP) in the current quarter will be about the same as in the preceding (1979:4) quarter, while industrial production will be somewhat lower. In the next two quarters, a mild decline in real GNP is expected to occur. The brief recession is to be followed by a slow initial recovery in 1980:4 and 1981:1. The rates of inflation will be very high in the first half of the year and only moderately lower in the second half.

The Outlook for Inflation

The GNP implicit price deflator (IPD) is projected to rise 8.7 percent between 1980:1 and 1981:1, an annual rate of inflation equal to that observed in 1979:4 but lower

⁸A. J. Auerbach and D. W. Jorgenson, "The First-Year Capital Recovery System," forthcoming as an NBER Working Paper.

Projections of GNP and Other Economic Indicators, 1980-81

	Annual				Quarterly						
	1979 Actual	1980 Forecast	Percent Change 1979 to 1980	1979 Q4 Actual	1980				1981 Q1	Percent Change	
					Q1	Q2	Q3 Forecast	Q4		Q4 79 to Q4 80	Q1 80 to Q1 81
1. Gross national product (\$ bil.)	2368.5	2583	+9.1	2455.8	2515	2551	2599	2665	2737	+8.5	+8.8
2. GNP implicit price deflator (1972 = 100)	165.5	180.5	+9.1	170.7	174.8	178.6	182.5	186	190	+9.0	+8.7
3. GNP in constant dollars (bil. 1972\$)	1431.1	1432	0.0	1438.4	1440	1430	1427	1431	1438	-0.5	-0.1
4. Unemployment rate (percent)	5.8	6.8	+1.0 ¹	5.9	6.3	6.6	7.0	7.1	7.2	+1.2 ¹	+0.9 ¹
5. Corporate profits after taxes (\$ bil.)	152.2	142.3	-1.5	149 ²	148	142	139	140	143	-6.0	-3.4
6. Plant and equipment expenditures (\$ bil.)	176.4	191.8	+8.7	184.3	189	192	192	194	198	+5.3	+4.8
7. New private housing units started (ann. rate mil.)	1.74	1.36	-21.8	1.60	1.40	1.32	1.32	1.40	1.50	-12.5	+7.1
8. Change in bus. inventories GNP accounts (\$ bil.)	10.2	9.1	-1.1 ³	6.4	10.0	13.5	5.0	8.0	10.5	+1.6 ³	+0.5 ³

SOURCE: American Statistical Association and National Bureau of Economic Research, Business Outlook Survey, February 1980. The figures on each line are medians of twenty-four to twenty-six individual forecasts.

¹Change in rate, in percentage points.

²Actual not available. Based on average forecast.

³Change in billions of dollars.

than that predicted for 1980:1 (10 percent). The 1979:4 value of IPD (170.7, index 1972 = 100) was very accurately predicted by the median forecast from the November 1979 survey (at 171). The projections of this index have been raised very little in the present survey compared with the previous one. The average for the year 1980, according to the new median predictions, will be 180.5, 9.1 percent above the average for 1979; in 1981:1 the index is to reach the level of 190. However, when inflation accelerates swiftly it turns out in retrospect to have been largely unanticipated, that is, underestimated (in this respect 1979-80 is apt to resemble 1973-74). The 10 percent inflation forecast for the GNP index in 1980:1 already looks like a substantial underprediction. Another caveat is that the survey was held before the current round of budget-balancing proposals and measures to restrict the growth of credit.

The estimated probabilities of change in IPD, for 1979-80, are concentrated in the range of 8 to 10 percent (63 chances in 100) and higher (30 chances in 100). It might be recalled that the consumer price index (CPI) has been recording much higher rates of inflation lately than did IPD. In terms of CPI, the survey forecasts imply no relief from two-digit inflation.

The Outlook for Aggregate Economic Activity

The combination of a high and accelerating inflation, declining productivity, and very little real growth, which prevailed during the past year, was reflected in a succession of pessimistic assessments of the near future in the recent ASA-NBER surveys. This time, the median forecasts from the survey imply continuing sluggishness in the current quarter and a milder and shorter decline in aggregate economic activity than had been projected previously. In November 1979, a loss of 1.3 percent in real GNP was anticipated for 1980 compared with 1979; the February survey forecasts no significant change in total output of the economy between the two years. The predictions of lesser declines in aggregate demand correspond to the predictions of more inflation ahead.

The reported probabilities that real GNP will turn down average only a little higher than 50 percent for the quarters 1980:2 and 1980:3 and between 28 and 36 percent for the other quarters covered. These estimates tend to be lower than those obtained in the previous (1979:4) survey.

Consistent with typical behavior during business cycles, manufacturing will weaken much more than the other sectors combined. The index of industrial production, which covers mining and utilities in addition to manufacturing, is expected to decline 3 percent between 1979:4 and 1980:3, then rise nearly 2 percent to the level of 150 (1967 = 100) in 1981:1. It will be down about 2 percent in 1980 relative to 1979, according to the median forecast. The corresponding quarterly movements in real GNP are constrained to ± 0.8 percent and the annual change in 1979-80 is approximately zero.

The rate of unemployment is seen as increasing in each quarter, from 5.9 percent of the labor force in 1979:4 to 7.2 percent in 1981:1. The average for the year 1980 is 6.8 percent, one percentage point higher than in 1979.

Business Investment, Consumer Capital Outlays, and Profits

The survey highlights the cyclically sensitive components of aggregate demand: business fixed investment and consumer capital outlays. In these areas, the anticipated declines in real terms during the year ahead (1980:1 to 1981:1) are substantial. Deflating the nominal predictions with the median forecasts for the GNP price index yields declines of approximately 4 percent for plant and equipment expenditures and 6 percent for consumer spending on durable goods. However, the forecasters predict that, on the average, housing starts will rise by about 7 percent in the same period. The downward trend in this sector, so pronounced in 1979, is to end at midyear (with starts running at 1.3 million units annual rate, down 18 percent from 1979:4) and is to be followed by a fair upturn (of nearly 14 percent, to 1.5 million units in 1981:1).

Investment in business inventories is not perceived as contributing strongly to the economy's weakness, as it did in most recent recessions. Its fluctuations are to be irregular, within a relatively narrow range of nonnegative values (\$5 billion to \$14 billion, annual rate).

Corporate profits after taxes are projected at \$139 billion annual rate in 1980:3, down \$10 billion from 1979:4, and at \$143 billion in 1981:1. These are very small movements for this variable by past standards, even if one allows for the magnification of the decline by inflation.

Some Implications and Assumptions

Defense spending is to gain nearly 13 percent in the year ahead, 4 percent more than the expected rise in the general price level. This sector, then, will help cushion the impact on constant-dollar GNP of the prospective declines in business fixed investment and consumer durables. The forecasts also imply that consumer spending on nondurable goods and services, a large component of GNP that has held up well recently at the apparent cost of unusually low personal saving rates, will continue relatively strong.

Most survey participants proceeded on the premise that the recent monetary and fiscal policies will continue essentially unchanged. A scattering of different policy assumptions included: (1) a tax cut of \$15-25 billion (seven forecasters); (2) a windfall profits tax (three forecasters); and (3) a tighter monetary policy (four forecasters). Major increases in defense spending were mentioned by most respondents, oil price increases by many. Eight forecasters stated explicitly that they anticipated no price-wage controls; seven said that they did assume the imposition of controls.

This report summarizes a quarterly survey of predictions by about fifty business, academic, and government economists who are professionally engaged in forecasting and are members of the Business and Economics Statistics Section of the American Statistical Association. Victor Zarnowitz of the Graduate School of Business of the University of Chicago and NBER and James Poterba of NBER were responsible for tabulating and evaluating this survey.

Victor R. Fuchs

Victor Fuchs, founder and co-director of NBER's Program in Health Economics, has been associated with the Bureau since 1962. Born in New York City, Fuchs received a Ph.D. in economics from Columbia University in 1955. He taught at Columbia and New York University and was a program associate at the Ford Foundation before joining the Bureau's research staff.

From 1968 to 1974, Fuchs was professor of economics and community medicine at the City University of New York. In 1974, Fuchs was appointed director of the Bureau's Palo Alto office and became professor of economics at Stanford University and Stanford Medical School.

Fuchs is a member of the Institute of Medicine of the National Academy of Sciences and has served on numerous advisory groups for the White House and the

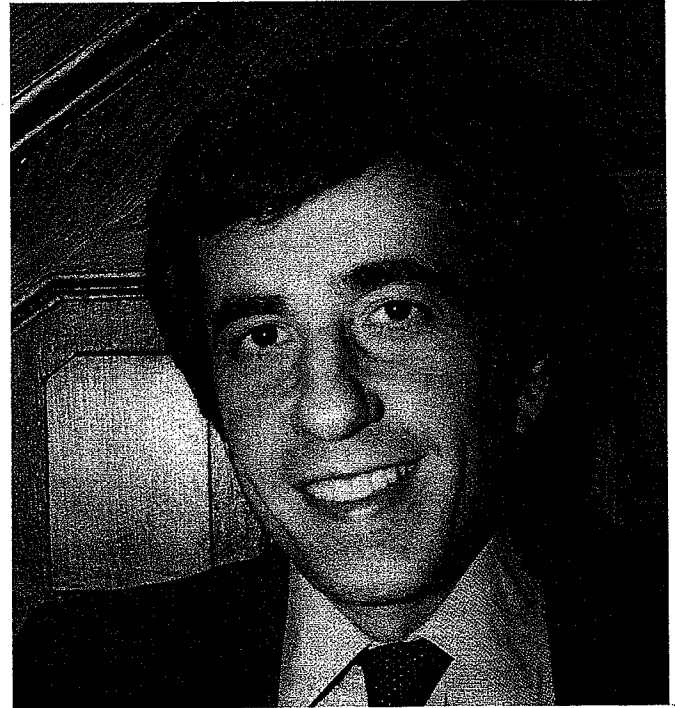


Department of Health, Education and Welfare. He is the author of five books, the editor of four others, and has published scores of articles in professional and popular journals. His 1974 book, *Who Shall Live?: Health, Economics, and Social Choice*, won national attention and continues to be widely used and cited. His current research interests include the life cycle and aging, and health and medical care.

Fuchs and his wife, Beverly, who is director of group services for the Palo Alto Senior Center, have four children. They enjoy hiking in their leisure time; Fuchs is also an avid tennis and racquetball player.

William M. Landes

William M. Landes, director of the Bureau's Program in Law and Economics, began his affiliation with NBER in his days as a graduate student at Columbia in 1962. Landes, a New York City native, received both his B.A. and Ph.D. degrees from Columbia. He was an NBER research



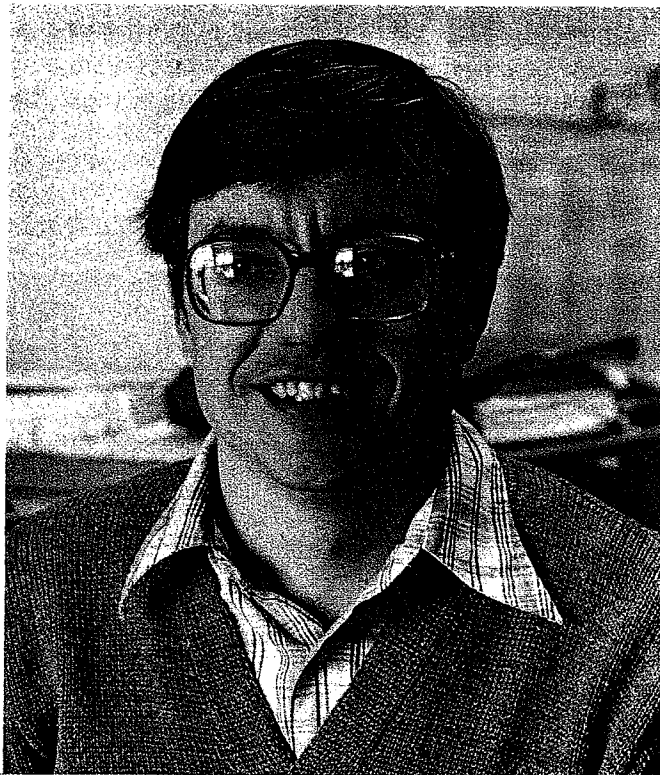
fellow in 1968, and was named a research associate in 1969. Before joining the faculty of the University of Chicago Law School in 1974, Landes taught at Stanford; the University of Chicago, in the economics department; Columbia; and the Graduate Center of the City University of New York.

In addition to his teaching, Landes has written numerous articles and books. Since 1975, he has been editor of the *Journal of Law and Economics*. He was also a member of the Panel on Legislative Impact on the Courts of the National Academy of Sciences from 1977-79.

Landes is married and has three children. His wife, Elizabeth, is also an economist and is a research fellow at the Center for the Study of the Economy and the State at the University of Chicago. Although he says he has no time for hobbies, Landes does manage to run about twenty-five miles a week.

John B. Shoven

John B. Shoven, who recently became director of NBER's research project on private and public pensions, has been a member of the Bureau's Program in Taxation and a participant in the research project on inflation. Shoven is a native Californian who went East for his graduate studies and received the Ph.D. in economics from



Yale in 1973. He then returned to the West Coast where he has been on the faculty of Stanford University ever since.

In 1978 and 1979, Shoven was a visiting research fellow at Harvard and Yale Universities and a visiting professor at Kyoto University, Japan. He has taught both corporate and public finance, mathematics for economists, and microeconomics. At present, Shoven's research interests include inflation, taxation, pensions, and corporate finance.

In addition to his teaching and research duties, Shoven has served as a consultant to a number of agencies. These include the Bureau of Labor Statistics, the Office of Tax Analysis (U.S. Treasury), the Council of Economic Advisers, the World Bank, and the Board of Governors of the Federal Reserve System. In his limited leisure time, Shoven enjoys camping, in specific, and traveling, in general.

Conferences

Postwar Changes in the American Economy

In celebration of its sixtieth anniversary, the Bureau held a small conference on January 3 and 4 on postwar changes in the American economy. The purpose of the conference was to analyze the changes in our economy over the past thirty years and to ask whether these changes represent a gradual evolution or a watershed in the development of the U.S. economy.

Nine background studies on particular aspects of the

economy were prepared in advance of the conference. To complement these studies, two distinguished commentators presented personal statements in each area as a basis for discussion at the conference.

The areas examined and the participants involved were:

1. *The Changing Structure of American Industry*
Commentators: Walter Wriston, Citicorp, and James Schlesinger, Georgetown University
Background Paper: Richard Caves, Harvard University
2. *The Changing Character of Labor Markets*
Commentators: John Dunlop, Harvard University, and Richard Schubert, Bethlehem Steel
Background Paper: Richard Freeman, Harvard University
3. *The Role of Government*
Commentators: George Shultz, Bechtel Corporation, and Paul Samuelson, Massachusetts Institute of Technology
Background Paper: George Break, University of California at Berkeley
4. *Demographic Change*
Commentators: Victor Fuchs, Stanford University, and Simon Kuznets, Harvard University
Background Paper: Richard Easterlin, University of Pennsylvania
5. *Technical Change and Productivity*
Commentators: Ruben Mettler, TRW, Inc., and David Packard, Hewlett-Packard Company
Background Paper: Edwin Mansfield, University of Pennsylvania
6. *Economic Well-Being and Income Distribution*
Commentators: Irving Kristol, New York University, and Wilbur Cohen, University of Michigan
Background Paper: Alan Blinder, Princeton University
7. *The Changing Character of Financial Markets*
Commentators: Milton Friedman, Hoover Institution, and Alden Clausen, Bank of America
Background Paper: Benjamin Friedman, Harvard University
8. *The International Setting*
Commentators: Herbert Giersch, Institute of World Economics, University of Kiel, and Peter Peterson, Lehman Brothers, Kuhn, and Loeb
Background Paper: William Branson, Princeton University
9. *Macroeconomic Conditions*
Commentators: Arthur Okun, the Brookings Institution, and Herbert Stein, University of Virginia
Background Paper: Robert Gordon, Northwestern University

The nine background papers are available for \$1.50 each. They may be requested by writing to: NBER Conference Papers, 1050 Massachusetts Avenue, Cambridge, Mass. 02138. The discussion papers will be available only in the conference volume that is scheduled for publication in late 1980.

Labor Program Meets

Participants in NBER's Program in Labor Studies met at the Cambridge office on December 7 to discuss work in progress. Three papers were presented:

W. Kip Viscusi, "Specific Information, General Information, and Employment Matches under Uncertainty" (NBER Working Paper No. 394)

Linda Leighton and Jacob Mincer, "Effects of Minimum Wages on Human Capital Formation" (NBER Working Paper No. 441)

Christopher Pissarides, "Staying on at School in England and Wales—and Why 9 Percent of the 1976 Age Group Did Not"

The Viscusi paper focuses on the specific or general information about the employment process that can be acquired by workers and employers. Such information affects the wages and turnover of workers in much the same way that specific and general job training do. The paper explores the type of information acquired and its impact on both the wage structures and the properties of turnovers associated with the worker-employer match.

Leighton and Mincer's paper asks how the minimum wage affects on-the-job training and schooling. They find that the minimum wage has three implications: (1) it induces schooling and part-time student work; (2) it reduces the pace of job advancement; and (3) it increases turnover for nonstudents by diminishing the probability of on-the-job training.

Pissarides is concerned with the factors that determine the number of students staying on at school after their compulsory schooling is completed. He finds that from 1955-69, the rate of students staying on at school grew by about 5 percent a year. After 1969, that rate turned down. He attributes this turnaround to changes in the earnings of qualified workers relative to the earnings of manual workers who left school early. After 1969, the earnings of boys ages 17-21 continued to rise, while the starting salaries of new graduates (age 21) stopped rising.

In addition to the authors, NBER research associates Kim Clark, Richard Freeman (director of the Program in Labor Studies), Zvi Griliches, Michael Grossman, Alan Gustman, Edward Lazear, and Robert Willis and others with an interest in labor research attended the meeting.

Debt and Equity Meeting

Participants in the Bureau's project on the changing roles of debt and equity in financing U.S. capital formation met in Cambridge on December 8 to discuss some of their recent work. The following papers were presented at the meeting:

John G. Cragg and Burton G. Malkiel, "Expectations and the Valuation of Shares"

Zvi Bodie, "Purchasing Power Annuities: Financial Innovation for Stable Real Retirement Income in an Inflationary Environment" (NBER Working Paper No. 442)

Robert Merton, "On Estimating the Expected Return on the Market: An Exploratory Investigation" (NBER Working Paper No. 444)

Stewart Myers and Gerald Pogue, "Measuring Expected Rates of Return, Risk Premiums, and the Market Price of Risk"

William Brainard, John Shoven, and Laurence Weiss, "The Financial Valuation of the Return to Capital"

Benjamin Friedman, "The Relative Stability of Money and Credit 'Velocities'"

The Cragg and Malkiel paper describes their use of forecasts done in the 1960s by professional securities analysts of the growth of corporate earnings in a model of stock valuation. Their empirical findings suggest that the expected growth of earnings is an important determinant of stock valuation and is useful in measuring the relationship between prospective returns and risk. They also find that the diversity of the analysts' expectations of earnings growth is a useful risk measure in modeling stock values.

Bodie's paper deals with two inflation induced problems that investors in annuities face. First, if an annuity calls for fixed equal contributions during the accumulation phase, the earlier contributions are greater in real terms than the later ones. Second, if the annuity payments are equal and nominally fixed, then they decline in real value over time. To avoid these problems, Bodie suggests that "purchasing power annuities" based upon a portfolio of short-term bonds and diversified commodity futures should be issued.

Merton's work concerns the estimation of expected returns on a market portfolio. There are at least two problems with simple estimation procedures: (1) the variance of the market return used in the calculation may not be constant and (2) results may imply negative expected excess returns. Therefore, Merton suggests the use of three more complex models to estimate expected excess returns.

The Myers and Pogue paper outlines an approach to estimating the expected return on a market portfolio of stocks using projected dividend-price ratios, growth of earnings, risk premiums, the market price of risk, and the variability of returns on individual stocks. The paper is preliminary and deals with theory rather than empirical evidence.

The study by Brainard, Shoven, and Weiss analyzes recent declines in the market value of corporations relative to their intrinsic value. The authors conclude that this decline is due to a fall in the market valuation of steady earnings flows, not to increasing risk premiums or high debt-equity ratios. They suggest that for a given amount of actual earnings, firms can boost their market valuations by using accounting procedures that raise reported earnings.

Friedman's paper documents the close relationship between GNP and the liabilities of the nonfinancial sector of the U.S. economy since World War II. He shows that the relationship between GNP and a broad measure of credit market liabilities is at least as stable as the relationship among GNP and various monetary aggregates.

In addition to the authors, Bureau President Martin Feldstein, Vice President Charles McLure, and project members Roger Gordon, David Hartman, and Robert Shiller attended the meeting.

January Meeting on Pensions

Members of the NBER Pension Project, under the direction of John Shoven of Stanford University, met in Palo Alto on January 7-9 to discuss current and future research. The first day's topic was social security. Research Associate Laurence Kotlikoff, UCLA, opened the program with a discussion of "The Adequacy of Savings for Retirement," a paper he wrote with Lawrence Summers and Avia Spivak.

Next Michael Boskin, director of NBER's Program in Social Insurance, and Michael Hurd, of the State University of New York at Stony Brook, presented their paper on "Social Security and Retirement." Boskin's paper, "Social Security and Private Saving," followed.

The final paper on the agenda for the first day was "Pensions, Wages, and Employment in the Local Public Sector: An Econometric Analysis" by Robert Inman of the University of Pennsylvania.

The topic for the second day was pensions. NBER Faculty Research Fellow Jeremy Bulow discussed his paper, "Analysis of Pension Funding under ERISA," NBER Working Paper No. 402. Research Associate Joseph Stiglitz followed with his paper on "Labor Turnover, Wage Structures, and Moral Hazard: The Inefficiency of Competitive Markets."

Next Benjamin Friedman, director of NBER's Program in Financial Markets and Monetary Economics, discussed his research report on private pensions and corporate financial behavior. Finally, Robert Spiegelman of SRI International gave a presentation on the survey being conducted by the President's Commission on Private Pensions.

The third day of the meeting was devoted to discussion of future work. Joint studies will be prepared by NBER Research Associates Kim Clark and Laurence Kotlikoff, Zvi Bodie and John Shoven, and Harvey Rosen and Princeton's Jonathan Eaton. Also engaged in project research are NBER Research Associates Martin Feldstein, Robert Lipsey, and Peter Mieszkowski, and Bert Hickman of Stanford University and Mark Gersovitz of Princeton.

The meeting was also attended by Marcy Arvin, Ken Cone, Victor Fuchs, Tom MaCurdy, Charles McLure, Robert Michael, and John Pencavel of NBER; John Cox and William Sharpe of Stanford Business School; Arden Hall of SRI International; Tony Lima of California State University at Hayward; Arthur Slepian of Stanford; and Irwin Tepper of Harvard Business School.

Research on Economic Fluctuations Discussed

About twenty members of the Bureau's Program in Economic Fluctuations met at the NBER office in Palo Alto on January 24 and 25 to discuss research in progress. The following six papers provided the basis for formal discussion:

Robert B. Litterman and Thomas J. Sargent, "Detecting Neutral Price Level Changes and Effects of Aggregate Demand with Index Models"

Robert J. Barro, "Output Effects of Government Purchases" (NBER Working Paper No. 432)

Olivier Blanchard, "Fiscal Policy under Imperfectly Flexible Prices"

Jacob A. Frenkel, "Flexible Exchange Rates in the 1970s"

Christopher A. Sims, "Comparison of Interwar and Postwar Cycles: Monetarism Reconsidered" (NBER Working Paper No. 430)

Robert E. Hall and Frederick S. Mishkin, "The Sensitivity of Consumption to Transitory Income: Evidence from Panel Data on Households"

The Litterman and Sargent paper is concerned with the detection and estimation of neutral fluctuations in nominal prices—that is, fluctuations that are not associated with changes in real economic activity. Using a statistical "index model," the authors find fairly strong evidence for the existence of a component of price variation that does reflect nominal price movements without a discernible effect on real economic variables.

Barro focuses on the theoretical and empirical distinctions between temporary and permanent variations in government purchases, particularly defense purchases. He categorizes defense spending on war as largely transitory and other defense spending as predominantly permanent. His analysis of national output reveals a significant expansionary effect of temporary defense purchases, a weaker but highly significant expansionary effect of permanent defense purchases, and no significant effect of nondefense purchases.

Blanchard considers the dynamic effects of fiscal policy under the assumption that prices and wages do not clear markets—that is, they are imperfectly flexible. He finds that a balanced budget increase in government spending will initially increase output. However, the effect of this increase on investment is ambiguous. Generally, such fiscal policy leads to an initial decrease in the stock market but an eventual increase in investments.

Frenkel's paper surveys the key issues and lessons of the experience with floating rates in the 1970s. By looking at three particular exchange rates—dollar/British pound, dollar/French franc, and dollar/Deutschemerk—the following four conclusions emerge. First, to a large extent, the markets for foreign exchange operated efficiently. Second, the high volatility of exchange rates, dependent on expectations of future events and on new information, reflects an intrinsic characteristic of the rel-

ative price of monies and other assets. Third, changes in exchange rates depend on changes in interest rates (which reflect current expectations about the future). Last, the experience in the 1970s does not support the purchasing parity doctrine that relates current prices to current interest rates, since the exchange rates have also reflected expectations of the future.

Analyzing monthly data on production, prices, and the money stock, Sims finds a remarkable similarity between interwar (1920-41) and postwar (1948-78) business cycles in the dynamic responses to economic "surprises." In both periods, changes in the money stock account for a substantial fraction of the variance in production. However, when an interest rate is added to the analysis, the central role of money stock surprises disappears for the postwar period. Since monetarist expectations do not fit the data comfortably, Sims suggests a nonmonetarist explanation based on the role of expectations in investment behavior.

The Hall and Mishkin study analyzes the response of household consumption to transitory and permanent (life cycle) changes in income. Their results suggest that consumption is somewhat more sensitive to transitory income than the life cycle-permanent income theory implies. However, permanent changes in income do elicit larger consumption responses than transitory changes. In fact, about 80 percent of the households in the sample only reacted vigorously to changes in their income that signaled major shifts in their economic well-being.

Taxation Meeting

Participants in the Bureau's Program in Taxation, directed by David Bradford of Princeton University, met in Cambridge on February 8 to discuss work in progress. Larry Lindsey, of Harvard and NBER, opened the meeting with his paper, "The Effectiveness of the Maximum Tax on Earned Income." Lindsey's paper examines a provision of the Tax Reform Act of 1969 that is designed to set a maximum marginal tax rate on earned income of 50 percent. He finds, however, that the provision is ineffective for the majority of taxpayers whose marginal rates would otherwise exceed 50 percent. Moreover, he finds that under certain circumstances, this provision of the tax law causes the marginal tax rate on earned income to fall as income rises.

Next on the program agenda were Daniel Feenberg, of NBER, and Harvey Rosen, of Princeton and NBER. They discussed their work in progress on "Imputing Family Labor Supply Responses to the Tax Model." Feenberg and Rosen are studying the distributional and efficiency effects of taxing families. However, the data on hours of work and wage rates that they need to estimate labor supply responses to alternate taxes is not available in any of the files that they are using. Therefore, they must first impute the hours and wage data and then construct an appropriate framework for estimating the labor supply response.

Christopher Sims, of the University of Minnesota and

NBER, followed with a related presentation of "Issues in Imputation with Merged Files." He discussed the kinds of errors one might get in merging file data, how one can determine the size and importance of the errors, and how these data errors might affect the research results.

Next Gerald Auten, of Bowling Green State University, and Charles Clotfelter, of Duke University, discussed their paper on "Permanent versus Transitory Tax Effects and the Realization of Capital Gains." They examine a new set of panel data that includes detailed individual tax information for a seven-year period. The data enable them to observe variations in marginal tax rates over time. Thus, they can distinguish between permanent and transitory income and between permanent and transitory effects of capital gains provisions. They do find that capital gains taxes do have a permanent lock-in effect on realizations and note that the long-run effect is less than the short-run effect.

Joseph Stiglitz's presentation on "Anomalous Properties of Current Capital Gains Taxation" concluded the meeting. He discussed some of the problems inherent in the present system of taxing capital gains. He also mentioned his current work on designing a tax structure that is inflation neutral.

In addition to the aforementioned, other participants in the day-long meeting were: NBER research associates Alan Auerbach, Martin Feldstein, Roger Gordon, Jerry Green, David Hartman, Jerry Hausman, Charles McLure, and Stewart Myers and NBER research fellows Joel Slemrod and Lawrence Summers. Also attending were William Andrews, Stanley Surrey, and Bernard Wolfman of Harvard Law School; Harvey Galper and Emil Sunley of the U.S. Treasury's Office of Tax Analysis; and Michael Rothschild of the University of Wisconsin.

Stiglitz Honored

NBER Research Associate Joseph E. Stiglitz received the John Bates Clark Medal of the American Economic Association in December at the association's annual meeting. The Clark award is bestowed biennially to an outstanding economist under the age of 40.

Stiglitz, who is a professor of economics at Princeton University, received his Ph.D. from MIT in 1966. Before joining the Princeton faculty, he had been on the faculties at MIT, Yale, Stanford, and Oxford and was a visiting professor and fellow at several other universities and research institutions.

Stiglitz is a member of the NBER Program in Taxation. His recent papers include: "Toward a Reconstruction of Keynesian Economics: Expectations and Constrained Equilibria," NBER Working Paper No. 376, with J. Peter Neary and "The Taxation of Exhaustible Resources," NBER Working Paper No. 436, with Partha Dasgupta and Geoffrey Heal.

More generally, Stiglitz's research has dealt with the economics of information, uncertainty, taxation, income distribution, trade and development, and macroeconomics. Stiglitz has also served as a consultant to a num-

ber of agencies and organizations, including the U.S. departments of Labor, the Interior, and State; the Federal Trade Commission and Federal Energy Administration; and the World Bank.

Previous recipients of the Clark Medal among NBER Research Associates and Emeritus Research Associates are Milton Friedman (1951), Zvi Griliches (1965), Gary Becker (1967), and Martin Feldstein (1977).

New Director Named

Albert G. Matamoros, vice president and chief economist of the Armstrong Cork Company, was recently elected a director of NBER. Matamoros represents the National Association of Business Economists, of which he was president in 1978-79. He is also a member of the Conference Board Economic Forum and the Economics Advisory Board of Columbia University's Graduate School of Business, and is a former chairman of the Conference of Business Economists.

Matamoros received a Ph.D. in economics from New York University. He joined Armstrong in 1955 and served as associate economist, general manager of economic and marketing research, assistant treasurer, and chief economist before being named vice president in 1968. He is currently responsible for Armstrong's economic research and forecasting and for coordination of investor relations.

New Bureau Books

Conference Volumes Available

Three new NBER volumes are now available through the University of Chicago Press: *The Measurement of Capital*, edited by Dan Usher; *New Developments in Productivity Measurement and Analysis*, edited by John W. Kendrick and Beatrice N. Vaccara; and *Rational Expectations and Economic Policy*, edited by Stanley Fischer.

The Usher volume contains a collection of papers originally presented at a 1976 NBER Conference on Income and Wealth. The papers deal with how government statistical agencies measure capital and how their techniques might be improved in order to correspond more closely to an economist's ideal measure of capital.

The first paper in the volume, by Allan H. Young and John C. Musgrave, surveys the methods used to construct the official time series of real U.S. capital. Subsequent papers deal with possible revisions in the procedure, either by expanding the scope of the official definition of capital, by reconstructing the price indexes used in the calculation, or by calculating the depreciation of buildings differently. Authors of these papers include Charles

R. Haulten and Frank C. Wykoff, Robert M. Coen, Stanley Engerman and Sherwin Rosen, Robert Eisner, John J. Soladay, Murray Brown, and W. E. Diewert.

The proceedings of an income and wealth conference on productivity measurement are contained in the Kendrick and Vaccara volume. The papers focus on certain aspects of productivity, including the acceleration of price inflation, the sluggish growth of real wage rates and income per capita, and the problems of international competitiveness of U.S. goods.

The first three papers, by Frank M. Gollup and Dale W. Jorgenson; Michael F. Mohr; and Benjamin Klotz, Rey Madoo, and Reed Hansen, are concerned with labor and multifactor productivity in industry. The next section of the volume deals with productivity in selected service sectors; the authors are John R. Meyer and Jose A. Gomez-Ibanez and Allan D. Searle and Charles A. Waite. The papers in the third section, authored by Nestor E. Terleckyi; M. Ishaq Nadiri and George C. Bitros, Zvi Griliches, and John G. Meyers and Leonard Nakamura, show the effect of R and D, energy, and environment on productivity growth. The final section deals with international comparisons of productivity. Authors are Saburo Yamada and Vernon W. Ruttan, and Laurits R. Christensen, Dianne Cummings, and Dale W. Jorgenson.

The rational expectations volume contains the papers and discussion presented at an NBER conference in October 1978. The papers fall roughly into two categories: (1) those concerned with empirical or theoretical development of the theory of rational expectations and (2) those dealing with the record of government to date in controlling monetary aggregates. The final discussion identifies three unresolved issues: the clearing of markets; the substitution of leisure in the propagation of trade cycles; and the evaluation of past policy.

Authors of this section include Robert Barro and Mark Rush; Olivier Blanchard; Robert Shiller; Finn Kydland and Edward Prescott; Robert Lucas; Stanley Fischer; Robert Solow, and William Poole. In addition, an introductory survey of the issues was written by Herschel Grossman.

All three volumes should be ordered directly from the University of Chicago Press, Order Department, 11030 South Langley Avenue, Chicago, Illinois 60628. The cost of the Usher volume is \$40.00; the Kendrick and Vaccara volume is \$52.00; and the Fischer volume is \$22.00. An academic discount of 10 percent for individual volumes and a 20 percent discount for standing orders for all NBER books published by the University of Chicago Press are available to university faculty. Orders must be sent on university stationery. NBER corporate associates will automatically receive all volumes, and other contributors to the National Bureau may order books at a discount from the Bureau's publications department.

Current Working Papers

Individual copies of NBER Working Papers are available free of charge to corporate associates and other supporters of the National Bureau. Others can receive copies of the Working Papers by sending \$1.00 per copy to Working Papers, National Bureau of Economic Research, 1050 Massachusetts Avenue, Cambridge, Mass. 02138. Please make checks payable to the National Bureau of Economic Research, Inc.

Journal of Economic Literature (JEL) subject codes are listed after the date of each Working Paper. Abstracts of all Working Papers issued since November 1979 are presented below. For earlier Working Papers, see previous issues of the *NBER Reporter*. The Working Papers abstracted here have not been reviewed by the Board of Directors of NBER.

The Roles of Monetary, Financial, and Fiscal Policy under Rational Expectations

Willem H. Buiter

Working Paper No. 412

November 1979

JEL No. 130

The implications of the "rational expectations revolution" for the effectiveness of monetary, fiscal, and financial policy are evaluated in this paper. The general conclusion is that to anticipate policy is not to neutralize it. This is obviously the case for *structural policies* that alter the level and composition of full employment output. It also holds for stabilization policies that influence deviations of real variables from their "natural" values. Substitution of bond financing for tax financing of a given real spending program reduces saving and lowers the capital-labor ratio, even when allowance is made for private intergenerational gifts. Anticipated monetary policy affects the cyclical and equilibrium behavior of real variables except in implausible special cases.

Why Do Companies Pay Dividends?

Martin Feldstein and Jerry Green

Working Paper No. 413

December 1979

JEL Nos. 321, 521

This paper presents a simple model of market equilibrium to explain why firms that maximize the value of their shares pay dividends even though the funds could instead be retained and subsequently distributed to shareholders in a way that would allow them to be taxed more favorably as capital gains. The two principal ingredients of our explanation are: (1) the conflicting preferences of shareholders in different tax brackets and (2) the shareholders' desire for portfolio diversification. We show that companies will pay a positive fraction of earnings in divi-

dends. We also provide some comparative static analysis of dividend behavior with respect to tax parameters and to the conditions determining the riskiness of the securities.

A Multicountry Econometric Model

Ray C. Fair

Working Paper No. 414

December 1979

JEL Nos. 210, 430

A multicountry econometric model is presented in this paper. The theoretical basis of the model is discussed in Fair (1979a, 1979b), and the present paper is an empirical extension of this work. Quarterly data have been collected or constructed for sixty-four countries, and the model contains estimated equations for forty-two countries. The basic estimation period is 1958:1-1978:IV (eighty-four observations). For equations that are relevant only when exchange rates are flexible, the basic estimation period is 1972:II-1978:IV (twenty-seven observations). Most of the equations have been estimated by two-stage least squares. Spot and forward exchange rates and interest rates are all endogenous in the model.

The paper contains: (1) a brief review of the theoretical basis of the model, (2) a description of the econometric model, including presentation and discussion of all the estimated equations, (3) a comparison of the predictive accuracy of the model to that of a fourth-order autoregressive model, and (4) an examination of the properties of the model (in both a fixed and a flexible exchange rate period) by means of changing various exogenous variables. The model provides quantitative estimates of the trade, price, and interest rate linkages among countries, and the results indicate that the price and interest rate linkages are quantitatively quite important. One conclusion from this study is that any model that is based primarily on trade linkages is not likely to be a very good approximation of the world economy.

The Impact of the Market and the Family on Youth Enrollment and Labor Supply

Alan L. Gustman and Thomas L. Steinmeier

Working Paper No. 415

December 1979

JEL No. 800

This paper analyzes the decisions of teenagers and young adults about school enrollment and labor supply as if they were jointly determined. The empirical results are based on an application of discrete multivariate analysis to a sample taken from the Survey of Income and Education. Higher relative wage offers are found to reduce the probability that a youth will enroll in school and to increase labor supply. However, the estimated impacts are very sensitive to adjustments made for the possibility that wage rate offers by firms are higher for full-time than for part-time work. Job availability, as measured by the local youth unemployment rate, has its strongest effect on the probability of enrollment and full-time labor force participation for nonwhite males. Job availability ac-

counts, in the extreme, for a difference in this probability of almost 50 percent. Since a wage measure is included as an independent variable, we can be sure that the job availability measure is not acting as a surrogate for an absent wage variable, but instead has an impact of its own. Specific findings on the influence of various family and market characteristics are compared to those from earlier studies.

An Economic Analysis of the Diet, Growth, and Health of Young Children in the United States

Dov Cherichovsky and Douglas Coate

Working Paper No. 416

December 1979

JEL No. 913

The purpose of this paper is to investigate the extent to which family income and education are obstacles to the provision of adequate diets for young children in the United States. Our study of the Health and Nutrition Examination Survey reveals the following:

1. Average nutrient intakes of young children are well above recommended dietary standards, with the exception of iron.
2. Average nutrient intakes for children in households of lower economic status are very similar to intakes for children in households of higher economic status. Rates of children's growth are also similar in these households.
3. Family income and education of the household head have statistically significant but very small positive effects on the nutrient intake levels of young children.
4. There are substantial effects of protein intakes on children's height and head growth, even though protein is consumed in excess of dietary standards.

The last finding and the apparent correlation between children's growth and their intellectual development brings to question the adequacy of present protein standards. Could American mothers, who provide very high protein diets for their children in households at all levels of socioeconomic status know more about what constitutes an adequate diet for their children than the experts do?

Preventive Care, Care for Children, and National Health Insurance

Gilbert R. Ghez and Michael Grossman

Working Paper No. 417

December 1979

JEL No. 913

The purpose of this paper is to examine issues related to the coverage of preventive care under national health insurance. Four specific kinds of medical care services are included under the rubric of preventive care: prenatal care, pediatric care, dental care, and preventive physicians' services for adults. We consider whether preventive care should be covered under national health insur-

ance, and if so what the nature of the optimal plan is. Our review of the literature on the effects of medical care on health suggests that prenatal care and dental care are effective, but pediatric care (except for immunizations) and preventive doctor care for adults are not. Moreover, cases in which care is effective correspond to cases in which differences in income as it relates to health are observed. These empirical results and the theory of health as the source of consumption externalities indicate that the optimal national health insurance plan should be characterized by benefits that fall as income rises. In addition, the plan should be selective rather than general with respect to the types of services covered.

Monetary Policy and the 1979 Supply Shock

Robert J. Gordon

Working Paper No. 418

December 1979

JEL No. 311

The most striking aspects of recent U.S. wage and price behavior are the small year-to-year variations in the rate of change of wages, the modest 1977-79 acceleration in the rate of change of both wages and the consumption deflator net of food and energy, and an unprecedented gap between the inflation rates recorded by the CPI and the personal consumption deflator.

A small and simple econometric model is used to forecast the consequences of various policies for the future growth of the monetary base. No policy will be able to prevent an acceleration in the growth rate of the personal consumption deflator net of food and energy from its recent 7 percent track to 8 percent or above in the first half of 1980. The gross personal consumption deflator will climb even faster, with the difference depending on the behavior of oil and food prices.

Thereafter, the effect of slack labor markets will begin to allow inflation net of food and energy to decelerate substantially. A 6 percent rule for the monetary base is too conservative and causes the unemployment rate to rise to 8.5 percent in 1982. An 8 percent rule for the base is preferable, allows the unemployment rate to begin to fall after late 1981, and still achieves a deceleration of inflation net of food and energy from 8 percent in mid-1980 to 6 percent in 1983. Thereafter, the growth of the base should be slowed down to keep the economy from overshooting again.

Public Policy toward Life Saving: Maximize Lives Saved versus Consumer Sovereignty

William Gould and Richard Thaler

Working Paper No. 419

December 1979

JEL No. 024

This paper is a theoretical analysis of individual and societal demand for saving lives. We begin by demonstrating that the allocation of health expenditures to

maximize the number of lives saved may be inconsistent with the willingness-to-pay criterion and consumer sovereignty. We further investigate the effects of information on aggregate willingness to pay. This discussion is related to the concepts of statistical and identified lives. Methods of financing health expenditures are considered. We show that risk averse individuals may reject actuarially fair insurance for treatments of fatal diseases even if they plan to pay for the treatment if they get sick. This result has implications regarding the choice of treatment or prevention. Finally, we examine the importance of the timing of life-saving decisions. A conflict arises between society's preferences before and after it is known *who* will be sick, even if it is known in advance how *many* people will be sick.

Strict Liability versus Negligence in a Market Setting

A. Mitchell Polinsky

Working Paper No. 420

December 1979

JEL Nos. 613, 722

Both strict liability and negligence are efficient in the short run when the number of firms causing harm is fixed. In the long run, only strict liability is efficient when the number of firms is variable. In general, the market price in the long run under negligence is too low and too many firms enter the industry. However, the optimal second-best negligence standard may result in the same price and number of firms as under strict liability.

An Empirical Model of Labor Supply in a Life Cycle Setting

Thomas E. MaCurdy

Working Paper No. 421

December 1979

JEL No. 821

This paper formulates and estimates a structural life cycle model of labor supply. Using theoretical characterizations derived from an economic model of life cycle behavior, a two-stage empirical analysis yields estimates of intertemporal and uncompensated substitution effects that provide the information needed to predict the response of hours of work to life cycle wage growth and shifts in the lifetime wage path. The empirical model developed here provides a natural framework for interpreting estimates found in other work on this topic. It also indicates how cross-section specifications of hours of work can be modified to estimate parameters relevant for describing labor supply behavior in a lifetime setting.

Tax Rules and the Mismanagement of Monetary Policy

Martin Feldstein

Working Paper No. 422

December 1979

JEL No. 311

This paper emphasizes the importance of the interaction between tax rules and the management of monetary policy. The monetary authorities' failure to recognize the implications of the tax structure has caused them to underestimate just how expansionary monetary policy has been. Moreover, because of our fiscal structure, attempts to encourage investment by an easy-money policy have actually had an adverse impact on investment in plant and equipment. The paper discusses the desirability of substituting a policy of tight-money and positive fiscal incentives for the traditional goals of easy money and fiscal restraint. More generally, the paper stresses the significance of the fiscal structure as a determinant of macroeconomic equilibrium.

Sectoral Productivity Slowdown

M. Ishaq Nadiri

Working Paper No. 423

December 1979

JEL No. 226

In this paper an attempt is made to answer two questions: (1) What set of factors explains the recent slowdown of the U.S. aggregate labor productivity? and (2) Does the same set of forces account for the slowdown of sectoral productivity growth as well? We specify a model that relates measured labor productivity growth to the capital-labor ratio, the level and rate of change of utilization, the stock of R and D, and the rate of disembodied technical change. The model is estimated using sectoral and aggregate data for the period 1949-78.

The results of the estimation suggest that the pattern of aggregate productivity growth can be explained by the growth of the capital-labor ratio, the gap between the potential and actual output growth paths, the change in degree of utilization, the growth of the stock of total R and D, and the time trend. In fact, at both the aggregate and sectoral levels, these factors account fairly well first for the growth and then for the subsequent slowdown of labor productivity in the postwar period. To be sure, in some specific industries, the performance of the model could be improved. However, the overall conclusion reached is that the slowdown in growth of capital formation, the inability of the economy and various sectors to grow at their normal growth rates, and the slowdown in the rate of technological change are some of the main reasons for the observed productivity slowdown of the recent years.

Risk Shifting, Unemployment Insurance, and Layoffs

Herschel I. Grossman
Working Paper No. 424
December 1979
JEL Nos. 131, 821

This paper develops an analysis of labor markets in which the use of layoffs to effect employment separations does not imply that markets fail to clear or that the amount of employment is suboptimal relative to current perceptions. This analysis focuses on the interaction between contractual arrangements for shifting risk from workers to employers and for tax financed unemployment insurance. The key element in the analysis is that unemployment insurance is more attractive than risk shifting as a way for workers to obtain income during unemployment. The paper also analyzes the effects of risk shifting and unemployment insurance on the magnitude of employment fluctuations. The analysis implies that given the existence of unemployment insurance, the existence of risk-shifting arrangements makes employment less variable.

Planning and Market Structure

Dennis W. Carlton
Working Paper No. 425
January 1980
JEL Nos. 022, 611

This paper examines a model in which demand is uncertain and production must occur before demand is known. By investing resources in information-gathering activity, demand can be forecast. This paper investigates the relationships among the incentive to plan, market structure, and conduct. Competition leads to too little planning, while monopoly leads to too high a price relative to the social optimum. A dominant firm with a competitive fringe turns out to be better than a firm with either pure competition or pure monopoly. One interesting result is that the optimal production strategy of the dominant firm is to produce even when price is below marginal cost. Although such a production policy resembles that associated with "predatory pricing" (a practice that is thought to be socially undesirable), society would be harmed by prohibition of such a policy.

The Term Structure of the Forward Premium

Craig S. Hakkio
Working Paper No. 426
January 1980
JEL No. 430

Most studies of the efficiency of the foreign exchange market focus on a single maturity, usually a one-month exchange rate. However, one observes that forward con-

tracts of many maturities are simultaneously traded in the foreign exchange market. The hypothesis that the foreign exchange market uses all available information has implications for the *joint* behavior of forward exchange rates of various maturities.

The paper proposes an equilibrium theory of the term structure of the forward premium. By combining the theory of the term structure of (domestic and foreign) interest rates with the hypothesis of interest rate parity, a simple expression relating the six-month forward premium to a geometric average of expected future one-month forward premiums can be developed. By assuming that the one-month and six-month forward premiums can be expressed as a bivariate stochastic process, one can derive an expression for the expected one-month forward premium. The theory will then impose highly nonlinear cross-equation restrictions on the parameters of the model. Two methods of testing the validity of the restrictions are presented. The results indicate that the data are consistent with the theory for Germany and inconsistent with the theory for Canada.

The "End-of-Expansion" Phenomenon in Short-Run Productivity Behavior

Robert J. Gordon
Working Paper No. 427
January 1980
JEL No. 226

The slowdown in the long-term growth rate of U.S. productivity has generated widespread concern and numerous studies. This paper makes no contribution to an understanding of the long-term slowdown; rather, its main objective is to examine the short-run behavior of aggregate labor productivity in isolation.

In addition to the phenomenon of increasing returns to labor in the short run, identified in previous studies, this paper isolates a little noticed but consistent tendency for productivity to perform poorly in the last stages of the business expansion. In 1956, 1960, 1969, 1973, and again in 1979, a productivity shortfall has developed with absolute declines in the level of productivity occurring in every episode but the first, and in every episode before 1979, the shortfall has subsequently been made up.

This paper contains estimates of regression equations that explain the response of changes in hours to changes in current and lagged output. Versions of the equation containing a new "end-of-expansion" variable perform better than those lacking this element and provide a much more accurate way to track the behavior of productivity, both within the sample period and in extrapolations for 1978-79, the period after the sample. The end-of-expansion effect is attributed to inertia and overoptimism in business personnel policies. This paper concludes that the absolute decline in the level of labor productivity in 1979 is consistent with the predictions of the equations based on past history but that the trend growth of productivity began a further slowdown in 1977-78 from the already poor performance recorded during 1973-76.

Savings and Taxation

Mervyn A. King

Working Paper No. 428

January 1980

JEL No. 321

The way in which taxes affect saving behavior has attracted much recent attention. It is highly relevant to the debate over reform of the personal tax system and the merits of an expenditure tax. In this paper, the efficiency arguments for and against an expenditure tax are examined, and the "optimal" tax rates are calculated. Not only are these tax rates very sensitive to parameter values, but also the interest elasticity of savings appears to be of only marginal significance in determining the most efficient tax structure. Within the framework of the simple model analyzed in this paper, the strongest arguments for an expenditure tax are the failure to index the income tax base for inflation and the existence of unfunded pension schemes.

Exchange Rates, Money, and Relative Prices: The Dollar/Pound in the 1920s

Jacob A. Frenkel and Kenneth W. Clements

Working Paper No. 429

January 1980

JEL No. 430

This paper applies the analytical framework of the monetary approach to exchange rate determination to the analysis of the dollar/pound exchange rate during the first part of the 1920s. The analysis uses monthly data up to the return of Britain to the gold standard in 1925. The equilibrium exchange rate is shown to be influenced by both real and monetary factors that operate through their influence on the relative demands and supplies of monies. Special attention is given to the relationship between exchange rates and the relative price of traded to nontraded goods. In the empirical work, the prices of traded goods are proxied by the wholesale price indices and the prices of nontraded goods are proxied by wages. One of the key results of this paper is an estimate of the elasticity of the exchange rate with respect to the relative price of traded to nontraded goods. This elasticity is estimated with high precision and is shown to be .415; this provides an independent measure of the relative share of spending for nontraded goods. This estimate is consistent with other estimates obtained in studies of expenditure shares. This paper concludes with a dynamic simulation that indicates the satisfactory quality of the predictive ability of the model.

Comparison of Interwar and Postwar Business Cycles: Monetarism Reconsidered

Christopher A. Sims

Working Paper No. 430

January 1980

JEL No. 1310

When monthly data on production, prices, and the money stock are interpreted (via a vector autoregression) as generated by dynamic responses to "surprises" in each of the variables, a remarkable similarity in the dynamics of the business cycles of the interwar period and those of the postwar period emerges, although the size of the surprises is much larger in the interwar period. Furthermore, the money stock emerges as firmly causally prior, in Granger's sense, in both periods and accounts for a substantial fraction of variance in production in both periods.

When a short interest rate is added to the vector autoregression, the remarkable similarity in dynamics in the periods persists, but the central role of the money stock surprises evaporates for the postwar period. While there are potential monetarist explanations for such an observation, none of them seem to fit the estimated dynamics comfortably. A nonmonetarist explanation of the dynamics, based on the role of expectations in investment behavior, seems to fit the estimated dynamics better. That this explanation, which is consistent with a passive role for money, could account for so much of the observed postwar relation between money stock and income may raise doubts about the monetarist interpretation even of the interwar data.

Money and the Dispersion of Relative Prices

Zvi Hercowitz

Working Paper No. 431

January 1980

A price dispersion equation is tested with data from the German hyperinflation. The equation is derived from a version of Lucas's (1973) and Barro's (1976) partial information-localized market models. In this extension, different excess demand elasticities across commodities imply a dispersion that can be tested, in which the explanatory variable is the magnitude of the unperceived money growth. The testing of this hypothesis requires two preliminary steps. First, a price dispersion series is computed using an interesting set of data. The data consist of monthly average wholesale prices of sixty-eight commodities, ranging from foods to metals, for the period of January 1921 to July 1923. The next step is the delicate one of measuring unperceived money growth. This estimation implies the postulation of an available information set and a function relating the variables in this set to money creation. The function used was based on considerations related to government demand for revenue. The model receives support from the empirical analysis although it is evident that omitted variables have important effects on price dispersion.

Output Effects of Government Purchases

Robert J. Barro

Working Paper No. 432

January 1980

Because of a small, direct negative effect on private spending, temporary variations in government purchases, as in wartime, would have a strong positive effect on aggregate demand. Intertemporal substitution effects would direct work and production toward these periods where output was valued unusually highly. Defense purchases are divided empirically into "permanent" and "temporary" components by considering the role of (temporary) wars. Shifts in nondefense purchases are mostly permanent. Empirical results verify a strong expansionary effect on output of temporary purchases, but contradict some more specific expectational propositions.

Money and Price Dispersion in the United States

Zvi Hercowitz

Working Paper No. 433

January 1980

JEL No. 023

This paper reports on an empirical test of a price dispersion equation, using data on the United States after World War II. The equation, derived elsewhere from a version of the partial information-localized market models, relates price dispersion to the magnitude of changes in the aggregate disturbances. In order to test the model, a series on price dispersion is computed using annual wholesale price indexes for the period 1948-76. The data on money shocks are the unanticipated money growth series estimated by Barro. The tests also include a measure of aggregate real disturbances.

From the theoretical point of view, the results are negative. They reject the hypothesis that unexpected money shocks, as measured by Barro, affect price dispersion in the way predicted by the model. In a previous paper, a similar model was tested with data from the German hyperinflation and found to be supported to a considerable extent. The difference in the results may be related to the extreme magnitude of the monetary disturbances during that period and to the apparently important effect of relative disturbances in the United States that were omitted in the analysis.

R and D and the Productivity Slowdown

Zvi Griliches

Working Paper No. 434

January 1980

JEL Nos. 226, 620

Can the recent productivity slowdown be explained by the slowdown in the growth of R and D expenditures that has occurred since the mid-1960s? The earlier estimated rates of return to R and D together with the observed

magnitude of the decline in R and D cannot account for much of the productivity decline. A new econometric study, based on recently released data from the Bureau of Labor Statistics for thirty-nine two- and three-digit manufacturing industries covering the 1959-77 time period, is used to investigate the relationship among productivity, physical capital, and different measures of cumulated past R and D expenditures. That study confirms the earlier conclusions and reveals an apparent decline in the effectiveness of R and D expenditures in the latter half of this period (1969-77). The interpretation of these results is clouded, however, by problems with the data and doubts about the applicability of standard modes of analysis to disequilibrium situations. Also, many of the effects of the R and D slowdown may still be in the future, and many other important contributions are not reflected at all in the official productivity measures as they are currently defined and constructed.

Government Deficits and Aggregate Demand

Martin Feldstein

Working Paper No. 435

January 1980

JEL No. 311

The evidence presented in this paper indicates that changes in government spending, transfers, and taxes can have substantial effects on aggregate demand. The estimates also indicate that the promise of future social security benefits significantly reduces private saving. Each of the basic implications of the so-called Ricardian equivalence theorem is contradicted by the data. The results are consistent with the more general view of the effects of fiscal actions and fiscal expectations that is described in the paper.

The Taxation of Exhaustible Resources

Joseph E. Stiglitz, Partha Dasgupta, and Geoffrey Heal

Working Paper No. 436

January 1980

This paper analyzes the effect of taxation on the intertemporal allocation of an exhaustible resource. A general framework within which a large variety of taxes can be analyzed is developed and then applied to a number of specific taxes. It is shown that a pattern of taxation exists that can generate essentially any desired pattern of resource use. Many tax policies, however, have effects that are markedly different both from the effects that these policies would have in the case of produced commodities and from those that they are designed (or widely thought) to have. For instance, if extraction costs are zero, a depletion allowance at a constant rate (widely thought to encourage the extraction of resources) has absolutely no effect; its gradual removal (usually thought to be preferable to a sudden removal) leads to faster rates of depletion (and lower prices) now, but higher prices in the future. Its sudden and unanticipated removal causes absolutely no distortion of the pattern of extraction. More

generally, it is shown that the effects of tax structure on the patterns of extraction are critically dependent on expectations concerning future taxation. The changes in tax structure that have occurred in the past fifty years are such that if they were anticipated (or if similar further changes were expected to occur in the future), they would lead to excessively rapid exploitation of natural resources. However, if it is believed that current tax policies (including rates) will persist indefinitely, the current tax structure would lead to excessive conservatism. Thus, whether current tax policies have in fact led to excessive conservatism is a moot question.

The International Economy as a Source of and Restraint on United States Inflation

Michael R. Darby

Working Paper No. 437

January 1980

JEL Nos. 134, 431

The balance of payments, changes in our terms of trade, and other foreign influences are widely believed to be a major, if not the dominant, cause of U.S. inflation. This is possible only if the international economy has caused a significant increase in the growth rate of the nominal quantity of money supplied, a significant decrease in the growth rate of the real quantity of money demanded, or both. Unlike nonreserve countries maintaining pegged exchange rates, in the United States the balance of payments need not influence the growth rate of the nominal quantity of money supplied by the Federal Reserve System. The Fed's reaction function is estimated and no effects of the (scaled) balance of payments can be detected. Nor is any other channel found by which the international economy has affected the growth rate of the nominal money supply. Changes in the terms of trade will cause some transitory self-reversing effects on real income, real money demand, and the price level and some permanent shifts in these variables. Because the permanent shifts in the level are nonrecurring, they average out when we examine the average growth rate over substantial periods. Indeed for four-year averages, all autonomous variability (domestic and foreign) contributes negligibly (standard error of 0.4 per annum) to variations in average inflation. Thus, except possibly through a supporting role in the short run, the international economy has contributed negligibly to U.S. inflation.

An Exploration into the Determinants of Research Intensity

Ariel Pakes and Mark A. Schankerman

Working Paper No. 438

January 1980

JEL No. 620

This paper explores the economic factors that deter-

mine the variation of research effort across firms. The intraindustry coefficient of variation of research intensity is much larger than those of traditional factors. We show that this important fact is consistent with the theoretical argument that knowledge possesses unique economic characteristics and that the demand for research depends both on the parameters of the production function for knowledge and on the ability of the firm to appropriate the benefits from the knowledge it produces. We propose and implement a framework for decomposing the observed intraindustry variance in research intensity into three components: the inducement of demand, a firm-specific structural parameter, and the errors in the observed variables. The main empirical findings are that errors in the variables (especially research) are important, that very little of the structural variance in research intensity is accounted for by the inducement of demand, and that the bulk of the variance is related to differences in the firm-specific parameter. Both the theoretical and empirical analysis indicate that it is not reasonable to treat the demand for research in a manner analogous to the demand for traditional inputs, including capital. Substantially richer models are required to provide insight into the structure of incentives driving the demand for research.

Expectations and the Forward Exchange Rate

Craig S. Hakkio

Working Paper No. 439

January 1980

JEL No. 431

This paper provides an empirical examination of the hypothesis that, for five currencies relative to the dollar, the forward exchange rate provides an "optimal" forecast of the future spot exchange rate. This hypothesis provides a convenient norm for examining the erratic behavior of exchange rates; this erratic behavior represents an efficient market that is quickly incorporating new information into the current exchange rate. Two distinct but related approaches to the analysis are used. The first approach is based on a regression of spot rates on lagged forward rates. When using weekly data and a one-month forward exchange rate, ordinary least-squares regression analysis of market efficiency is incorrect. Econometric methods are proposed that allow for consistent (though not fully efficient) estimation of the parameters and their standard errors. A second approach to testing exchange market efficiency is based on a general time-series process generating the spot and forward exchange rates. The hypothesis of efficiency implies a set of cross-equation restrictions imposed on the parameters of the time-series model. This paper derives these restrictions, proposes a maximum likelihood method of estimating the constrained likelihood function, estimates the model, and tests the validity of the restrictions with a likelihood ratio statistic.

Wage Expectations in the Labor Market: Survey Evidence on Rationality

Jonathan S. Leonard
Working Paper No. 440
February 1980
JEL No. 130

Using a new set of directly observed wage expectations from firms, this paper finds that, in general, forecasts of these firms fail to be unbiased and efficient, two requirements of weak-form rational expectations. These market participants consistently underestimate the wages they will actually pay, and their expectations do not efficiently utilize information from past realizations. The mean absolute forecast error of 2 percent compares with an error of only 5 percent if static expectations were held. The major source of errors in wage forecasts seems to be in predicting demand, rather than in predicting supply or the general price level. Wage forecast errors are positively correlated across fields with distinct supply patterns and are positively correlated with quantity forecast errors. The properties of stochastically weighted expectations and the effectiveness of the wage and price controls of the early 1970s are also discussed.

Effects of Minimum Wages on Human Capital Formation

Linda Leighton and Jacob Mincer
Working Paper No. 441
February 1980
JEL No. 800

The hypothesis that minimum wages tend to discourage on-the-job training is largely supported by our empirical analysis. Direct effects on reported job training and corollary effects on wage growth, as estimated in microdata of the National Longitudinal Sample (NLS) and Michigan Income Dynamics (MID), are consistently negative and stronger at lower educational levels. With one exception, no effects are observable among the higher wage group whose education exceeds high school.

The effects on job turnover are a decrease in turnover among young NLS whites and an increase in turnover among young NLS blacks and MID whites. Whether these apparently conflicting findings on turnover reflect a distinction between short-run and long-run adjustments to jobs is a question that requires further testing.

Purchasing Power Annuities: Financial Innovation for Stable Real Retirement Income in an Inflationary Environment

Zvi Bodie
Working Paper No. 442
February 1980
JEL No. 313

In the context of the U.S. financial system, this paper

explores the desirability and feasibility of purchasing power annuities (PPAs)—retirement annuities indexed by some measure of consumer prices. After investigating the inadequacies in an inflationary environment of both conventional variable annuities and variable annuities based on equities, this paper assesses whether money market instruments hedged with commodity futures contracts are a suitable base for PPAs. This paper also considers the possibility that life insurance companies and private pension plans might offer PPAs to the public. The empirical evidence of the past twenty-six years indicates that the real earnings rate (adjusted for inflation) that these financial institutions should use in pricing PPAs is, at most, zero.

Federal Deficit Policy and the Effects of Public Shocks

Robert J. Barro
Working Paper No. 443
February 1980

Government shifts between current taxation and issuance of debt alter the timing of taxes and, in turn, induce a variety of intertemporal substitution effects. In some circumstances, the minimization of excess budget costs would entail the stabilization of expected overall tax rates over time. The first section of the paper discusses this condition and derives its implications for the behavior of public debt. Empirically, the major movements in U.S. public debt can be explained along the lines of the theoretical model as sensible responses to business fluctuations, changes in government expenditures, and variations in the anticipated inflation rate. In particular, much of federal deficit policy appears to be consistent with economic efficiency.

The next section focuses on the economic effects of debt shocks, which are interpreted as departures of public debt movements from the systematic behavior that was investigated in the previous section. It is theoretically possible that these shocks could influence aggregate demand even when such effects do not arise from the systematic behavior of the deficit. The constructed debt shocks appear to have expansionary influences on output and negative effects on the unemployment rate, although the magnitudes of the effects that have been isolated are substantially weaker than those estimated for money shocks. Because it is the shock component of deficits—rather than the systematic “policy” response—that has been shown to affect real economic activity, the results do not provide a basis for using the deficit as an element of activist stabilization policy. Overall, the results do not suggest much payoff from the imposition of restrictions on federal deficit behavior. It is likely that such constraints would mainly increase the excess burden that is imposed on the private sector by financing of government expenditures.

On Estimating the Expected Return on the Market: An Exploratory Investigation

Robert C. Merton

Working Paper No. 444

February 1980

JEL No. 520

The expected return on the market is a number frequently required for the solution of many investment and corporate finance problems. However, there has been relatively little academic research on estimating this expected return. The current practice for estimating the expected return on the market is to take the historical average of realized excess returns (on the market) and add it to the current observed interest rate. While this model does explicitly reflect the dependence of the market experience return on the interest rate, it does not take into account the effect of changes in the level of risk associated with the market.

Three models of equilibrium expected market returns that do reflect this dependence are analyzed in this paper. Estimation procedures are derived, incorporating the restriction that equilibrium expected excess returns on the market must be positive. The parameters of the models are estimated using realized return data for the period 1926-78.

The principal conclusions from this exploratory investigation are: (1) in estimating models of the expected return on the market, the nonnegativity restriction of the expected excess return should be explicitly included as part of the specification; (2) estimators that use a time series for realized return should be adjusted for heteroscedasticity.

The Role of Intergenerational Transfers in Aggregate Capital Accumulation

Laurence J. Kotlikoff and Lawrence Summers

Working Paper No. 445

February 1980

JEL Nos. 130, 224

This paper uses historical U.S. data to directly estimate the contribution of intergenerational transfers to aggregate capital accumulation. The evidence presented indicates that intergenerational transfers account for the largest proportion of aggregate U.S. capital formation; only a negligible fraction of actual capital accumulation can be traced to life cycle or "hump" saving. A major difference between this study and previous investigations of this issue is the use of actual rather than hypothetical longitudinal age-consumption profiles. These profiles are simply too flat to generate substantial data on life cycle saving.

This paper suggests the importance of and need for substantially greater research and data collection on intergenerational transfers. Life cycle models of saving that emphasize saving for retirement as the dominant

form of capital accumulation should give way to models that emphasize the rather massive intergenerational transfers in the U.S. economy.

The Evolution of the American Labor Market, 1948-80

Richard B. Freeman

Working Paper No. 446

February 1980

JEL No. 824

The U.S. labor market has experienced significant changes since World War II in the composition of the work force, the type of work performed, the institutional rules of operation, and the structure of wages, employment, and unemployment. Some of these changes continue historic trends while others have diverged from developments in earlier decades. This paper identifies seven of the most important changes, documents their magnitude, and seeks to estimate their impact on the economy. The seven changes are:

1. A decrease in the rate of growth of real wages and labor productivity
2. A change in the age, sex, and education composition of the work force
3. A significant change in the composition of labor demand and employment
4. A decline in the proportion of workers in trade unions
5. Changes in operating rules and procedures of firms and unions
6. The altered structure of wages
7. Changes in the rate and composition of unemployment and its relation to wage inflation.

Mortgage Revenue Bonds: Tax Exemption with a Vengeance

Patric H. Hendershott

Working Paper No. 447

February 1980

JEL Nos. 313, 315, 323, 324

This paper presents calculations of the impacts of two levels of mortgage revenue bonds (MRBs) on: (1) yields on home mortgages, tax-exempt bonds, and taxable bonds; (2) the allocation of the American fixed capital stock among residential (by three tax brackets), business, and state and local capital; (3) the productivity of this aggregate stock; and (4) the federal deficit. The levels of MRBs analyzed are \$40 billion and the maximum permitted by the realities of the marketplace. The latter is estimated to be \$440 billion, or over half of regular home mortgages outstanding.

Limited levels of MRBs directed solely at lower income housing would not have any clear impact on productivity. An unlimited volume would generate an estimated annual productivity loss of \$3 billion. Assuming a 4 percent discount rate, the present value of this stream is \$75 billion.

The Distribution of the U.S. Capital Stock between Residential and Industrial Uses

Martin Feldstein

Working Paper No. 448

February 1980

JEL Nos. 226, 321

Residential real estate currently accounts for nearly one half of all private fixed capital in the United States. The purpose of this study is to measure the extent to which an increase in the total capital stock induces an increase in the stock of residential capital, that is, to measure the *marginal* propensity of additional capital to be absorbed in residential capital. This paper begins with a simple theoretical model of the division of capital between housing and other industries. For plausible values of the key parameters, the model implies that the marginal share of housing is less than its average share. Then the historical experience of the United States since 1929 is used to estimate the size of the total capital stock and the amount of capital used for residential real estate. This statistical analysis supports the conclusion of the theoretical model that the marginal share of housing in total capital is less than its average share.

Sterilization and Monetary Control under Pegged Exchange Rates: Theory and Evidence

Michael R. Darby

Working Paper No. 449

February 1980

JEL No. 431

In view of recent strong evidence that substantial sterilization of the monetary effects of reserve flows occurs, a modified monetary approach model is formulated in which central banks exercise no control over their domestic money supply despite their sterilization activities. This model is compared with a more general model in which the balance of payments and the domestic money supply are both influenced by the central bank's domestic policy goals. In order for the central bank to exercise monetary control, *three* conditions must be met: assets cannot be perfect substitutes, goods cannot be perfect substitutes, and expected depreciation cannot be "too responsive" to the balance of payments. The third condition may be met for small but not large reserve flows. Reduced form tests are derived that show that domestic policy goals of Canada, France, Germany, Italy, Japan, the Netherlands, and the United Kingdom strongly influenced quarterly changes in the domestic money supply. This contradicts both the modified and the standard monetary approach to the balance of payments. Thus there is a relevant "short run" in which monetary authorities exercise monetary control. The paper concludes that the simpler monetary approach is no longer empirically tenable for analysis of quarterly data and that more general simultaneous models must be specified and tested.

Flexible Exchange Rates in the 1970s

Jacob A. Frenkel

Working Paper No. 450

February 1980

JEL No. 430

The 1970s witnessed the dramatic evolution of the international monetary system from a regime of pegged exchange rates into a regime of flexible rates. This paper presents a survey of the key issues and lessons from the experience with floating rates during the 1970s. The main orientation is empirical and the analysis is based on the experience of three exchange rates: the dollar/British pound, the dollar/French franc, and the dollar/Deutsche-mark. The first issue that is examined is the efficiency of the foreign exchange market and the degree of exchange rate volatility. The analytical framework emphasizes that exchange rates are the prices of assets that are traded in organized markets and are strongly influenced by expectations about future events. The principal finding is that the behavior of the foreign exchange market has been broadly consistent with the efficient market hypothesis. The second issue concerns the relationship between exchange rates and interest rates. It is shown that during the inflationary period of the 1970s, exchange rates and interest rates were positively correlated. This positive association is interpreted in terms of the role played by inflationary expectations. The analysis draws a distinction between expected and unexpected changes in interest rates; it is demonstrated that changes in exchange rates are strongly associated with the unexpected component of changes in the interest rates. The third issue concerns the relationship between exchange rates and prices. It is shown that the experience of the 1970s does not support the prediction of the simple version of the purchasing power parity theory and that the deviations from purchasing power parities can be characterized by a first-order autoregressive process. These deviations are then interpreted.

Dynamic Aspects of Children's Health, Intellectual Development, and Family Economic Status

Robert A. Shakotko

Working Paper No. 451

February 1980

JEL No. 913

This paper presents an empirical investigation of childhood and adolescent health and cognitive development as determined by family economic variables. The model proposed recognizes that these processes may be jointly dependent and may, in part, be determined by common unobserved factors. These factors may also be correlated with the observed family economic variables. A two-factor model is estimated using panel data. The results indicate

that when such factors are taken into account, family income is estimated to have no significant influence on health and cognitive development, but parents' education has a strong positive influence.

Exchange Rates, Prices, and Money: Lessons from the 1920s

Jacob A. Frenkel

Working Paper No. 452

February 1980

JEL No. 430

The experience with flexible exchange rates during the 1920s has proven to be extremely important in shaping our current thinking about the operation of regimes of floating rates. This paper summarizes the results of an empirical comparison of the operation of flexible exchange rates during the 1920s under both hyperinflationary conditions (based on the experience of Germany) and "normal" conditions (based on the experience of Britain, the United States, and France). The three issues that are discussed are (1) the efficiency of the foreign exchange rate, as estimated by the relationship between spot and forward exchange rates; (2) the relationship between exchange rates and prices as indicated by certain aspects of the purchasing power parity doctrine; and (3) the determinants of exchange rates, ascertained by examining the relationship among exchange rates, money, and expectations.

Disequilibrium Dynamics with Inventories and Anticipatory Price Setting

Jerry Green

Working Paper No. 453

February 1980

JEL No. 023

This paper describes the sequence of short-run, quantity constrained equilibriums in a model with a single storable output, labor, and money. The durability of output gives rise to inventory fluctuations that, in turn, influence the course of the equilibriums attained.

One interesting feature is the assumption that prices are not at the level that would equilibrate all markets if there were no stochastic shocks to the economy. With prices frozen at this level, the nature of the realized shocks determines the type of disequilibrium reached and the unintended component of inventory change.

The analysis concentrates on two questions: (1) What is the statistical nature of the process governing the real wage, output, employment, and inventories? (2) Is it possible to test this model against the alternative hypothesis that prices are continually flexible even after the shocks have disturbed the system? I find that although these theories are similar in their qualitative structure, tests

can be developed. I also show how the frequencies of different types of quantity constrained equilibriums vary with the stochastic specification. This may shed some light on why it is commonly believed that some types of disequilibrium phenomena have not been observed.

An Exploration of the Dynamic Relationship between Health and Cognitive Development in Adolescence

Robert A. Shakotko, Linda N. Edwards,

and **Michael Grossman**

Working Paper No. 454

February 1980

JEL No. 913

This paper presents an empirical exploration of the dynamic relationship between health and cognitive development. A longitudinal data set, compiled from two nationally representative cross sections of children, is used in the analysis. Our results indicate that there is feedback both from health to cognitive development and from cognitive development to health, but the latter of these relationships is stronger. They also indicate that the model's estimates of the effects of family background—which can be assumed to be less influenced by genetic factors—are smaller than their cross-sectional counterparts, but still remain, in part, statistically significant.

The first finding calls attention to the existence of a continuing interaction between health and cognitive development over the life cycle. The second finding suggests that nurture affects cognitive development and health outcomes.

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