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Program Report

Pensions and Individual and Corporate Behavior

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Over the past two years, the NBER Project on Pensions has concentrated in four areas: (1) the incentive effects of private pension plans on labor force participation; (2) the relationship between retirement income and saving; (3) the economic welfare of the elderly; and (4) the relationship between pensions and corporate finance.

Incentive Effects

In the first of these areas, Laurence J. Kotlikoff and I are continuing our work on the links between private pension plans and labor force participation.[1] Based on our analysis of approximately 2500 pension plans, we conclude that almost all plans provide a substantial incentive to retire at age 65. Many plans also provide an incentive to quit work on the current job as early as age 55. The structure of pension plans and their incentive effects suggest that private plans may have contributed significantly to the decline over the past two decades in the labor force participation rates of older workers.

In a closely related paper, Howard Frant and Herman B. Leonard analyze state and local government pension plans.[2] They also conclude that public sector plans have potentially large incentive effects on the labor market and that the incentives vary dramatically from one plan to another. A comparison of public sector with private sector plans shows that public sector plans are typically much more generous than private plans.

[1] *L. J. Kotlikoff and D. A. Wise, "The Structure of Private Pension Plans and Labor Force Incentives," forthcoming as an NBER Working Paper.*

[2] *H. Frant and H. B. Leonard, "State and Local Government Pension Plans: Labor Economics or Political Economy?" forthcoming as an NBER Working Paper.*

In This Issue

This issue of the *Reporter* highlights the Bureau's study of pensions and individual and corporate behavior. Next, M. Ishaq Nadiri describes his work on the economics of research and development. After the quarterly Economic Outlook Survey are biographical sketches, news of NBER conferences, the Conference Calendar, and other NBER news and reports. The *Reporter* concludes with short summaries of recent NBER Working Papers.

The military pension system is particularly generous. Work by Leonard[3] and a companion paper that Douglas Phillips and I wrote[4] examine the very substantial contribution of the military pension system to total compensation of military personnel. Also, these papers find that the military pension system creates large incentives for retirement. Furthermore, Leonard concludes that the unfunded liability of the military pension system together with the unfunded liability of the federal civil service pension system are equal to the national debt.

[3] *H. B. Leonard, "Financial Aspects of the Military Retirement System," forthcoming as an NBER Working Paper.*

[4] *D. Phillips and D. A. Wise, "Military versus Civilian Pay: A Descriptive Discussion," forthcoming as an NBER Working Paper.*

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In another study of incentives, Edward P. Lazear and Robert Moore analyze the ages of retirement under the pension plans of six large corporations.[5] They then use option value measurement to evaluate the relation between pension wealth and continuing work. The Lazear-Moore tentative results suggest that turnover rates are twice as high for workers without pensions as for those with the typical pension.

A recent paper by Lazear and Sherwin Rosen[6] concludes that pension plans may exacerbate black-white inequality in total compensation while reducing male-female inequality in compensation. Even though women are less likely than men to work in jobs entitling them to pensions, those women who are eligible for pensions receive relatively generous ones. While the average pension received by the typical female retiree is well below that of the typical male retiree, the difference is not as pronounced as the male-female difference in salary.

Pensions and Saving

Several recent papers have examined the interrelationships among income for retirement, income security after retirement, and saving. Individual retirement accounts (IRAs) were initiated to encourage retirement saving among persons without private pension plans. However, Steven F. Venti and I conclude that (after controlling for income, age, and other variables) persons without private pension plans are no more likely than those with them to contribute to an IRA.[7] If anything, those with private plans contribute more than those without them. In general, persons with low incomes are unlikely to have IRAs. Whether a person contributes to an IRA at all and the amount of contributions are both determined in large part by income and to some extent by age. Moreover, the individual's marginal tax rate is of limited importance. Our estimates suggest that the current Treasury Department proposal would lead to about a 30 percent increase in IRA contributions. An interesting feature of these results is that they compare very closely with estimates based on Canadian data, where a tax-deferred saving option equivalent to IRA and Keogh accounts is also available.

B. Douglas Bernheim and John B. Shoven analyze the negative relationship between defined-benefit pension contributions and the real interest rate.[8] While

[5] *E. P. Lazear and R. Moore, "Pensions and Turnover," forthcoming as an NBER Working Paper.*

[6] *E. P. Lazear and S. Rosen, "Pension Inequality," NBER Working Paper No. 1477, October 1984.*

[7] *S. F. Venti and D. A. Wise, "The Determinants of IRA Contributions and the Effect of Limit Changes," forthcoming as an NBER Working Paper.*

[8] *B. D. Bernheim and J. B. Shoven, "Pension Funding and Saving," NBER Working Paper No. 1622, May 1985.*

pension assets represent a large component of individual personal savings, it is only aggregate pension funding minus the outlays of defined-benefit plans that constitutes a component of personal savings that generates loanable funds for financing investment or government deficits. From the company's point of view, funding the pension obligation is the target; the higher the earnings of the assets that fund the plan, the lower the company's contribution need be in order to meet the pension obligation. Although corporate pension contributions fell sharply in 1984, the number of unfunded plans declined. Bernheim and Shoven argue that high real interest rates, which may encourage other kinds of saving, are the primary reason behind both the reduction in underfunded plans and the sharp drop in pension contributions. They present empirical evidence consistent with this proposition.

Few elderly persons in the United States purchase life annuities. Benjamin M. Friedman and Mark Warshawsky explore potential reasons for this in two of their papers.[9] They conclude that neither the cost of annuities nor individual bequest motives provide a plausible explanation for the limited annuity purchases in the United States. However, taken together, these two factors can explain the limited market for annuities.

In contrast, R. Glenn Hubbard[10] and Kotlikoff, Shoven, and Avia Spivak[11] examine the potential effect of annuity markets (the availability of longevity insurance) on saving. Both papers examine the consumption and saving behavior of individuals facing uncertain life expectancy. In the absence of longevity insurance, individuals presumably save for precautionary purposes: if they don't live as long as they anticipate, that motivation can lead to sizable unintended bequests. If annuity markets were perfect (and Social Security benefits were paid out in the form of an inflation-adjusted annuity), the authors argue, then both saving and bequests would be reduced. Kotlikoff, Shoven, and Spivak suggest that a fully funded, actuarially fair retirement annuity program would reduce the steady-state saving rate and capital stock between 35 and 60 percent. Both papers argue that the annuity payment form of Social Security might depress savings as much as the current unfunded, pay-as-you-go nature of Social Security.

Another paper by Bernheim provides new answers to the question of whether people continue to save after they retire.[12] He looks at both bequeathable wealth and total wealth (including the value of retirement annuities) and finds some evidence of dissaving during retirement. However, he concludes that the observed patterns of saving and dissaving are inconsistent with the pure life-cycle theory.

Economic Welfare of the Elderly

In a series of papers, Michael J. Boskin and Shoven continue their work on the welfare of the elderly.[13] They examine issues of measurement of the well-being of the elderly, relative to their previous standard of living (otherwise known as their replacement rates). They consider the treatment of taxes, the expenses of raising children, health status and health care costs, the cost of income uncertainty, and uncertainty about the date of death. The authors' findings indicate that fully adjusted replacement rates are very high for most people. For many of the elderly, earnings are almost completely replaced by Social Security alone. Boskin and Shoven conclude that total postretirement income usually exceeds preretirement income.

In another paper,[14] the two authors conclude that despite the enormous *general* improvement in the economic status of older people in the recent past, a significant fraction of the elderly either remain poor, become poor, or have very low replacement rates (in terms of their total income). Women, especially widows, are the most likely to be poor or to have declines in income as they age. In addition, those who retire relatively early tend to have low replacement rates. Boskin and Shoven also conclude that there are large differences between expectations and realizations of retirement income among those who are poor or who have low replacement rates as compared with those who do better.

In related work, Zvi Bodie, Alan J. Marcus, and Robert C. Merton analyze pension plan integration.[15] Others have focused on the integration of private pension plans and Social Security as one means of insuring adequate retirement income and replacement rates that are equal for all employees regardless of salary level. Here, though, the authors focus on integration as a means of insuring employees who are covered by pension plans against adverse changes in Social Security benefits. Using option pricing methodology, the authors develop a model to explore the quantitative aspects of this characteristic of integration.

[9] *B. M. Friedman and M. Warshawsky, "The Cost of Annuities: Implications for Saving Behavior and Bequests," and "Annuity Yields and Saving Behavior in the United States," forthcoming as NBER Working Papers.*

[10] *R. G. Hubbard, "Uncertain Lifetimes, Pensions, and Individual Savings," NBER Working Paper No. 1363, June 1984.*

[11] *L. J. Kotlikoff, J. B. Shoven, and A. Spivak, "Annuity Markets, Savings, and the Capital Stock," NBER Working Paper No. 1250, December 1983.*

[12] *B. D. Bernheim, "Dissaving after Retirement: Testing the Pure Life-Cycle Hypothesis," NBER Working Paper No. 1409, July 1984.*

[13] *M. J. Boskin and J. B. Shoven, "Concepts and Measures of Replacement during Retirement," NBER Working Paper No. 1360, June 1984.*

[14] *M. J. Boskin and J. B. Shoven, "Poverty among the Elderly: Where Are the Holes in the Safety Net?" forthcoming as an NBER Working Paper.*

[15] *Z. Bodie, A. J. Marcus, and R. C. Merton, "Pension Plan Integration as Insurance against Social Security Risk," forthcoming as an NBER Working Paper.*

Pensions and Corporate Finance

Finally, a series of papers continues earlier work on pensions and corporate finance. Bodie, Jay O. Light, Randall Mørck, and Robert A. Taggart, Jr., use new data to show that the discount rate chosen by a firm is systematically related to its financial condition.[16] Therefore, unless all firm liabilities are adjusted to a uniform rate, the relationship between financial condition and funding status is obscured. They also show that less profitable firms tend to choose higher discount rates and thus to report lower pension liabilities. Moreover, there is a significant positive relationship between firm profitability and the degree of pension funding.

Marcus analyzes the value of the Pension Benefit Guaranty Corporation (PBGC) "put option."[17] He presents empirical estimates of the "fair market value" of the insurance provided by the PBGC for a sample of *Fortune* 100 firms and concludes that prohibiting voluntary termination of underfunded plans drastically reduces the calculated value of the PBGC put.

Jeremy I. Bulow, Mørck, and Lawrence H. Summers continue the analysis done by Feldstein and others that suggests that the stock market valuation of firms reflects their pension funding status reasonably accurately.[18] Using a different data set and an alternative methodology, their results support earlier findings.

Bodie, Marcus, and Merton examine the advantages and disadvantages of defined-benefit versus defined-contribution pension plans.[19] They compare plans with respect to the risks faced by employers and employees, the sensitivity of benefits to inflation, the flexibility of funding, and the importance of governmental supervision. They conclude that neither type of plan can be said to wholly dominate the other from the perspective of employer welfare.

Finally, Bulow summarizes the economic theory of pension liabilities and then discusses pension funding and investment policy.[20] He also considers the ways in which such policies can affect the Financing Accounting Standards Board and the PBGC.

Future Research

The Bureau's Project on Pensions has increased our understanding of the incentive effects of pension plans on worker turnover and retirement decisions and on the savings decisions of households and corporations. Members of the project have also studied the contribution of pensions to retirement income. Future research will include analysis of the growth in fringe benefits, of the consequences of tax-free or tax-deferred compensation and saving, and of the economic welfare of the elderly.

In the coming year, three NBER books on pensions will be published by the University of Chicago Press. The first of these, described in this issue of the *NBER Reporter* and available in September, is *Pensions, Labor, and Individual Choice.* The other two, coedited by Bodie, Shoven, and me, are: *Issues in Pension Economics* and *Pensions in the U.S. Economy.*

[16] *Z. Bodie, J. O. Light, R. Mørck, and R. A. Taggart, Jr., "Funding and Asset Allocation in Corporate Pension Plans: An Empirical Investigation," NBER Working Paper No. 1315, March 1984.*

[17] *A. J. Marcus, "Corporate Pension Policy and the Value of PBGC Insurance," NBER Working Paper No. 1217, October 1983.*

[18] *J. I. Bulow, R. Mørck, and L. H. Summers, "How Does the Market Value Unfunded Pension Liabilities?" NBER Working Paper No. 1602, April 1985.*

[19] *Z. Bodie, A. J. Marcus, and R. C. Merton, "Defined-Benefit and Defined-Contribution Plans: What Are the Real Trade-Offs?" forthcoming as an NBER Working Paper.*

[20] *J. I. Bulow, "Pension Funding and Investment Policy," forthcoming as an NBER Working Paper.*

Research Summary

Economics of R and D Investment

M. Ishaq Nadiri

My research, with various coauthors, on the economics of investment in R and D have centered on five interrelated sets of issues: (1) modeling the R and D investment decision as an integral part of the firm's optimal decision framework; (2) incorporating the effects of the financial structure of the firm on its investment in physical and R and D capital; (3) measuring the spillover effects (that is, appropriability) of R and D investment; (4) examining the impact of R and D investment on the production structure of the firm; and finally, (5) assessing the contribution of R and D to the growth of productivity and measuring the rates of return on investments in R and D and physical capital. To address these five issues, we have developed consistent dynamic demand models and in general have used firm data to estimate them.

Expectations, Adjustment Costs, and the R and D Decision

R and D investment, like all other types of investment, is costly to change, takes some time to complete, and is affected strongly by the firm's changes in expectations.[1] Ingmar R. Prucha and I developed a

[1] *For a detailed analysis, see I. R. Prucha and M. I. Nadiri, "A Dynamic Factor Demand Model with Nonstatic Expectations and Adjustment Costs: The Finite Horizon Case," mimeo, 1982.*

model of investment behavior that incorporates nonstationarity of expectations with a general cost-of-adjustment production technology, assuming a finite planning horizon for the firm. We are then able to estimate flexible dynamic factor demand equations by using a numerical solution to a first-order optimization condition instead of by an explicit analytical solution.[2] Then we can easily introduce a variety of hypotheses about expectations into the framework. We emphasize the forward-looking aspect of the investment process and explicitly state the rationale for using survey data on anticipations in investment models.

We have also analyzed empirically the effect of changes in expectations and adjustment costs on the R and D decision. In one paper,[3] Mark A. Schankerman and I integrate the formation of expectations with adjustment costs in determining actual and multiple-span planned investment decisions about R and D at the firm level. We suggest a methodology for testing the mechanisms of three leading forecasting hypotheses: "rational," "adaptive," and "static" expectations. Our empirical results strongly reject the parameter restrictions implied by both the rational and the static expectations hypotheses. The hypothesis most favored by the data is a mixed one, with adaptive forecasting on the level of output and static expectations on the price of R and D.

Next, Pierre A. Mohnen, Prucha, and I considered the role of R and D in the manufacturing sector of the United States, Germany, and Japan.[4] The adjustment cost model explains the behavior of inputs in these sectors fairly well. The speed of adjustment of R and D to its optimal value seems to be smaller than the speed of adjustment for capital. The price and output elasticities vary considerably among the manufacturing sectors, and the average net rates of returns for R and D are greater than those for physical capital. The magnitudes of the rates for the two types of capital are similar across countries. The rate of return on R and D is typically somewhat greater than that on capital.

In a recent paper,[5] Prucha and I estimated a dynamic factor demand model of a firm with a finite planning horizon. Our empirical results show that the optimal plans for the finite horizon model converge rapidly to those of the infinite horizon model. This indicates that it is reasonable for firms to plan only moderately (as they actually do) into the future. The form of expectations affects the adjustment paths of investment in R and D and physical capital. The estimates of the adjustment coefficients suggest a fairly short adjustment period for physical capital and a long adjustment period (about four to five years) for R and D. The forms of expectations also significantly affect the output and price elasticities of investment in physical and R and D capital.

Financial Structure and the R and D Decision

An issue Jeffrey I. Bernstein and I considered is the effect of a firm's financial structure on its decisions to invest in plant and equipment and R and D.[6] The decisions are interrelated in the sense that the firm determines its optimal debt-equity ratio by maximizing its initial share value. This debt-equity ratio also minimizes the cost of capital, which in turn affects its real investment plans.

Our empirical results suggest that the debt-equity ratio exerts a statistically significant but small impact on investment in physical capital in R and D. According to our model, investment in R and D and physical capital depends on a lagged investment flow, the cost of additional capital (as reflected by the debt-equity ratio), and the utilization of the existing capital stock, as measured by the sales-to-asset ratio for each particular type of real capital. The empirical results indicate that the sales-to-asset ratio significantly affects both types of investment and dominates the effects of the prices and debt-equity ratio. These results clearly imply that financial considerations are a significant element in determining investment demand. Increases in the cost of external financing exert greater pressure on physical capital than on R and D. The pressure of demand, measured by the sales-to-asset ratio, is also much stronger on investment in physical capital than on R and D investment. Finally, we find substantial differences in the determinants of these two types of investments across differerent firms.

R and D and the Production Structure

In a series of papers, Bernstein and I explored: the effects of relative prices on R and D decisions; factor substitution among labor, physical capital, and R and D capital; the influence of R and D capital formation on physical capital utilization; and the adjustment process associated with R and D investment. In one theo-

[2] *Previous efforts in this direction frequently have been unsuccessful because combining these two features of investment decision often leads to intractable nonlinear models. Explicit analytical solutions for a factor demand, such as demand for R and D investment, will be difficult to specify unless extreme simplifying assumptions are adopted. See I. R. Prucha and M. I. Nadiri, "Formulation and Estimation of Dynamic Factor Demand Equations under Nonstatic Expectations: A Finite Horizon Model," NBER Technical Working Paper No. 26, October 1982, revised 1984.*

[3] *M. A. Schankerman and M. I. Nadiri, "Investment in R and D, Costs of Adjustment, and Expectations," NBER Working Paper No. 931, July 1982, and in* Patents, R and D, and Technical Change, *Z. Griliches, ed., Chicago: University of Chicago Press, 1984.*

[4] *P. A. Mohnen, M. I. Nadiri, and I. R. Prucha, "R and D, Production Structure, and Productivity Growth in the U.S., Japanese, and German Manufacturing Sectors: A Nonseparable Factor Demand Model," NBER Working Paper No. 1264, January 1984, and forthcoming in* European Economic Review, *1985.*

[5] *M. I. Nadiri and I. R. Prucha, "Nonstatic Expectations, Adjustment Costs, and the Production Structure and Dynamic Factor Demand for AT&T," mimeo, 1984.*

[6] *J. I. Bernstein and M. I. Nadiri, "Financing and Investment in Plant and Equipment and Research and Development: Theoretical and Empirical Results," NBER Working Paper No. 1017, November 1982, revised 1983.*

retical paper,[7] we develop a model that shows that along the dynamic path, as the R and D intensity of physical capital increases, knowledge capital per worker rises, and the utilization rate of physical capital decreases. There is also a distinction between the intertemporal movement of the firm and the response to unanticipated changes in demand and cost conditions.

In an empirical paper,[8] we estimated the production structure by using panel data for a set of firms in four industries. Our results indicate that R and D and physical capital are complements, while the capital inputs are substitutes for labor. Across different industries, output growth exerts a significant and positive influence on factor requirements dominating the effect of relative price changes. There is also evidence of short-run overshooting in the demand for labor in response to increases in output, but it dissipates as the capital inputs adjust. Finally, marginal adjustment costs for each of the capital inputs are about 20 percent to 65 percent of their respective rental prices. The marginal value of R and D exceeds the marginal value of physical capital because the marginal adjustment costs associated with R and D capital are greater than those for physical capital.

R and D and Spillover Effects

Unlike other forms of capital, a firm's investment in R and D may spill over to other firms. Bernstein and I have developed and estimated a dynamic model that incorporates the intraindustry externality associated with R and D investment.[9] Preliminary evidence suggests that approximately one-fourth of a firm's R and D investment spills over to its rivals in the chemical industry. This implies that the social marginal rate of return is 25 percent greater than the private rate of return.

Edward Wolff and I have used input-output analysis to examine: (1) the relation between the rate of technological change (represented by a firm's R and D effort) and its degree of linkage to both purchasing and supplying sectors; (2) the direct and indirect effects of R and D in an industry on its productivity growth; (3) the transmission process of spillovers of technology from one industry to another; and (4) whether the allocation of R and D resources by private and public sectors is "optimal."[10] Our empirical results suggest that the direct rate of return on total R and D ranges from 11 percent to 16 percent, while the indirect rate of return is in the range of 15 percent to 22 percent. That is, the spillover effects of R and D are somewhat larger than the direct effects.

The spillover into other industries depends heavily on interindustry linkages. Forward linkages (to customers) are usually larger than backward linkages (to suppliers). There is some evidence, however, that the distribution of private and public R and D expenditures among industries has little relationship to the strength of the forward, backward, or total linkages of various industries.

Technological spillovers from a sector's suppliers and customers depend on productivity growth and not necessarily on R and D. Output is a highly significant determinant of both forward and backward linkages, while R and D affects linkages indirectly through its effect on output growth. Finally, R and D intensity in a sector is highly related to R and D intensity in the industries that it purchases from and the industries to which it sells. But R and D intensity is not related to the productivity growth of those industries. This finding suggests that there are significant spillovers in research knowledge among sectors.

R and D Contribution to Productivity Growth and Return to R and D Investment

Work with Schankerman, Mohnen, and Angelo Cardani attempted to identify the sources of the slowdown in total factor productivity and to note the contribution of R and D.[11] Schankerman and I proposed methodology for decomposing the measured growth or total factor productivity (TFP) resulting from scale economies and from induced technical change.[12] The evidence, based on industry data, suggests that the slowdown in demand growth was an important factor in retardation of the rate of growth of TFP in all industry groups. Real factor prices contributed moderately to the decelerating growth rate of TFP. The decline in the

[7] *J. I. Bernstein and M. I. Nadiri, "Does Knowledge Intensity Matter? A Dynamic Analysis of Research and Development, Capital Utilization, and Labor Requirements," NBER Working Paper No. 1238, November 1983.*

[8] *J. I. Bernstein and M. I. Nadiri, "Rates of Return on Physical and R and D Capital and the Structure of the Production Process: Cross-Section and Times-Series Evidence," mimeo, 1983.*

[9] *J. I. Bernstein and M. I. Nadiri, "Research and Development, Spillovers, and Adjustment Costs: An Application of Dynamic Duality at the Firm Level," mimeo, 1983.*

[10] *E. Wolff and M. I. Nadiri, "Interindustry Effects and the Return to R and D in Manufacturing," mimeo, 1984, and "Linkage Structure and Research and Development," mimeo, 1984.*

[11] *M. I. Nadiri and M. A. Schankerman, "The Structure of Production, Technological Change, and the Rate of Growth of Total Factor Productivity in the Bell System," in* Productivity Measurement in Regulated Industries, *New York: Academic Press, 1981; "Adjustment Costs and Labor Productivity in Major OECD Dountries," in* Revue Economique, *1985; and M. I. Nadiri, M. A. Schankerman, P. A. Mohnen, and A. Cardani, "Labor Productivity Slowdown in a Dynamic Model with Energy, Capital, and R and D for Italian and French Manufacturing," in* Giornale Degli Economisti e Annali de Economia, *1985.*

[12] *M. I. Nadiri and M. A. Schankerman, "Technical Change, Returns to Scale, and the Productivity Slowdown,"* AER, Papers and Proceedings, *May 1981.*

growth of the R and D stock contributed modestly to the slowdown in the TFP growth, but in total and durable manufacturing it contributed nearly a quarter of the retardation in the growth of TFP.

Prucha, Mohnen, and I calculated the rates of return to R and D in several studies.[13] Some used dynamic demand models while others used restricted cost functions. The internal rates of return to fixed factors depend on the shadow price of these factors, the growth of demand for output, the rate of price adjustment, and the role of deterioration of the stocks of fixed factors. We show that a divergence between the rate of return and the opportunity cost of funds is the dual of the divergence between the observed and static equilibrium of fixed factors.

The methodology Schankerman and I developed permits testing overinvestment or underinvestment in these factors.[14] The empirical results suggest that in one case—that of the Bell System—there is substantial underinvestment in R and D and overinvestment in capital: the rate of return on R and D is about 10 to 15 percent, or two to three times larger than the return to physical capital. This misallocation of investment in the Bell System raised total costs by 5 to 10 percent over the static equilibrium; the divergence from such equilibrium contributes to a significant understatement of the true growth in TFP.

In summary, our studies indicate that R and D investment can be treated as an input in the production structure of the firm. It is affected by changes in relative prices and output as well as by the financial structure of the firm. The expectations process plays a crucial role in determining investment in R and D and physical capital. Significant complementarities exist among physical, R and D capital, and labor inputs, while substitutional relationships are present among these three inputs. Also, there is evidence of much longer lags in adjustment for R and D than for physical capital. The rate of return on R and D in general is much higher than on physical capital, and R and D capital contributes significantly to the growth of output and productivity.

[13] *M. I. Nadiri and I. R. Prucha, "Nonstatic Expectations, . . ." and P. A. Mohnen, M. I. Nadiri and I. R. Prucha, "R and D Production Structure. . . ."*

[14] *For details, see M. A. Schankerman and M. I. Nadiri, "Restricted Cost Functions and the Rate of Return on Quasi-Fixed Factors, with an Application to R and D and Capital in the Bell System," NBER Working Paper No. 1259, January 1984.*

Economic Outlook Survey

Second Quarter 1985

Victor Zarnowitz

According to the May survey of 29 professional forecasters taken by NBER and the American Statistical Association, the vigorous recovery phase of this expansion ended in mid-1984. This was reflected by the lack of growth in leading indicators and was recognized by most forecasters. This year, the economic slowdown worsened sharply, largely because of declines in manufacturing and other industries that depend on exports (or compete with imports) and so are particularly vulnerable to the strong dollar. A major risk now is that the slowdown may spread to other sectors of the economy and turn into a recession. Most forecasters assess the probability of this happening soon as rather low, although significant, but gradually increasing during the year ahead. They expect the average growth of total output to increase from subnormal 2.2 percent between 1984:3 and 1985:1 to about 3 percent between 1985:2 and 1986:2. Such moderate expansion would not be associated with any significant rise in inflation, but it would also be insufficient to reduce the unemployment rate substantially.

Recent Evidence and Forecasts

The latest news was mostly bad. Real GNP growth in 1985:1 was revised downward again, to a meager 0.7 percent. The index of leading indicators decreased 0.2 percent in April according to preliminary estimates; it has been essentially flat for several months now. The industrial production index moved down a bit. The GNP implicit price deflator (IPD) and the consumer price index (CPI) rose at rates exceeding those of the recent past. Corporate profits after taxes in 1985:1 declined moderately to a level 7 percent below their peak of 1984:1 under the combined influence of weakness in final sales and foreign trade and the upward drift of unit labor costs.

On the other hand, both short and long-term interest rates declined substantially in recent weeks and are now well below their highs of summer 1984. In the six months after October 1984, the monetary aggregates M1 and M2 grew at average annual rates of 9–10 percent, a sharp acceleration from the preceding half-year period (3–7 percent).

Many forecasters count on the monetary expansion and lower interest rates to halt and reverse the recent

deterioration of business conditions. Some hold that no further easing is needed: the economy is about to rebound; monetary growth will then slow; and short-term interest rates will rise later in the year. Others believe that a new policy mix is necessary to prolong the expansion. Less apprehensive of the danger of reigniting inflation, they would have the Fed continue a growth-oriented course of action while fiscal policy turns much less stimulative, promising major reductions in future federal budget deficits.

Countercyclical policies are difficult to time, quantify, and coordinate properly; their past record is therefore very uneven. Hence, the various policy-centered expectations presently held could well be misplaced or too optimistic. But the bond and stock markets rallied strongly in the wake of such recent actions as the Fed's cutting the discount rate to 7.5 percent. Well-taken and well-received policy measures can strengthen the confidence of investors, consumers, and businessmen, thereby inducing more spending and confirming the forecasts that the economy is on the mend.

It should be noted that many of the replies to our survey were received before the latest GNP revision and some other bad news. They also predate the very recent, more hopeful developments in financial markets and the administration's new tax reform proposal, which is apt to generate much controversy and new uncertainties.

Point Predictions of Output Growth and Probabilities of Alternative Outcomes

Real GNP is predicted to rise 3.1 percent in 1985:2-1986:2 and 2.9 percent in 1985-86, according to the median forecast from the survey. The figure for 1984-85 is 3.1 percent, substantially less than the 3.8 percent predicted on average in the survey taken three months ago. The quarterly averages are close to 3 percent annual rate, except for 1985:3 (4.8 percent) and 1986:1 (1.9 percent).

Survey participants are asked to report the probabilities they attach to various ranges of annual percentage changes in real GNP. The means of their assessments are distributed as follows (percentages add up to 100 in each column):

Percentage Change in Real GNP	*Percentage of Responses*	
	1984-85	*1985-86*
6.0 percent or more	2	2
4.0 to 5.9 percent	13	15
2.0 to 3.9 percent	59	51
0 to 1.9 percent	23	25
Negative	3	7

In the previous NBER-ASA survey, only 13 percent of the distribution for 1984-85 fell below 2 percent; now the corresponding figure is 26 percent. For 1985-86, the estimated probability of low or negative growth rises to 32 percent.

The chance that real GNP will decline averages 12, 14, 20, and 25 percent, respectively, for the four successive quarters ahead (from mid-1985 to mid-1986).

Unemployment Relatively Stable; Industrial Production Weak

The median forecast has the rate of unemployment declining slightly from 7.5 percent in 1984 to 7.2 percent in 1985 and 7.0 percent in 1986. Seventeen respondents expect the jobless rate in 1986:2 to be lower than in 1985:2; three expect it to be unchanged; and eight expect it to be higher. The range for 1986:2 is 6.4-7.9 percent; for 1986 as a whole, 6.5-8.1 percent.

Output of manufacturing, mining, and utilities is predicted to gain only 1.1 percent in 1984-85, a very low average forecast. The gains projected for 1985:2-1986:2 and 1985-86 are much better but still modest: 3.6 percent and 3.0 percent, respectively. It appears that many forecasters are increasingly worried about the effects of trade deficits, which are generally predicted to remain high, although not increasing much further.

Most Inflation Forecasts Moderately Higher

Forecasts of changes in the CPI average 3.7 percent for 1985 and 4.2 percent for 1986. The quarterly figures rise from 4.0 percent annual rate in 1985:2 to about 4.5 percent in the first half of 1986. Three out of four responses list higher CPI inflation rates for 1986:2 than for 1985:2, but most of the projected rises are fractional.

Similarly, most of the forecasters expect inflation measured by the GNP implicit price index to increase, albeit mildly, in the year ahead. The median predictions are close to 4 percent for both this year and next and 4.3 percent for 1985:2-1986:2. However, the percentage distributions of means of the individual probabilistic forecasts clearly show a shift in expectations toward higher IPD inflation. In the previous (February-March) NBER-ASA survey, 60 percent of the corresponding responses for 1984-85 were concentrated in the "less than 4 percent" interval.

Percentage Change in IPD	*Percentage of Responses*	
	1984-85	*1985-86*
8.0 percent or more	14	21
6.0 to 7.9 percent	42	49
4.0 to 5.9 percent	40	26
Less than 4.0 percent	4	4

Many See Somewhat Higher Interest Rates Next Year

The three-month Treasury bill rate is projected to be at its low levels of 7.8 percent or slightly less in this quarter and the next. According to the median forecast, it will average about 8.2 percent late this year and in 1986. Three out of four respondents place it higher in 1986:2 than in 1985:2. Individual expectations for mid-1986 vary from 6.9 percent to 10.4 percent.

The yield on new high-grade corporate bonds is expected to increase just a little, from about 12 percent to 12.2 percent in the year ahead; again, these averages conceal much dispersion across individuals. Two

Projections of GNP and Other Economic Indicators, 1985-86

	Annual				
				Percent Change	
	1984 Actual	1985 Forecast	1986 Forecast	1984 to 1985	1985 to 1986
1. Gross National Product ($ billions)	3662.8	3928.0	4204.0	7.2	7.0
2. GNP Implicit Price Deflator (1972 = 100)	223.4	232.3	241.8	4.0	4.1
3. GNP in Constant Dollars (billions of 1972 dollars)	1639.3	1690.0	1739.0	3.1	2.9
4. Unemployment Rate (percent)	7.5	7.2	7.0	-0.3[1]	-0.2[1]
5. Corporate Profits After Taxes ($ billions)	145.9	144.0	152.0	-1.3	5.6
6. Nonresidential Fixed Investment (billions of 1972 dollars)	204.9	220.5	231.0	7.6	4.8
7. New Private Housing Units Started (annual rate, millions)	1.7	1.8	1.8	3.0[2]	-1.4[2]
8. Change in Business Inventories (billions of 1972 dollars)	24.8	17.6	16.0	-7.2[3]	-1.6[3]
9. Treasury Bill Rate (3-month, percent)	9.6	7.9	8.2	-1.6[1]	0.3[1]
10. Consumer Price Index (annual rate)	3.8	3.7	4.2	-0.1[1]	0.5[1]

	Quarterly							
		1985			1986		Percent Change	
	1985 Q1 Actual	Q2	Q3	Q4	Q1	Q2	Q1 85 to Q1 86	Q2 85 to Q2 86
		Forecast						
1. Gross National Product ($ billions)	3819.9	3886.0	3966.4	4039.5	4119.0	4187.5	7.8	7.8
2. GNP Implicit Price Deflator (1972 = 100)	229.9	231.0	233.3	235.7	238.4	241.0	3.7	4.3
3. GNP in Constant Dollars (billions of 1972 dollars)	1668.0	1680.0	1700.0	1712.0	1720.0	1732.6	3.1	3.1
4. Unemployment Rate (percent)	7.3	7.2	7.2	7.1	7.0	7.0	-0.3[1]	-0.2[1]
5. Corporate Profits After Taxes ($ billions)	140.0	143.0	146.0	149.0	152.8	153.6	9.2	7.4
6. Nonresidential Fixed Investment (billions of 1972 dollars)	215.6	219.0	222.0	224.0	227.0	230.0	5.3	5.0
7. New Private Housing Units Started (annual rate, millions)	1.8	1.9	1.8	1.8	1.8	1.8	-0.1[2]	-4.9[2]
8. Change in Business Inventories (billions of 1972 dollars)	20.7	16.2	17.0	17.0	16.5	16.0	-4.2[3]	-0.2[3]
9. Treasury Bill Rate (3-month, percent)	8.2	7.8	7.8	8.2	8.2	8.1	0.0	0.4[1]
10. Consumer Price Index (annual rate)	2.5	4.0	4.0	4.3	4.6	4.3	2.1[1]	0.3[1]

SOURCE: National Bureau of Economic Research and American Statistical Association, Business Outlook Survey, June 1985. The figures on each line are medians of twenty-nine individual forecasts.

[1]Change in rate, in percentage points.
[2]Apparent discrepancy in percent change is caused by rounding.
[3]Change in billions of dollars.

out of three respondents expect bond yields to rise between mid-1985 and mid-1986. The range of forecasts for 1986:2 is 10.3-13.9 percent.

Those who foresee renewed growth (the majority) tend to project lower inflation and interest rates than those who expect a sluggish economy.

Consumption to Grow Somewhat Less; Housing to Decline Mildly

Total consumption expenditures in 1972 dollars are predicted to rise 3.7 percent in 1984-85, 2.9 percent in 1985:2-1986:2, and 2.8 percent in 1985-86. Looking ahead to 1986, this would be a trifle less than the growth in real GNP.

Housing starts, in millions of units annual rate, are forecast to average 1.85 in 1985:2 and about 1.75 in 1986:2. For 1986 as a whole, they are expected to decline very mildly. The range for mid-1986 is 1.6-2.2.

Modest Gains in Profits and Business Investment

Most forecasters expect corporate profits after taxes in current dollars to decline in 1984-85; the average (1.3 percent) is small. The gains projected for 1985:2-1986:2 and 1985-86 are 7.4 percent and 5.6 percent, respectively.

Nonresidential fixed investment in 1972 dollars is expected to grow 7.6 percent in 1984-85, 5.0 percent in 1985:2-1986:2, and 4.8 percent in 1985-86. There is considerable consensus among the respondents that business capital formation, although no longer booming, will continue to increase at rates higher than the growth of total output.

Government Spending and Policy Assumptions

Federal government purchases of goods and services are predicted to grow 7.1 percent in 1984–85 but only about 3.7 percent in both 1985:2–1986:2 and 1985–86, after adjustments for inflation. Most forecasters assume that defense outlays will grow more slowly, perhaps by 4–6 percent, or merely in step with the rise in prices. State and local government purchases in constant dollars will grow slowly: 1.9 percent in 1984–85, near 2.2 percent in 1985:2–1986:2, and the same in 1985–86.

Half of the respondents assumed no substantial change in the current tax law; others were divided between a tax cut and a tax increase in the year ahead. (As noted above, their responses were received prior to the new proposal and debates.)

Regarding monetary policy, the most common assumptions were that M1 and M2 would tend to grow by 5–8 percent and 6–8 percent, respectively; very few of those surveyed quoted lower or higher trend growth rates.

A large majority of the survey participants assumed that the dollar would weaken. About the same number anticipated stable prices of oil as anticipated decreasing prices; very few stated that energy demand and prices would increase.

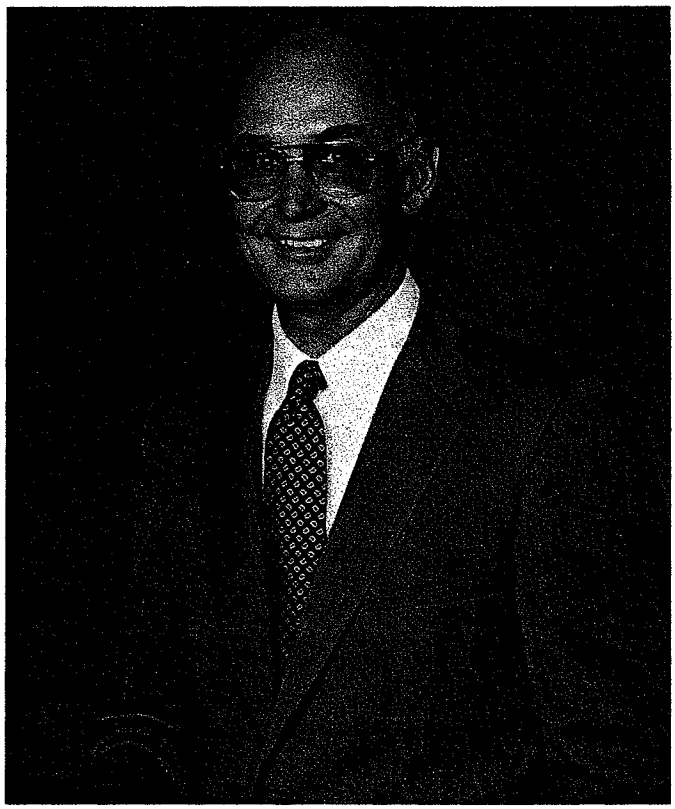
This report summarizes a quarterly survey of predictions by 29 business, academic, and government economists who are professionally engaged in forecasting and are members of the Business and Economics Statistics Section of the American Statistical Association. Victor Zarnowitz of the Graduate School of Business of the University of Chicago and NBER, assisted by Robert E. Allison of NBER, was responsible for tabulating and evaluating this survey.

NBER Profiles

David Kendrick

David Kendrick, elected in April to NBER's Board of Directors, is professor of economics at the University of Texas at Austin.

Kendrick received his B.A. in government from the University of Texas and his Ph.D. in economics from MIT. From 1966–70, Kendrick was an assistant professor of economics at Harvard University. In 1969–70 he was a visiting scholar at Stanford University. He joined the economics faculty at the University of Texas in 1970, chaired the economics department there from 1976 to 1978, and was a visiting professor at MIT's Sloan School of Management in 1978–79.



Kendrick was one of the founding editors of the *Journal of Economic Dynamics and Control* and served as president of the Society for Economic Dynamics and Control in 1980–81. In addition to his numerous journal articles, Kendrick has authored six books including *Stochastic Control for Economic Models,* published by McGraw-Hill in 1981.

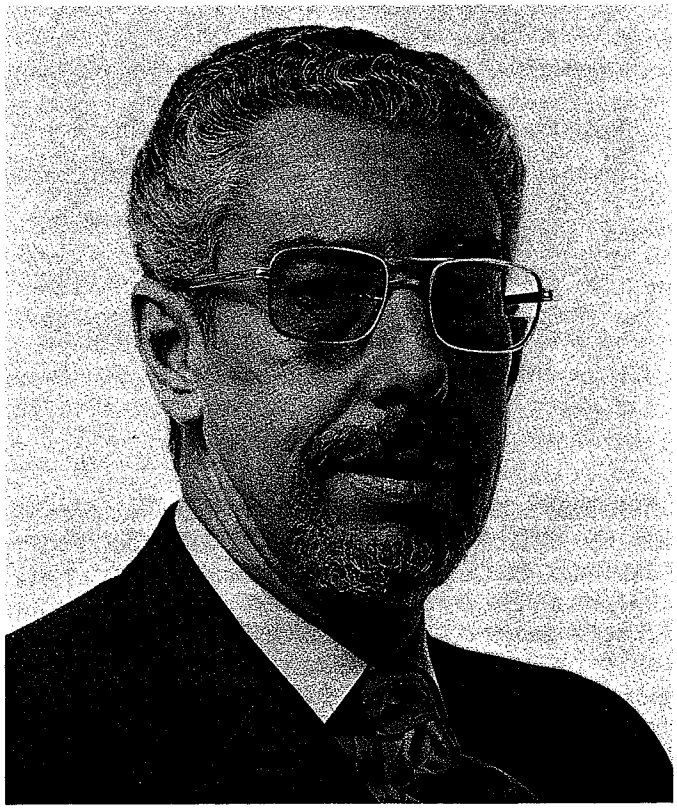
An Austin resident, Kendrick is married and has two children. His hobbies are tennis and swimming; he also enjoys overseas travel.

Roy E. Moor

Roy E. Moor, senior vice president and chief economist of the First National Bank of Chicago, has served on NBER's Board of Directors since 1974. Moor, who received his Ph.D. from Harvard University in 1958, taught economics and finance in the 1950s and 1960s at UCLA, Williams College, Princeton University, George Washington University, and the University of Pennsylvania.

In 1965, Moor left academia to join the Fidelity Bank (Philadelphia) as vice president and economist. Subsequently, he became director of economic research at Drexel Firestone (1969-71) and director of economic research and vice president of A. G. Becker et al. (1971-81).

Moor has also worked in federal government: he was a fiscal economist at the U.S. Department of the Treasury and at the Congressional Joint Economic Committee. In the 1960s, he served as a consultant to the U.S. Public Health Service and later as administrative assistant to Senator Proxmire.



Moor, a past president and Fellow of the National Association of Business Economists, lives with his wife in Barrington Hills, a suburb of Chicago. Their home, which they designed and built, reflects their interest in energy conservation; it is reputed to be one of the most energy efficient houses in the country.

M. Ishaq Nadiri

"Ned" Nadiri has been continuously associated with NBER for nearly two decades now. Having joined the Bureau in 1967 as a Research Fellow, Nadiri was promoted to Research Associate in 1969 and is currently a member of the Program in Productivity. He also directed NBER's Conference on the Role of the Computer in Economic and Social Research from 1971-77 and directed the Conference and Workshop Series on Latin American Research from 1972-79.

Nadiri emigrated from Afghanistan to the United States at age 19 and received his B.S. from the University of Nebraska, his M.A. from the University of California, Berkeley, and his Ph.D. from the University of California. He has taught at Berkeley, Northwestern University, University of Chicago Business School, Columbia University, and New York University. He joined the latter faculty in 1970 as a full professor, served as chairman of the economics department there from 1972-78, and was named Jay Gould Professor of Economics, his current title, in 1975.

Nadiri's fields of specialization are the economics of technological change and productivity growth, investment theory and modeling, monetary economics, and quantitative analysis and applied econometrics. His articles have appeared in a number of journals and books, and he has written several books.

Nadiri has served as a consultant to a number of corporations and organizations, including the Ford Foundation, the United Nations Conference on Trade and Development, several governmental agencies and other governments, and the United Nations Association. He is listed in *Who's Who in Economics* and *Who's Who in America*.

Nadiri and his wife Tahira, who is a physician, have two children: Youssof and Khalid. The Nadiris live in Manhattan.

Conferences

The Coordination of Economic Policies between Japan and the United States

NBER and Tokyo University cosponsored a conference on the "Coordination of Economic Policies between Japan and the United States" in Tokyo on March 25–27. This conference, organized by Richard C. Marston of NBER and the Wharton School of the University of Pennsylvania and Koichi Hamada of Tokyo University, was a joint program of the Japanese Society for the Promotion of Science and the Social Science Research Council. Funding for American participation was provided by the Japan-United States Friendship Commission. The conference included eleven papers:

Jacob A. Frenkel, NBER and University of Chicago, and Assaf Razin, NBER and Tel Aviv University, "Fiscal Policies in the World Economy"

Discussant: Michihiro Ohyama, Keio University

Stephen J. Turnovsky, NBER and University of Illinois, and Vasco d'Orey, University of Illinois, "Monetary Policies in Interdependent Economies: A Strategic Approach"

Discussant: Hiroshi Yoshikawa, Osaka University

General Discussion: Akira Takayama, Kyoto University

Masanao Aoki, University of California, Los Angeles, "Effects of Anticipated Real Supply Shocks and Coordinated Monetary Accommodation on the Interest Rate Differential and Exchange Rate in a Two-Country Perfect Foresight Model"

Discussant: Hajime Hori, Tohoku University

Marcus M. Miller and Mark Salmon, Warwick University, "Policy Coordination and Dynamic Games"

Discussant: Kazuhisa Kudo, Tsukuba University

General Discussion: Stephen J. Turnovsky

Kazuo Ueda, Osaka University, "The Japanese Current Account Surplus: How Much Is Structural?"

Discussant: Mitsuhiro Fukao, Economic Planning Agency

Toshihisa Toyoto, Kobe University, and Masanori Hirano, Economic Planning Agency, "International Transmission of Economic Policies: An Analysis by the EPA World Economic Model"

Discussant: Dale W. Henderson, NBER and Georgetown University (on leave from the Federal Reserve Board)

Ryuzo Sato, NBER and Brown University, "R and D Activities and the Technological Game: A Dynamic Model of U.S.-Japan Competition"

General Discussion: Takahiko Mutoh, Tokyo Keizai University

Dale W. Henderson, "Strategic Aspects of Macroeconomic Policymaking in Interdependent Economies: The Fundamentals"

Discussant: Kiyoshi Otani, Tokyo Keizai University

Matthew Canzoneri, Federal Reserve Board, "Strategic Aspects of Macroeconomic Policymaking in Interdependent Economies: Three Countries and Coalitions"

Discussant: Ryuhei Okumura, Nagoya University

General Discussion: Ryutaro Komiya, Tokyo University

Koichi Hamada, "Strategic Aspects of International Fiscal Interdependence"

Discussant: Kyoji Fukao, Seikei University

Richard C. Marston, "Some General Characteristics of Exchange Rate Unions"

Discussant: Miyako Suda, Senshu University

Concluding Discussion: Yusuke Onisuka, Yokohama National University, and Jacob A. Frenkel

The first paper, by Frenkel and Razin, addresses concern about recent government budget deficits in the United States that has enhanced interest in the domestic and international effects of fiscal policy. The authors give a theoretical perspective to the effects of budget deficits and government spending on world interest rates, consumption, and wealth. In order to capture the effects of budget deficits, they assume that the probability of survival is less than unity, so that the effective interest factor that individuals use to discount future taxes differs from the market interest factors that governments use. They show that current and prospective budget deficits raise the value of domestic wealth and consumption but lower the value of foreign wealth and consumption. The negative transmission of fiscal policy to the foreign country occurs because the deficit raises world interest rates. Government spending financed by taxes, in contrast, lowers domestic and foreign wealth, although the effect on the world interest rate depends on whether the spending is temporary or permanent.

The paper by Turnovsky and d'Orey is the first of several in this conference that analyze the interdependence between countries in strategic terms. The authors specify a two-country version of Rudiger Dornbusch's overshooting model in which the policymakers in each country attempt to minimize inflation and the deviation of output from its natural level. The authors study a number of noncooperative game solutions including Cournot, Stackelberg, and a "consistent conjectures" equilibrium analogous to a rational expectations equilibrium in a nonstrategic setting. Among the cooperative equilibriums are fixed and flexible exchange

rates, so the authors are able to analyze the traditional question of the choice of exchange rate regimes. They can also broaden that choice to consider a richer set of cooperative and noncooperative equilibriums.

Aoki's paper studies the dynamic adjustment paths of two economies using a decoupling technique that he pioneered several years ago. This technique permits an investigator to summarize the behavior of two complex economies in terms of the average and differential movement of the principal variables. Using this technique, Aoki shows that uncoordinated national policies designed to influence differential variables, such as the exchange rate and the terms of trade, often end up adversely affecting the average levels of output and prices in the economies concerned. He studies several types of cooperative behavior, including policies specifically designed to mitigate the effects of exchange rate overshooting.

In any dynamic model of policymaking in which private-sector expectations are important, time consistency problems arise because the government has an incentive to depart from previously announced plans once the announcement effects of the policy have been achieved. Therefore, optimal policy that is time inconsistent lacks credibility. For this reason, Miller and Salmon examine a set of time consistent solutions for cooperative and noncooperative games between countries. They reach the interesting conclusion that international coordination between governments can actually reduce the welfare of the countries involved. This possibility arises because cooperation between governments still permits strategic interaction between the private sector and government.

In the first of three empirical papers, Ueda examines the causes of the recent current account surpluses in Japan, decomposing the surpluses into cyclical and structural components. Among the structural determinants of the surpluses are the savings rates of Japan, the United States, and OPEC. These structural determinants alone explain 50 percent of the movement in the current account. Ueda argues that the record current account surpluses experienced recently are attributable not so much to Japanese saving behavior, which has been relatively stable over time, but to the sharp increase in U.S. fiscal deficits.

Toyoto and Hirano address the important empirical question of international transmission effects through simulations of the Economic Planning Agency's World Economic Model. This large-scale model is one of the first with fully endogenous exchange rates, so the authors are able to study patterns of transmission effects under both fixed and flexible exchange rates. The results of the simulations for fiscal policy are particularly interesting: A U.S. fiscal expansion leads to an appreciation of the dollar and a positive transmission to Germany and Japan. But fiscal expansions in Germany and Japan lead to a depreciation of their respective currencies, because the current account of the country concerned responds more than the capital account to the fiscal change, so the transmission effects are mitigated.

Sato's paper considers international trade competition between the United States and Japan. He traces part of this competition to the research and development expenditures of the two countries. The largest proportion of U.S. expenditures are on defense and aerospace-related industries, while Japanese expenditures are concentrated on the chemical, electronic, communications, and automobile industries. This pattern of R and D expenditures has a significant effect on U.S. and Japanese export performance in these industries. Sato then analyzes in theoretical terms the strategic interaction between two economies with such R and D patterns, using an analytical approach similar to those used by other participants to study macroeconomic interaction.

The next two papers, by Henderson and Canzoneri, develop models of international coordination. In the first paper, these authors review the main results of the static analysis of macroeconomic interdependence pioneered by Hamada and others. They develop a simple model of two countries designed to illustrate the external effects of national policy and the gains that can be made (in most but not all cases) from international cooperation. The paper provides a very clear and concise introduction to the international coordination literature.

The second of these papers breaks new ground in analyzing the interactions between three or more countries. Henderson and Canzoneri specify a three-country model in which two of the countries together are of the same size as the third country. In the absence of any coalitions, the large country is a Stackelberg leader with the two smaller countries as followers. The authors cite two reasons usually given for a coalition between the two smaller countries: these countries could abandon their role as followers, and they could avoid the inefficiencies caused by externalities between coalition members. The authors show the pitfalls in both arguments. First, in many cases being a follower may be advantageous in itself. Second, a coalition between two countries may induce adjustments by the third country that modify or even reverse the gains from cooperation.

Hamada's paper presents a strategic analysis of fiscal policy centering on the common determination of the world rate of interest. He specifies a two-country version of an overlapping generations model in which each government has an incentive to exploit its power to influence the interest rate by varying its fiscal policy. The inefficiencies that result are of two types: diverting the rate of interest from its optimal level, and changing the intertemporal terms of trade between lending and borrowing countries. The paper provides an interesting contrast to Hamada's earlier work on international policy coordination, since the model is explicitly intertemporal and since the real interest rate rather than the money supply is the focus of government policy.

Marston's paper concerns a particular type of international cooperation, an exchange rate union tying currencies of several countries together in a joint float

relative to other world currencies. He develops a series of propositions that indicate the advantages and disadvantages of such a union. One of the greatest advantages of a union, for example, is that it permits countries to pool financial disturbances so as to reduce the overall variance of exchange rates and output. But this advantage does not extend to real disturbances that are mitigated by the flexibility of exchange rates. Marston also shows that if a union succeeds in increasing the integration between its financial markets, this by itself will have no effect on the variance of output; the behavior of output depends only on the average exchange rate, which is unaffected by formation of the union.

The conference concluded with a panel session, led by Onisuka and Frenkel, which centered on the prospects for future research on international policy coordination.

U.S. Trade Policy

On April 19, NBER's Trade Relations Project met in Washington to consider "Trade Policy in the Second Reagan Administration: Options and Directions." The meeting was designed to seek the views of the Washington trade policy community on important issues that are likely to emerge over the next four years and to discover which areas should be studied in detail. A follow-up conference to explore some of these issues will be held on August 8 in Cambridge.

The Washington meeting was cochaired by Robert E. Baldwin and J. David Richardson, both of NBER and the University of Wisconsin at Madison. Also attending were NBER Research Associates Irving B. Kravis, University of Pennsylvania, and Robert E. Lipsey, Queens College, and NBER Executive Director Geoffrey Carliner. The participants included trade specialists from Congress, government agencies, private organizations and research institutions, and universities. The following individuals made presentations:

- Lawrence A. Fox, National Association of Manufacturers, "The Viewpoint of Business"
- Brian Turner, Industrial Union Department, AFL-CIO, "The Viewpoint of Labor"
- Geza Feketekuty, Office of the U.S. Trade Representative, "The Administration's Plans"
- Joanna R. Shelton, Ways and Means Committee, U.S. House of Representatives, and Jeffrey M. Lang, Finance Committee, U.S. Senate, "The View from Congress"
- Paula Stern, Chair, International Trade Commission, "The Perspective from the International Trade Commission"

It was Fox's opinion that the business community was not enthusiastic about a new round of multilateral trade negotiations, but he felt it might become more supportive as U.S. objectives became more focused. Any new General Agreement on Tariffs and Trade (GATT) round, he added, should first deal with issues left over from the Tokyo Round: revising the safeguards code; strengthening the rules against counterfeiting; and further improving both the standards and government procurement codes. The most important new issues for GATT consideration, he continued, are the need for better rules on subsidies, the trading practices of the less developed countries, export credits, preference requirements, trade in high tech goods, trade in services, and agricultural trade. He urged the administration to develop a strategic plan on a new round of negotiations and then to try to sell it to other countries. Fox also urged the linking of negotiations in the trade and finance areas.

Turner raised several broad issues that he felt needed more attention. First, how should a government respond to the industrial policies of other countries? Should it be prepared to match these policies or, if not, perhaps to abandon certain industries? Turner suggested that the U.S. government may soon face this question in the machine tool industry. A second important matter is the link between trade policy and domestic deregulation. Deregulation has significantly opened the U.S. economy to foreign goods. This effect was generally not anticipated, and other countries have not lowered their trade barriers in response to it. Another topic for study is whether the composition of economic activity has any significant, independent impact on a country's welfare. In particular, should the government be indifferent to the distribution between industry and services and the pattern of manufacturing industries? Is there some minimal ideal size for a country's steel and textile industries, for example? Turner also questioned the wisdom of multinationals developing new technology in the United States and then going abroad with affiliates or licensing . He concluded that new trade negotiations are needed but wondered what the United States, with its $130 billion trade deficit, could bring to the table.

Feketekuty represented the view of the USTR that there are three major current trade issues: managing trade with Japan; reducing the U.S. trade deficit; and undertaking a new round of trade negotiations. First, the USTR hopes that Japan will overhaul its administrative apparatus; that is, make itself more open to U.S. goods and less bound by rules.

The magnitude of the trade deficit in the future, of course, will depend on growth rates among countries, the savings rate in the United States, and the domestic effects of U.S. macroeconomic policies. Regarding trade negotiations, Feketekuty does not sense the need for massive new liberalization. Rather, we need to deal with a few pressing issues: strengthening the GATT rules; balancing subsidies on agricultural exports with access to agricultural markets; determining what subsidies are permissible in various industries; improving the mechanism for settling GATT disputes; and refining existing codes of trade.

Feketekuty also sees several new issues emerging: First, there is the need to liberalize trade in services. A general code is needed to emphasize transparency, national treatment, the use of explicit barriers only, and the importance of arms-length transactions in dealing with monopolies. Individual sectors could be dealt with later in separate agreements.

The protection of intellectual property is also becoming an important trade issue, especially for electronic, pharmaceutical, and biotech companies. A third concern is market access for high tech items, such as telecommunications equipment. In the developing countries, market access is limited to U.S. goods. The problem is, what can the United States offer these countries in return for their liberalization?

Another important objective that is also difficult to achieve is the phasing down of existing restrictive international agreements in the textile and steel sectors. Finally, we need to liberalize the requirements on trade-related investment that so many countries have. Progress in this area will likely be less rapid than in the others.

In their presentation, Shelton and Lang noted Congress's frustration with administration trade policies. The administration may actually lose control over the trade agenda because, many congressmen believe, there is a lack of strong leadership in the field.

Moreover, Shelton and Lang believe that there will be little congressional support for a new round of negotiations until members of Congress are brought more closely into the planning process. The effects of international policies now spill over onto domestic sectors, and Congress must be concerned about such things as exchange rates and trade policies. However, most congressmen feel that the GATT rules on safeguards, antidumping, and countervailing duties are not effective for the United States.

Stern then pointed out that the United States faces a new set of economic circumstances: significant economic growth, but a $123 billion deficit. Because of the strong dollar, there is great pressure for protection. Existing macroeconomic policies cause hardships to many industries that compete with imports, especially basic industries, and to many export industries.

Stern then spelled out two routes for providing assistance: the rule-oriented route, provided by ITC, and the political route, which can be pursued through the Congress or the executive branch. The rule-oriented route is generally best, she argued, since other factors, such as foreign policy considerations, are likely to enter into political decisions. In dealing with injured industries, Stern argued, the ITC should take the middle ground, using import relief policies to provide for the orderly adjustment of workers out of declining industries. This may require monitoring certain industries, such as steel. Moreover, even if an industry is *not* given import relief, there may be a need to assist particular firms in helping workers leave the industry. Stern presented a case for such assistance to firms under our trade laws. However, she stated, it is also very important that trade considerations be given more weight in the formation of macroeconomic policies.

At the close of the meeting, Baldwin and Richardson attempted to summarize the issues raised during the day and to identify areas of future research. Topics that may be analyzed by the project include: the links between financial fluctuations, trade, and sectoral prosperity, and between deregulation and trade; an analytic basis for trade policy with multinational firms and management; and, using the economic literature on principal-agent relationships, to draw insights for the administration of trade policy.

Spring Conference on Money and Financial Markets

Over 100 economists from the United States and Canada gathered in Cambridge on April 26 and 27 for an NBER-Universities Research Conference on Money and Financial Markets. The program, organized by NBER Research Associate Robert J. Shiller of Yale University, was:

SESSION I: DEMAND FOR MONEY
Chair: Anna J. Schwartz, NBER

Donald A. Nichols, University of Wisconsin, and David A. Small, Board of Governors of the Federal Reserve System, "The Effect of Money Stock Announcements in the Federal Funds Market"

Discussants: John Huizinga, NBER and University of Chicago, and Paul Wachtel, NBER and New York University

Yoshihisa Baba, Soka University; David F. Hendry, Oxford University; and Ross M. Starr, University of California, San Diego, "U.S. Money Demand, 1960-84"

Discussants: Stephen F. LeRoy, University of California, Santa Barbara, and Joyce Manchester, Dartmouth College

SESSION II: RATIONAL EXPECTATIONS, MONEY, AND INTEREST RATES
Chair: James Tobin, Yale University

John Y. Campbell, NBER and Princeton University, "Stock Returns and the Term Structure" (NBER Working Paper No. 1626)

Discussants: J. Huston McCulloch, Ohio State University, and Kenneth J. Singleton, NBER and Carnegie-Mellon University

Roman Frydman and Peter Rappaport, New York University, "An Examination of Econometric Tests of the Propositions Central to the New Classical Macroeconomics"

Discussants: Frederic S. Mishkin, NBER and Columbia University, and Charles I. Plosser, University of Rochester

Thomas J. Sargent, NBER and University of Minnesota, "Learning to Be Rational"

Discussants: Stanley Fischer, NBER and MIT, and Michael Woodford, Columbia University

SESSION III: THE BANKING FIRM

Chair: Edward J. Kane, NBER and Ohio State University

Thomas Cosimano, Texas A & M University, "The Banking Firm and Industry under Uncertain Monetary Policy"

Discussants: William Poole, NBER and Brown University, and Jeremy J. Siegel, University of Pennsylvania

Vittorio Grilli and Peter M. Garber, University of Rochester, "The Belmont-Morgan Syndicate as an Optimal Investment Banking Contract"

Discussants: Truman A. Clark, University of Southern California, and Arthur J. Rolnick, Federal Reserve Bank of Minneapolis

SESSION IV: RISK PREMIA AND VOLATILITY IN THE STOCK AND BOND MARKETS

Chair: Robert J. Shiller

Benjamin M. Friedman, NBER and Harvard University, "Crowding Out or Crowding In? Evidence on Debt-Equity Substitutability" (NBER Working Paper No. 1565)

Discussants: Herschel I. Grossman, NBER and Brown University, and Angelino Melino, NBER and University of Toronto

N. Gregory Mankiw, NBER and MIT, and Matthew D. Shapiro, Yale University, "Risk and Return: Consumption Beta versus Market Beta" (NBER Working Paper No. 1399)

Discussants: Lawrence Christiano, Carnegie-Mellon University, and Terry A. Marsh, NBER and MIT

James M. Poterba, NBER and MIT, and Lawrence H. Summers, NBER and Harvard University, "The Persistence of Volatility and Stock Market Fluctuations" (NBER Working Paper No. 1462)

Discussants: Robert S. Pindyck, NBER and MIT, and Robert F. Engle, University of California, San Diego

The first paper, by Nichols and Small, examines how the "announcement effect" works in the federal funds market. The announcement effect is the response of interest rates to the weekly announcement of the money stock; typically, interest rates rise when a surprisingly large money stock is announced. In a previous paper, the authors noted that since the supply and demand for money are equal at prevailing interest rates before an announcement is made, a surprising announcement for the money stock must reveal new information about both demand and supply. In this paper, Nichols and Small continue to emphasize this symmetry of money stock announcements, but they conduct their analysis in a framework that specifies the actual regulatory constraints and information lags of the federal funds market.

Their analysis shows that, under a plausible specification of how a bank arbitrages its holding of reserves across a settlement week, an announcement of a surprisingly large money stock made in the middle of a settlement week does not reveal the information that other banks will likely increase their demand for federal funds before the settlement week ends. Rather, the market demand for funds is already higher than expected. Thus, any jump in interest rates in response to the announcement is caused by the anticipation that the supply of funds will soon be reduced. Higher rates are not caused by the anticipation that the demand for funds will increase.

For a given set of regulatory constraints, information lags, and Federal Reserve strategy, Nichols and Small show that a shift from lagged reserve accounting to contemporaneous reserve accounting will increase the response of interest rates to a surprising money stock announcement.

In their paper, Baba, Hendry, and Starr note that in recent years the demand for money has been characterized by apparently unpredictable changes. This instability has made money demand models less useful as guides to Fed policy. The Baba-Hendry-Starr paper uses economic variables known to be theoretically important but not usually present in other money demand specifications, and statistical structure, to formulate a specification of money demand that does not experience such shifts. Their model is stable over 1960–84, including during those periods widely recognized in alternative models as displaying shifts in M1 demand. Hence, the apparent shifts in other models appear to be the result of misspecifications of the function.

In specifying the demand function, the three authors include: dynamic structure; an adaptive yield variable on instruments in M2, reflecting financial innovation; a measure of the financial risk to holding long-term bonds; and the inflation rate. Interest rates in the model are net after tax. The dynamic structure for error correction, more complex than in conventional partial adjustment models, allows for differing speeds of adjustment to exogenous changes. The risk to holders of long-term bonds is represented as the standard deviation (over the preceding three years) of monthly holding period yield. The current inflation rate enters the specification explicitly. Each of these distinctive variables is essential to stability and enters the model with strong statistical significance.

Incorporating dynamic structure, financial innovation, bond risk, tax rates, and inflation results in a demand function for M1 that shows no significant structural change over 1960–84. The dynamic structure and distinctive variables are essential; their omission results in a structural breakdown of the model and an apparent shift in the function.

In his paper, Campbell notes that stock returns in the postwar period have tended to be low when the short-term nominal interest rate is high. He then shows that the term structure of interest rates predicts stock

returns even more generally. Risk premiums on stocks appear to move closely together with risk premiums on 20-year Treasury bonds; risk premiums on Treasury bills move somewhat independently. Average returns on 20-year bonds have been very low relative to average returns on stocks.

Using these observations, Campbell tests some simple models of asset pricing. First he considers latent variable models in which betas are constant and risk premiums vary with expected returns on a small number of unobservable hedge portfolios. The data strongly reject a single-latent-variable model.

If hedge portfolios are observable, then models with time-varying betas can be tested. Campbell finds that risk premiums in the 1959–78 period are explained well by reference to a single hedge portfolio of bills, bonds, and stocks. Time variation in the expected return of this portfolio, and in betas of individual assets within it, both contribute to time variation in estimated risk premiums. The results are related to informal explanations of risk premiums that stress risks of inflation and output.

The paper by Frydman and Rappaport studies the econometric properties of estimation and testing procedures used in the empirical studies of the New Classical Macroeconomics. It focuses on the effects of the measurement problems that are inherent in empirical applications of the rational expectations hypothesis. The results cast serious doubt on the validity of the inferences drawn in the major empirical studies of policy neutrality, rational expectations, and Lucas's proposition concerning the trade-off between output and inflation.

The Frydman-Rappaport paper also suggests some alternative approaches to estimation that avoid the problems of mismeasurement. One of these is to test a different null hypothesis from those in the New Classical literature. This null hypothesis states that the effects on output of anticipated and unanticipated monetary policy are identical. Frydman and Rappaport use the data and models of Barro and Rush, and Mishkin to test this hypothesis; it is not rejected in these contexts. The authors interpret these results as not necessarily supporting this hypothesis but rather as suggesting that effects of mismeasurement of rational expectations on statistical inference are potentially very serious.

Cosimano's paper describes the optimal decisions of banks with regard to loans, excess reserves, and borrowed reserves. He uses the Rational Expectation Equilibrium concept introduced by Lucas and Prescott (1971). The author shows the banks' decisions to be dependent on their rational forecast of the future loan and federal funds rates. This analysis suggests that the banks take account of the determination of both the loan and federal funds rates in their respective markets.

In particular, the Fed's choice between an interest rate and a reserve rule affects the bank's optimal decisions, since the rule influences the federal funds rate. Consequently, a change in the policy of the Fed will alter the reduced form model of the banking system. This result brings into question the Fed's ability to predict and control the money supply under the procedure it adopted after October 1979.

The Grilli-Garber paper applies theories of speculative attacks on fixed exchange rate regimes and theories of optimal investment banking contracts to the 1895 contract between the U.S. Treasury and the Belmont-Morgan Syndicate. The purpose of the work is to determine the extent to which such simple theories can elucidate both the events of that period and the features of the Belmont-Morgan contract. Grilli and Garber outline the laws restricting the behavior of the Treasury; they define its objective and the historical context of the Belmont-Morgan Syndicate. Finally, they describe the provisions of the contract.

Their theory of government and syndicate behavior implies that the qualitative features of the contract were optimal, given the constraints on the Treasury and the stochastic environment. Grilli and Garber then show how to derive the magnitude of spread, the size of the issue, and the fixed price guaranteed to the government for the bond issue.

Friedman notes that when the composition of assets outstanding in the market changes, the pattern of expected asset returns also changes, shifting to whatever return structure will induce investors to hold just the new composition of existing assets. The object of Friedman's paper is to determine, on the basis of the respective risks associated with the returns to broad classes of financial assets in the United States, and hence on the basis of the implied portfolio substitutabilities among these assets, how government deficit financing affects the structure of market-clearing expected returns on debt and equity securities traded in U.S. markets.

The empirical results indicate that government deficit financing raises expected debt returns relative to expected equity returns, regardless of the maturity of the government's financing. More specifically, financing a single $100 billion government deficit by issuing short-term debt lowers the expected return on long-term debt by 0.06 percent and lowers the expected return on equity by 0.33 percent, relative to the return on short-term debt. Financing a $100 billion deficit by issuing long-term debt raises the expected return on long-term debt by 0.10 percent but lowers the expected return on equity by 0.24 percent, again in comparison to the return on short-term debt. These per-unit magnitudes are not huge, but in the current U.S. context of government deficits approximating $200 billion —year after year—are not trivially small either.

Friedman's results have immediate implications for the composition of private financing. In addition, in conjunction with some assumption (for example, about monetary policy) to anchor the overall return structure, they bear implications for the total volume of private financing, as well as for capital formation and other interest-sensitive elements of aggregate demand.

Mankiw and Shapiro note that the interaction between the macroeconomy and asset markets is central to a variety of modern theories of the business cycle. In fact, much recent work emphasizes the joint nature of

the consumption decision and the portfolio allocation decision. In this paper, Mankiw and Shapiro compare two formulations of the Capital Asset Pricing Model (CAPM). The traditional CAPM suggests that the appropriate measure of an asset's risk is the covariance of the asset's return with the market return. The consumption CAPM, on the other hand, implies that a better measure of risk is the covariance with aggregate consumption growth. They examine a cross section of 464 stocks and find that the beta measured with respect to a stock market index outperforms the beta measured with respect to consumption growth.

Finally, the paper by Poterba and Summers examines the potential influence of changing volatility in stock market prices on the level of stock market prices. It demonstrates that volatility is only weakly serially correlated, implying that shocks to volatility do not persist. Therefore, these shocks can have only a small impact on stock market prices since changes in volatility affect expected required rates of return for relatively short intervals. These findings lead Poterba and Summers to be skeptical of recent claims that the stock market's poor performance during the 1970s can be explained by volatility-induced increases in risk premiums.

Conference Calendar

Each *NBER Reporter* includes a calendar of upcoming conferences and other meetings that are of interest to large numbers of economists (especially in academia) or to smaller groups of economists concentrated in certain fields (such as labor, taxation, finance). The calendar is primarily intended to assist those who plan conferences and meetings, to avoid conflicts. **All activities listed should be considered to be "by invitation only," except where indicated otherwise in footnotes.**

Organizations wishing to have meetings listed in the Conference Calendar should send information, comparable to that given below, to Conference Calendar, National Bureau of Economic Research, 1050 Massachusetts Avenue, Cambridge, MA 02138. Please also provide a short (fewer than fifty words) description of the meetings for use in determining whether listings are appropriate for inclusion. The deadline for receipt of material to be included in the Fall 1985 issue of the *Reporter* is August 15. If you have any questions about procedures for submitting materials for the calendar, please call Kirsten Foss at (617) 868-3900.

August 4-7, 1985
Annual Meeting, American Agricultural Economics Association*

August 5-8, 1985
Annual Meeting, American Statistical Association*

August 17-24, 1985
World Congress, Econometric Society

August 26-28, 1985
Income and Wealth: Productivity Growth in the United States and Japan, NBER

August 26-30, 1985
Annual Congress, International Institute of Public Finance

August 29-September 1, 1985
20th International Conference, Atlantic Economic Society

September 2-6, 1985
Conference on Recent Developments in Corporate Finance and Investment, Center for Economic Policy Research

September 5-7, 1985
Market Value of In-Situ Reserves, International Association of Energy Economists*

September 11-14, 1985
17th CIRET Conference, Center for International Research on Economic Tendency Surveys

September 12-13, 1985
Panel on Economic Activity, Brookings Institution

September 23-25, 1985
Benelux Association of Energy Economists, International Association of Energy Economists*

September 29-October 2, 1985
Annual Meeting, National Association of Business Economists*

October 1985
Conference, Atlantic Economic Society*

October 13-16, 1985
Annual Conference, National Tax Association-Tax Institute of America*

October 31-November 1, 1985
Program Meeting: Taxation, NBER

November 6-8, 1985
North American Meeting, International Association of Energy Economists*

November 7-8, 1985
Program Meeting: Financial Markets and Monetary Economics, NBER

November 7-9, 1985
Causes and Consequences of Non-Replacement Fertility, Hoover Institution

November 11-12, 1985
Panel on Economic Policy, Center for Economic Policy Research-Maison des Sciences de l'Homme-Ecole des Hautes Etudes en Sciences Sociales

**Open conference, subject to rules of the sponsoring organization.*

November 22-23, 1985
Public Policy Conference: Exchange Rates, Carnegie-Mellon/ University of Rochester

November 24-26, 1985
Annual Meeting, Southern Economic Association*

December 10-13, 1985
7th Annual North American Conference, International Association of Energy Economists*

December 13-14, 1985
Conference on International Aspects of Fiscal Policies, NBER

December 28-30, 1985
Annual Conference, American Economic Association*

February 13-16, 1986
Conference on Capital Formation, NBER

February 20-21, 1986
Program Meeting: Financial Markets and Monetary Economics, NBER

March 7-8, 1986
Conference on Macroeconomics, NBER

March 21, 1986
Program Meeting: Economic Fluctuations, NBER

April 1986
21st International Conference, Atlantic Economic Society

April 1986
International Conference, International Health Economics and Management Institute

April 3-4, 1986
Program Meeting: Taxation, NBER

April 3-5, 1986
Annual Meeting, Midwest Economics Association

April 11-12, 1986
Public Policy Conference, Carnegie-Mellon/University of Rochester

April 17-19, 1986
Conference on Public Sector Unionism, NBER

May 1986
Conference: Research Project on Europe-U.S. Trade Relations, NBER

May 2-3, 1986
Universities Research Conference, NBER

May 19-20, 1986
Spring Symposium, National Tax Association-Tax Institute of America*

June 5-7, 1986
International Conference, International Association of Energy Economists*

June 24-26, 1986
International Seminar on Macroeconomics, NBER

June 25-28, 1986
Summer Meeting, Econometric Society

July 1-5, 1986
Annual Conference, Western Economic Association

July 27-31, 1986
Annual Meeting, American Agricultural Economics Association*

August 18-21, 1986
Annual Meeting, American Statistical Association*

September 13-17, 1986
Annual Meeting, National Association of Business Economists*

November 9-12, 1986
79th Annual Conference, National Tax Association-Tax Institute of America*

December 28-30, 1986
Annual Conference, American Economic Association*

August 2-5, 1987
Annual Meeting, American Agricultural Economics Association*

August 17-20, 1987
Annual Meeting, American Statistical Association*

September 27-October 1, 1987
Annual Meeting, National Association of Business Economists*

November 8-11, 1987
80th Annual Conference, National Tax Association-Tax Institute of America*

August 8-11, 1988
Annual Meeting, American Statistical Association*

September 25-28, 1988
81st Annual Conference, National Tax Association-Tax Institute of America*

**Open conference, subject to rules of the sponsoring organization.*

Bureau News

Kuznets Dead at 84

NBER Research Associate Emeritus Simon Kuznets died in Cambridge on July 9 at the age of 84. Born in Kharkov, Russia, Kuznets came to the United States in 1922. He studied at Columbia University, where he received a B.S. in 1923, an M.A. in 1924, and a Ph.D. in 1926.

In 1927 Kuznets joined the NBER staff, and he continued to work for the Bureau until 1961. He taught concurrently at the University of Pennsylvania, from 1930 to

1954, taking time out during World War II to serve as associate director of the War Production Board's Bureau of Planning and Statistics. From 1954 to 1960, Kuznets was on the economics faculty of Johns Hopkins University in Baltimore, and in 1960 he came to Harvard University. In 1971, Harvard named Kuznets professor emeritus.

Kuznets was best known for his work at NBER on the national income accounts that became the framework for government statistics on national income. However, his first Bureau study, published in 1933, was on seasonal variations in industry and trade. He also published work through NBER on the contribution of capital formation to economic growth; saving and income of upper-income groups; the income of private professionals; and immigration. Toward the end of his career, Kuznets explored the sources and characteristics of modern economic growth; he won the Nobel Prize in Economics in 1971 for these studies.

Kuznets was past president of the American Economic Association and the American Statistical Association (ASA). He was also an ASA Fellow, an honorary fellow of the Royal Statistical Society of England, and a member of the Royal Swedish Academy of Science, the International Statistical Institute, and the American Philosophical Society. In addition, Kuznets had honorary degrees from Princeton University, Columbia University, the University of Pennsylvania, Harvard University, Hebrew University, the University of New Hampshire, and Brandeis University.

Kuznets will be remembered by his Bureau friends for his careful and imaginative empirical research, his concerned teaching, and his warmth and curiosity. NBER shares his loss with his wife Edith, his son Paul, and his daughter Judith.

Spring Meeting Draws Macroeconomists

Members of NBER's Program in Economic Fluctuations and invited guests gathered in Cambridge on March 29. The agenda for the day-long meeting was:

Kenneth West, Princeton University, "Speculative Bubbles and Stock Price Volatility"
Discussant: Kenneth J. Singleton, NBER and Carnegie-Mellon University

N. Gregory Mankiw and David Romer, MIT, and Matthew D. Shapiro, Yale University, "An Unbiased Reexamination of Stock Market Volatility"
Discussant: Andrew B. Abel, NBER and Harvard University

Alan S. Blinder, NBER and Princeton University, "Credit Rationing and Effective Supply Failures"
Discussant: Rudiger Dornbusch, NBER and MIT

Stephen R. King, NBER and Stanford University, "Monetary Transmission: Through Bank Loans or Bank Liabilities?"
Discussant: Martin N. Baily, NBER and Brookings Institution

Olivier J. Blanchard, NBER and MIT, "Monopolistic Competition, Small Menu Costs, and Real Effects of Nominal Money"
Discussant: Robert E. Hall, NBER and Stanford University

In his paper, West considers whether market prices are reasonably efficient in processing information so that the market may allocate resources effectively. Previous empirical tests have indicated that asset prices were too volatile to be generated by an efficient market. In turn, these studies have been criticized for imposing stationarity on the dividend and asset price processes and for neglecting some small sample biases associated with the tests.

West proposes and implements a test that overcomes these latter two objections. His approach is based on the variance of the innovations that are caused by updated forecasts of the expected present discounted value of an asset's dividend stream. This variance is larger when expectations are conditional only on the set of current and past dividends than on a larger information set. He decisively rejects the efficient markets model in favor of the bubbles model. Bubbles are found to contribute 75 to 95 percent of the variance of the annual innovations in aggregate stock price indexes.

The efficient markets hypothesis does little better in the paper by Mankiw, Romer, and Shapiro. They propose two new tests that follow from a simple identity and the basic properties of rational expectations models. They use three asset prices in their inequality tests: an ex-post rational price, an observed market price, and a naive forecast. The tests are that: (1) the market price is a better forecast of the ex-post rational price than is the naively forecast stock price; and (2) the ex-post rational price is more volatile around the naive forecast than is the market price. The authors uniformly reject the inequalities implied by the efficient markets model. However, both the West and the Mankiw et al. studies maintain a constant discount rate; a number of comments focused on the importance of this assumption for the empirical results.

The next two papers throw new light on the old but critical question of how variations in monetary policy affect real activity. With the emergence of numerous alternative monetary assets in recent years, traditional demand-side channels have become implausible, and recent attention has been turned toward the supply side. Blinder's paper develops such a supply-based theory. Central to his story are: (1) that firms need credit to hire factors of production; (2) credit expands with economic activity; and (3) demand is determined by a Keynesian income-expenditure multiplier. Blinder assumes that all credit is issued through banks, that interest elasticities are zero, and that money plays no essential independent role. His theoretical analysis indi-

cates that whether the economy is credit-constrained depends on the relative magnitudes of central bank credit and on autonomous expenditure. Under credit constraints, the response of output to autonomous spending is smaller, and to monetary policy larger, than when the credit constraint is not binding. Furthermore, reductions in credit may be inflationary and unstable.

King presents an alternative approach to analyzing the relationships among money, credit, and output. Focusing on aggregate bank portfolios, he develops and implements tests of two competing models of bank behavior: an imperfectly competitive model in which banks face a downward sloping demand curve for loans; and a credit rationing model in which banks may refuse to extend loans at the current interest rate because of adverse selection. Both of these models ignore the liquidity aspects of marketable securities held by banks; they are modified to take this effect into account. Aggregate data on bank portfolios decisively reject the credit rationing model but are more supportive of the conventional model of imperfectly competitive banks. Thus, the role of bank credit as the link between variations in money and output is questioned. King shows that bank assets have little productive content for GNP, whereas the reverse is true for bank demand deposits. In both King's and Blinder's papers, the analysis is restricted to bank credit. In the discussion, there were suggestions that the models also consider the role of financial intermediaries in the credit process.

Two major themes in Keyenesian economics are that, in an economy with many price setters, the price level can adjust only slowly to movements in aggregate demand and that, during the process of adjustment, aggregate demand determines the level of output. Blanchard develops a model that is consistent with these themes. Under monopolistic competition, price setters choose relative prices that are greater than marginal cost. If increases in demand do not result in relative price adjustments, they will nonetheless be accommodated by suppliers as long as price exceeds marginal cost. What may make it profitable to leave prices constant are the small costs of changing prices and wages. Blanchard then shows that the private opportunity costs of not adjusting prices are of second order compared to the social welfare effects, which are of first order. These results hold for both small and large changes in the level of aggregate demand. This latter result depends on the magnitude of some of the underlying parameters. The discussion of Blanchard's paper focused on whether these parameter values were plausible and on how the model differed from traditional Keynesian stories of price stickiness.

Robert Chirinko, of NBER and Hoover Institution, attended the meeting and assisted in the preparation of this summary. Other NBER associates at the session were: Ben S. Bernanke, Stanford University; Fischer Black, Goldman Sachs; Michael D. Bordo, University of South Carolina; John Y. Campbell and David Card, Princeton University; Andrew Caplin, Barry J. Eichengreen, Benjamin M. Friedman, and Lawrence H. Summers, Harvard University; Ray C. Fair, William D. Nordhaus, and Robert J. Shiller, Yale University; Stanley Fischer, Paul R. Krugman, James M. Poterba, and Julio J. Rotemberg, MIT; Robert J. Gordon and Robert J. Hodrick, Northwestern University; Tahatoshi Ito, Hoover Institution; Frederic S. Mishkin and Maurice Obstfeld, Columbia University; and Anna J. Schwartz.

Invited guests included: Sumro Altug, University of Minnesota; Christopher Baum and Joe Peek, Boston College; Roger Brinner, Data Resources, Inc.; Stephen Cecchetti and Roman Frydman, New York University; Christophe Chamley and Russell Cooper, Yale University; Lawrence Christiano and Martin Eichenbaum, Carnegie-Mellon University; Benjamin Eden, Gary Fethke, John Kennan, and Andrew Policano, University of Iowa; Paul Evans, University of Houston; Roger Farmer and Stephen Zeldes, University of Pennsylvania; Mark Gertler and Kenneth Rogoff, University of Wisconsin; Jo Anna Gray, Washington State University; Bruce Greenwald, James Stock, and Mark W. Watson, Harvard University; Oliver Hart, MIT; Roger Kaufman, Smith College; David Lindsay, Federal Reserve Board; Michael Lovell, Wesleyan University; Louis Maccini, Johns Hopkins University; Jeffrey Miron, University of Michigan; Knut Mork, Vanderbilt University; Salih Neftci, City University of New York; Michael Parkin, University of Western Ontario; David Runkle, Brown University; John Seater, North Carolina State University; Bruce Smith, Federal Reserve Bank of Minneapolis; Michael Woodford, Columbia University; and Randall Wright, Cornell University.

Productivity Group Meets in Cambridge

On March 29, members of NBER's Program in Productivity and Technical Change with an interest in R and D gathered in Cambridge. The day-long meeting opened with a presentation by Mark Schankerman, NBER and New York University, of his recent paper (with Ariel Pakes) on "Estimates of the Private Value of Patent Protection in Several European Countries." In this paper, the authors use recent data on patent renewals and renewal costs for the United Kingdom, France, and Germany to estimate the distribution of the private value of patent protection in these countries. They also estimate the rate of decay of such values over time.

Their main conclusion is that the distribution of private values is sharply skewed to the right. Most patents have very little private economic value, but there are a small number of highly valuable patents. Furthermore, the estimated rate of decay in the annualized stream of revenues is between 10 and 25 percent per year. Pakes and Schankerman also find some evidence of an improvement in the "quality" of patents in the 1970s, in

the sense that the expected life of more recent patents has risen relative to what it was in the 1960s.

Marvin Lieberman, Stanford University, then reported on his ongoing research on costs, prices, and technology in the chemical industry. Lieberman hopes to use patent data on specific chemical products as an indicator of cost reduction for these products and a link to their subsequent price behavior.

Frank R. Lichtenberg, NBER and Columbia University, reported on his ongoing study of the impact of federal expenditures on R and D on private R and D. He presented data indicating that the recent rise in defense expenditures may have been responsible for the concurrent rise in private R and D investments.

Brian Arthur, Stanford University, outlined a simple model of technology diffusion with learning and increasing returns to scale. In this model, a technology that gets an "early lucky break" may come to dominate the field even though, in a sense, the alternative may have represented the better choice. In a world with increasing returns to scale, small historical events may matter; all is not necessarily for the best in such a world. Following Arthur's presentation, there was much discussion of the empirical relevance and possible magnitudes of the effects described.

Last on the morning agenda, Martin N. Baily, Brookings Institution, gave a progress report on his ongoing study of inventive activity in the chemical industry.

After lunch, Luc Soete, Sussex and Stanford Universities, reported on the program of the Science Policy Research Unit at Sussex. He described the types of data collected by the Unit and illustrated their work by outlining a model of embodied technical change that has been simulated on recent data for the UK television industry.

Next, Edward Wolff, NBER and New York University, reported on joint work in progress with Schankerman. They are trying to motivate and test the widely observed relationship between productivity growth and output growth (the Verdoren effect) by developing a model in which technical change depends on the rate of output growth in the industries that supply input.

Jeffrey I. Bernstein, Carleton University, discussed the work he is doing with M. Ishaq Nadiri, NBER and New York University, on incorporating financial constraints into an R and D investment model with spillovers.

Ingmar R. Prucha, University of Maryland, then outlined the work on comparisons of international productivity that he and Nadiri are pursuing jointly. They are focusing especially on comparisons between the United States and Japan and the role of R and D in their respective productivity.

The meeting concluded with discussion of a paper by Zvi Griliches, NBER productivity program director and Harvard University, on "Productivity, R and D, and Basic Research at the Firm Level in the 1970s" (NBER Working Paper No. 1547). Griliches uses a new data set for the largest 1000 firms in the Unuted States. He concludes that there is no evidence that the role of R and D as a contributor to productivity growth declined in the 1970s. He also finds that basic research contributes relatively more to productivity growth than other components of R and D.

In addition to those who presented their work, the following individuals participated in the discussions: Thomas Abbott, Sumanth Addanki, and Adam B. Jaffee, Harvard University; Geoffrey Carliner, NBER; Kim B. Clark, NBER and Harvard University; Robert Evenson, Yale University; Bronwyn H. Hall, NBER; Shaul Lach, Columbia University; and Pierre A. Mohnen, Université au Québèc à Montréal.

Program in Labor Studies Meets

Members of NBER's Program in Labor Studies gathered in Cambridge on May 3 for their spring meeting, which was devoted to a discussion of research on job search and job matching. The day's agenda included:

Harry J. Holzer, NBER and Michigan State University, "Job Search Methods Used by Unemployed Youth"

Katherine G. Abraham and Henry S. Farber, NBER and MIT, "Match Quality, Seniority, and Earnings"

Boyan Jovanovic, NBER and New York University, joint work with John Dagsvik, Central Bureau of Statistics, Norway, and Andrea Shepard, Bell Laboratories and Columbia University, "A Foundation for Three Popular Assumptions in Job-Matching Models"

Mark R. Killingsworth, NBER and Rutgers University, "Heterogeneous Preferences and Compensating Wage Differentials"

Holzer's paper analyzes methods of job search used by unemployed black and white youths. These methods are both formal (for example, use of state employment services) and informal (such as talking with friends and relatives or direct contact with firms). After presenting a model of job search that allows for varying costs and productiveness, Holzer provides some empirical evidence in order to: (1) determine the factors that cause young unemployed workers to use different methods of search; and (2) analyze the effects of these methods on potential employment for young whites and blacks.

Holzer's results show that the most frequently used search methods are talking to friends and relatives and direct contact with employers. These are also the most effective in terms of producing job offers at high wages. Furthermore, most of the racial differences in the youths' probability of getting a job can be attributed to the fact that blacks and whites use different methods of search with different probabilities of producing an offer. White youths tend to use friends, relatives, and direct contact

with employers, while black youths use more formal channels, such as state employment services.

Abraham and Farber propose a measure of "match quality" based on the completed duration of jobs. They then investigate three important questions surrounding the relationships among match quality, seniority, and earnings: Are earnings higher in high-quality matches? To what extent do the direct effects of seniority versus heterogeneous match quality produce the observed, cross-sectional positive correlation between seniority and earnings? To what extent does the observed positive correlation between seniority and earnings vary with match quality? The authors' measure of match quality is based on a Weibull model of job duration and uses a longitudinal sample from the Michigan Panel Study of Income Dynamics. Abraham and Farber estimate earnings functions that include this measure as a regressor.

They find that: (1) earnings are significantly higher on a given job in high-quality matches (long jobs); (2) on average, about one-third of the observed cross-sectional relationship between seniority and earnings is caused by "match quality bias"; and (3) there is a positive relationship between earnings and seniority only in high-quality matches. In addition, there are substantial differences in the importance of heterogeneous match quality and in the returns to experience and seniority across broad occupational groups. For blue collar workers, the returns to general labor market experience are low, but match quality has an important effect on earnings. For white collar workers, the returns to general labor market experience are higher, but match quality has only a small effect on earnings. The results suggest that there are fundamental differences in the operation of labor markets between white and blue collar workers.

Jovanovic and his coauthors begin by noting that matching models of the labor market usually assume a distribution of match productivity that is exogenous. The act of changing jobs then has the worker taking a new, independent sample from this distribution. The history from past samples is assumed to contain no information about the next sample, and the distribution of the match is often assumed to be normal.

Using a "characteristics" approach to matching two heterogeneous populations, Jovanovic's paper shows that assumptions concerning the normality and serial independence of match-productivity (across successive matches) follow from some simple axioms. Moreover, the normality assumption is supported by an empirical test using data on the output of a large group of workers and their supervisors. One virtue of this test is that output is used directly, and wages (which for various reasons may be a poor proxy for the productivity of the job-worker match) are not used.

Killingsworth's paper estimates the compensating wage differential between white and blue collar work. He assumes that different workers prefer (or demand) different types of jobs. Therefore, the wage differential is influenced not only by the supply of workers but also by their preferences.

Using a structural model of job choice, wage, labor supply, and earnings (which are left out of some earlier work on this subject), Killingsworth finds that blue collar workers actually earn a wage premium of 4 to 14 percent over white collar workers.

In addition to the authors, the following NBER associates participated in the discussions: John Abowd, Edward P. Lazear, Kevin Murphy, Sherwin Rosen, and Robert Topel, University of Chicago; Steven G. Allen, North Carolina State University; David E. Bloom, Richard B. Freeman (Program Director), Zvi Griliches, and David A. Wise, Harvard University; George J. Borjas, University of California, Santa Barbara; Charles C. Brown, University of Maryland; William T. Dickens and Jonathan S. Leonard, University of California, Berkeley; Ronald G. Ehrenberg and Olivia S. Mitchell, Cornell University; Alan L. Gustman, Dartmouth College; Wayne B. Gray, Clark University; Jerry A. Hausman, MIT; Bengt Holmstrom, Yale University; Casey Ichniowski, Columbia University; Morris Kleiner, University of Kansas; Ann Witte, Wellesley College; Jeffrey S. Zax, Queens College; and Geoffrey Carliner, NBER.

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NBER Volume on Taxes and Charity

Federal Tax Policy and Charitable Giving by Charles T. Clotfelter is now available from the University of Chicago Press at a cost of $39.00. This study demonstrates that changes in tax policy can have a significant impact on the level and composition of charitable giving.

The book focuses on four major types of giving: individual contributions, volunteering, corporate contributions, and charitable bequests. The evidence suggests that the charitable deduction, tax rates, and other related factors influence the size and direction of all four types of giving.

Clotfelter, a research associate in NBER's Program in Taxation, is also Vice Provost for Academic Policy and Planning and Professor of Public Policy Studies and Economics at Duke University. He is currently Vice President of the Southern Economic Association.

Evaluation of Tax Policy Studied

A General Equilibrium Model for Tax Policy Evaluation by Charles L. Ballard, Don Fullerton, John B. Shoven, and John Whalley will be available in September from the University of Chicago Press. It is priced at $36.00.

This NBER monograph develops a general equilibrium model of the U.S. tax system and then uses it to evaluate the effects of various tax policies. The general equilibrium model is a large-scale model of the economy that takes into account interrelationships among sectors. It may be contrasted with *partial* equilibrium models that ignore such interrelationships and are therefore inadequate to explain the full effects of a given change, such as integration of corporate and personal taxes, or a switch to a consumption tax system.

The NBER volume analyzes a number of current issues including international flows of capital and the Laffer curve. Therefore, it should be of interest both to academic economists and to public policymakers.

Fullerton and Shoven are both research associates in NBER's Program in Taxation. In addition, Fullerton is a professor of economics at the University of Virginia; Shoven is a professor of economics at Stanford iversity. Ballard is an assistant professor of economics at Michigan State University and Whalley is professor of economics and director of the Centre for the Study of International Economic Relations at the University of Western Ontario.

Pension Study Released

Pensions, Labor, and Individual Choice, edited by David A. Wise, will be available in September for $50.00 from the University of Chicago Press. The papers collected in this volume, originally presented at an NBER conference in 1983, examine the effect of pension coverage on participation in the labor force. One of the major findings detailed in the book is that an individual's decision to retire, and at what age, is directly influenced by his or her pension options. Increases in Social Security benefits, too, are found to encourage retirement.

Pension plans are also found to impose a high cost on workers who change jobs. Therefore, pension coverage may reduce turnover among workers.

Finally, the research shows that the type of pension that presents the least risk to the employee is a plan based on percentage of final salary, rather than career average salary, or years of service.

Wise is director of NBER's Project on Pensions and a member of NBER's Program in Labor Studies. He is also Stambough Professor of Political Economy at Harvard University's Kennedy School of Government.

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Journal of Economic Literature (JEL) subject codes, when available, are listed after the date of the Working Paper. Abstracts of all Working Papers issued since April 1985 are presented below. For previous Working Papers, see past issues of the *NBER Reporter*. The Working Papers are intended to make results of NBER research available to other economists in preliminary form to encourage discussion and suggestions for revision before final publication. Working Papers are not reviewed by the Board of Directors of NBER.

Does a Flexible Industry Wage Structure Increase Employment? The U.S. Experience

Linda A. Bell and **Richard B. Freeman**
Working Paper No. 1604
April 1985

This paper examines the flexibility of wages across industries in the United States. It also seeks to determine the potential impact on employment of changes in the industrial wage structure.

We find that the United States, alone among the major OECD countries, has experienced substantial changes in the industry wage structure since 1970: the variation of (log) wages among industries increased dramatically, particularly in the 1970s. This represents a widening of the gap between wages in the high- and low-wage sectors.

In order to evaluate these changes, we estimate equations linking changes in industry wages over an extended period of time to a variety of characteristics that determine potential wages. We find that industrial wages are positively correlated with value productivity per worker, even after institutional and supply side factors that may have contributed to the increased dispersion of wages in the 1970s are taken into account. Our results are not consistent with the standard competitive model

of industry labor markets, in which wages and productivity are uncorrelated across sectors and wages depend on aggregate, rather than sectoral, conditions.

Next we evaluate the circumstances under which flexible wages among industries may enhance or reduce employment. For the U.S. economy in the 1970s, the latter possibility—flexible wages reducing employment—seems to hold. The U.S. experience is that flexible wages by industry have not contributed to employment growth.

Paying the Piper Calling the Tune: Implications of Changes in Reimbursement

Victor R. Fuchs
Working Paper No. 1605
April 1985
JEL No. 913

The United States is in the midst of a revolution in health care finance, the third since the end of World War II. Among the best-known symbols of the new era in health care finance are: Medicare's PPS (prospective payment system) based on DRGs (diagnosis-related groups); California's hospital-specific contracts for Medi-Cal patients; deductibles and coinsurance; HMOs (health maintenance organizations); and PPOs (preferred provider organizations).

This paper analyzes the economic factors responsible for innovations in health care reimbursement. It also discusses the distinguishing characteristics of the new methods and examines their potential impact on hospitals, physicians, nurses, and patients. The paper concludes by considering some fundamental problems of public policy with respect to health care.

Some Historical Evidence, 1870–1933, on the Impact and International Transmission of Financial Crises

Michael D. Bordo
Working Paper No. 1606
April 1985
JEL Nos. 042, 044, 131, 431

This study presents evidence from 1870–1933 for six countries (the United States, United Kingdom, Germany, France, Canada, Sweden) as to the impact of financial crises on economic activity and the international transmission of financial crises. The paper examines two approaches in the literature on the role and importance of financial crises as disturbances to domestic and international economic activity: the monetarist view of Friedman-Schwartz and Cagan; and the view of Fisher-Minsky and Kindleberger.

Over 1870–1933, severe contractions in economic activity in all cases were accompanied by monetary contraction, usually by stock market crashes as well, but never, except in the United States, by banking crises. The unique performance of the United States can be attributed to the absence of a nationwide branch banking system, as existed in the five other countries, and to the less effective role played by the U.S. monetary authorities in acting as a lender of last resort.

There are two principal findings on the international transmission of financial crises. The first is consistent with the monetarist approach: under the classical gold standard, in periods containing financial crises, nations' money supplies were linked by gold flows and changes in high-powered money; under periods of flexible exchange rates, there is evidence of insulation of domestic monetary and real variables from foreign shocks.

The second finding is in sympathy with the Fisher-Minsky-Kindleberger approach. The similarity among countries of turning points in stock market prices, the common incidence of stock market crises, and the similar importance of the deposit reserve ratio as the key determinant of monetary contraction in all countries (except the United States) suggest that arbitrage in stock prices was a channel for the international transmission of crises.

Estimating the Effects of R and D on Bell System Productivity: A Model of Embodied Technical Change

Roger H. Gordon, Mark Schankerman, and **Richard H. Spady**
Working Paper No. 1607
April 1985
JEL Nos. 226, 621

This paper develops an econometric model of the effects of R and D efforts on the magnitude and characteristics of technical change in the Bell System. We simultaneously estimate a vintage capital production function, embodying several distinct types of capital and various factor demand functions for the Bell System during the postwar period. Each vintage of capital is assumed to differ in productivity according to a parametric function of R and D effort. We also allow for augmenting technical change in the noncapital inputs. Our estimates use a new, extensive data set that contains detailed information on the vintage structure of investment in different types of capital in the Bell System.

Most previous papers in the field have assumed that technical change is disembodied. However, we find that a model assuming capital-embodied technical change fits the data much better than one making the traditional assumption. We use the parameter estimates to calculate the ex post rate of return earned on R and D expenditures at Bell Laboratories and the improvements in the productivity of specific capital inputs that result from those R and D expenditures. The results suggest not only that the return to R and D expenditures has been very high but also that it has been growing over time. In addition, the rate of increase in the productivity of capital inputs has risen over time. The model fails to produce a plausible estimate for the degree of returns to scale, but the results on the return to R and D effort are reasonably insensitive to what we assume about the degree of economies of scale.

Part-Time Work versus Full-Time Work of Married Women in Japan

Tadashi Yamada and **Tetsuji Yamada**
Working Paper No. 1608
April 1985
JEL No. 813

In this paper, we attempt to resolve the drawbacks in previous studies of the labor supply of women in Japan. We hypothesize that the response to the socioeconomic factors that influence the decision to work varies among different groups of women, and, by using the 1980 Population Census data for Japan, we estimate separately the labor supply of married women employed part time and those who are employed full time.

The major finding is that there is a clear difference in the labor supply behavior of women who are employed part time and those who are employed full time. For example, the estimated elasticities are noticeably different for the following factors: women's wages, men's wages, the unemployment rate, the industry-mix variable, and the provision of day-care centers and nursery schools.

Our empirical results suggest that, in public policy implementation, giving special attention to the specific characteristics of the labor market of women in Japan would be useful and important in understanding the different responses to the factors influencing the different socioeconomic groups in their decision to work.

Supply Shocks, Wage Indexation, and Monetary Accommodation

Joshua Aizenman and **Jacob A. Frenkel**
Working Paper No. 1609
April 1985
JEL Nos. 310, 430

This paper develops a unified framework for the analysis of wage indexation and monetary policy in the presence of supply shocks. We first present simple formulas for the optimal wage indexation rule and for the optimal money supply rule. In order to set the stage for an evaluation of departures from the optimal policy rules, we first analyze two extreme cases: a rule that stabilizes employment, and a rule that stabilizes the real wage.

The analysis of these two extreme cases provides the ingredients for the evaluation of various rules for wage indexation and for monetary targeting. We examine the implications of indexing wages to: (1) nominal GNP; (2) the CPI; and (3) the value-added price index. We also consider the implications of targeting the money supply to these three alternative indicators. We show that the various indexation rules bear a dual relationship to the various monetary targeting rules. The welfare ranking of the various rules depends on whether the elasticity of the demand for labor exceeds or falls short of the elasticity of labor supply. If the demand for labor is more elastic than the supply, then policy rules that stabilize employment produce a smaller welfare cost than policy rules that stabilize the real wage. In that case, indexing wages to nominal GNP results in a smaller welfare cost than indexing to a value-added price index that in turn produces a smaller cost than indexation to the CPI.

Because of the dual relationship between monetary policy and wage indexation, it follows that under the same circumstances, monetary policy that targets nominal GNP produces a smaller welfare cost than policy that targets the value-added price index. This in turn results in a smaller cost than the policy that targets the CPI. This ranking is reversed when the elasticity of the supply of labor exceeds the elasticity of demand.

Conventional Valuation and the Term Structure of Interest Rates

Robert J. Shiller
Working Paper No. 1610
April 1985
JEL No. 313

There appears to be no general tendency for long-term interest rates either to overreact or underreact to short-term interest rates relative to a rational expectations model of the term structure. Rather, there appears to be some tendency for markets to set long-term interest rates in terms of a convention or rule of thumb that makes long-term rates behave as a distributed lag, with gradually declining coefficients, of short-term interest rates. People seem to remember the recent past but blur the more distant past. This convention implies overreaction in some monetary policy regimes and underreaction in others.

Aspects of Investor Behavior under Risk

Benjamin M. Friedman and **V. Vance Roley**
Working Paper No. 1611
April 1985
JEL No. 311

The three sections of this paper support three related conclusions. First, asset demands with the familiar properties of wealth homogeneity and linearity in expected returns follow as close approximations from expected utility-maximizing behavior under the assumptions of constant relative risk aversion and joint normally distributed asset returns. Second, although such asset demand exhibit a symmetric coefficient matrix with respect to the relevant vector of expected asset returns, symmetry is not a general property, and the available empirical evidence warrants rejecting it for both institutional and individual investors in the United States. Finally, in a manner analogous to the finite maximum exhibited by quadratic utility, a broad class of mean-variance utility functions also exhibits a form of wealth satiation that necessarily restricts its range of applicability.

Asset Pricing Model Specification and the Term Structure Evidence

Terry A. Marsh
Working Paper No. 1612
April 1985
JEL No. 313

In this paper, I develop a set of tests of models of relative capital asset prices. I then use tests to examine how well the models explain maturity premiums on government bonds, although the models are perfectly general and hence could be applied to stocks or other assets. The tests allow for the nonobservability of investors' optimal per capita consumption (or expected marginal utility).

I find that the returns on government bonds bear a systematic risk that is measured better by their covariability with aggregate per capita consumption than with the returns on the NYSE index; the latter is the surrogate-wealth portfolio typically used to measure risk in the traditional Sharpe-Lintner-Mossin CAPM.

On the Negative Correlation between Performance, Experience, and Education

Andrew Weiss and **Henry Landau**
Working Paper No. 1613
April 1985

We consider a model in which a worker's productivity must exceed some lower bound in order for him to satisfy the minimum qualifications for a particular job. If the worker's productivity exceeds some upper bound, he is promoted. We assume that the productivity of every worker increases with experience, tenure, and education. This relationship differs across workers.

We present distributions of workers whose particular job, education, experience, or tenure is negatively correlated with productivity. For any single worker on that job, however, those demographic characteristics have strongly positive effects on productivity. Our result stems from the effect of the job assignment rule on the distribution of workers on the job.

Valuation and Optimal Exercise of the Wild Card Option in the Treasury Bond Futures Market

Alex Kane and **Alan J. Marcus**
Working Paper No. 1614
April 1985
JEL No. 313

The Treasury Bond Futures Contract of the Chicago Board of Trade allows the short position several delivery options for when and with which bond the contract will be settled. The timing option allows the short position to choose any business day in the delivery month to actually make delivery. In addition, the contract settlement price is locked in at 2:00 p.m. when the futures market closes, despite the facts that the short position need not declare an intent to settle the contract until 8:00 p.m. and that trading in Treasury bonds can occur all day in dealer markets. If bond prices change significantly between 2:00 and 8:00 p.m., the short has the option of settling the contract at a favorable 2:00 p.m. price. This phenomenon, which recurs on every trading day of the delivery month, creates a sequence of 6-hour put options for the short position that has been dubbed the "wild card option." This paper presents a valuation model for the wild card option and computes estimates of the value of that option, as well as rules for its optimal exercise.

The Impossibility of Rational Bubbles

Behzad Diba and **Herschel I. Grossman**
Working Paper No. 1615
May 1985
JEL No. 134

Rational bubbles involve a self-confirming belief that an asset price depends on information that includes variables or parameters not part of market fundamentals. The existing literature shows that if market

fundamentals are economically interesting (that is, forward looking), then any rational bubbles would be either explosive or implosive. Further arguments based on the literature show that utility-maximizing behavior implies finite bounds on asset prices. Accordingly, such behavior precludes both explosive and implosive rational price expectations, except for the possible case of an implosion in the value of fiat money. These arguments therefore rule out both positive and negative rational bubbles, except for the possibility of rational inflationary bubbles.

This paper extends the theoretical analysis of rational bubbles in two ways. First, it shows that, although a supply response of current asset stock to the current asset price dampens fluctuations in market fundamentals, such a response would cause a rational bubble to explode or implode even faster. Thus, the explosiveness or implosiveness of rational bubbles is not an artifact of assuming that the asset stock evolves autonomously.

Second, and more importantly, our analysis considers the inception of rational bubbles and shows that, for a negative rational bubble—such as a rational inflationary bubble—to get started, there would also have to be a positive probability of a positive rational bubble. Specifically, the expected initial absolute value of a potential negative rational bubble cannot exceed the expected initial value of a potential positive rational bubble. The result dramatically expands the theoretical basis for precluding rational bubbles. Specifically, because utility maximization directly rules out rational deflationary bubbles, it also precludes the inception of rational inflationary bubbles.

The Implications of Mean-Variance Optimization for Four Questions in International Macroeconomics

Jeffrey A. Frankel
Working Paper No. 1617
May 1985

The hypothesis that investors try to optimize the mean and variance of their end-of-period wealth has powerful implications for some standard but interesting questions for international macroeconomists. The implications transcend the particular econometric technique used to estimate the return variance-covariance matrix.

For conventional estimates of risk aversion, substitutability between domestic and foreign securities is close to perfect. Risk premiums are small in magnitude (a few basis points) and thus cannot explain much bias in forward rates. Nevertheless, as long as risk aversion is not zero, foreign exchange intervention still affects the *level* of the exchange rate. If interest rates are held constant, the effect is proportionate to the contemporaneous change in asset supplies and is more than proportionate if the expectations of future asset supplies also change. Current account deficits have effects that are comparable to, but smaller in magnitude than, the effects of equal-sized changes in asset supplies through intervention of government borrowing. Finally, the perceived tendency for dollar depreciation to be associated with appreciation of the mark against the franc is not consistent with the implication of mean-variance optimization that the franc should be a closer substitute for the dollar than the mark is.

Do Wages Rise with Job Seniority?

Joseph Altonji and **Robert A. Shakotko**
Working Paper No. 1616
May 1985

After one controls for total labor market experience, the extent to which wages rise with the accumulation of seniority (tenure) in a firm is fundamentally a question of the structure of earnings. A variety of studies have found a large, positive partial effect of tenure on wages. This paper reexamines the evidence: we use a simple instrumental variables scheme to deal with well-known estimation biases that arise from the fact that tenure is likely to be related to unobserved individual and job characteristics affecting the wage. We use the variation of tenure over a given job match as the principal instrumental variable for tenure. The variation in tenure over the job, in contrast to variation in tenure across individuals and jobs, is uncorrelated *by construction* with the fixed individual-specific and job-matching components of the error term of the wage equation. Our main finding is that the partial effect of tenure on wages is small. General labor market experience and job shopping in the labor market account for most wage growth over a career. The strong cross-sectional relationship between tenure and wages is primarily the result of heterogeneity bias.

Money and Interest in a Cash-in-Advance Economy

Robert E. Lucas, Jr., and **Nancy L. Stokey**
Working Paper No. 1618
May 1985

In this paper, we analyze an aggregative general equilibrium model in which the use of money is moti-

vated by a cash-in-advance constraint, applied to purchases of a subset of consumption goods. The system is subject to both real and monetary shocks, which are economywide and observed by all. We develop methods for verifying the existence of, characterizing, and explicitly calculating equilibriums. A main result of the analysis is that current money growth affects the current real allocation *only* insofar as it affects expectations about future money growth, that is, *only* through its value as a signal.

Credit Rationing and Effective Supply Failures

Alan S. Blinder
Working Paper No. 1619
May 1985
JEL No. 311

This paper presents two macro models in which central bank policy has real effects on the supply side of the economy because of credit rationing. In each model, there are two possible regimes, depending upon whether credit is or is not rationed. Starting from an unrationed equilibrium, either a large enough contraction of bank reserves or a large enough rise in aggregate demand can lead to rationing. I show monetary (fiscal) policy to be more (less) powerful when there is rationing than when there is not.

In the first model, credit rationing reduces working capital. There is a "failure of effective supply" in that credit-starved firms must reduce production below national supply. The resulting excess demand in the goods market may, in turn, drive prices up and reduce the real supply of credit further, leading to further reductions in supply and a stagflationary spiral.

In the second model, credit rationing reduces investment, which cuts into both aggregate demand and supply. Despite the effect on demand, stagflationary instability is still possible. A rise in government spending crowds out investment in the rationed regime but crowds in investment in the unrationed regime.

Educational Achievement in Segregated School Systems: The Effects of "Separate-But-Equal"

Robert A. Margo
Working Paper No. 1620
May 1985
JEL No. 042

In segregated school systems, educational achievement was considerably lower in black schools than in the white schools. Economic historians have argued that this racial achievement gap reflected the discriminatory funding of the black schools. This paper assesses the historical effects of a "separate-but-equal" policy of educational finance.

Using cross-sectional data from 1930 and 1940, I estimate race-specific educational production functions. Eliminating race differences in inputs supplied by school boards explains 40–50 percent of the racial achievement gap, depending on how achievement is measured. The remainder of the difference appears to reflect the impact of family background on achievement: the most important effect was adult black illiteracy, a legacy of slavery and educational backwardness in the late 19th century.

The paper also shows how school boards' marginal valuation of black achievement can be recovered from the production function estimates. Compared to preferences that would have led them to voluntarily practice equality, southern school boards judged black achievement to be worth roughly half the value they placed on white achievement.

A Model for Analyzing Youth Labor Market Policies

Alan L. Gustman and **Thomas L. Steinmeier**
Working Paper No. 1621
May 1985
JEL Nos. 810, 820

This paper formulates a model of the youth labor market. At the heart of the model is a minimum wage restriction that causes some youths to become unemployed and prevents others from training. We assume labor to be heterogeneous in performance on skilled jobs and less productive among youths than among adults simply because of the difference in maturity. We apply the model to the effects of three representative policies: a youth subminimum wage; subsidies paid to firms that hire youths; and training subsidies that offset the costs of on-the-job training.

Pension Funding and Saving

B. Douglas Bernheim and **John B. Shoven**
Working Paper No. 1622
May 1985

This paper suggests that the nature of the funding of defined-benefit pension plans may be an important reason why personal saving has not responded positively to the high real interest rates and tax incentives

designed to encourage saving and investment of the last few years. From a firm's standpoint, funding the promised pension is a target, and higher rates of return permit reaching that target with lower contributions. According to the Flow-of-Funds Accounts of the Federal Reserve System, between 1982 and 1984 net pension contributions declined from 6.02 percent of disposal personal income to 4.02 percent.

This paper presents empirical information on pension contributions, unfunded liabilities, interest rates, and recent developments in pension funding. It specifies the target saving model of pension funding and derives the theoretical elasticity of pension contributions to changes in interest rates. It then investigates this elasticity with aggregate time-series econometrics. In general, the estimated elasticities are consistent with the theory and indicate that a rise of one percentage point in real interest rates would, in the long run, reduce pension contributions by 20 to 30 percent. Such a large negative elasticity for such an important source of loanable funds in the economy suggests that the pension funding mechanism should be taken into account in designing policies to increase the economy's saving and investment.

Aggregate Output with Operating Rates and Inventories as Buffers between Variable Final Demand and Quasi-Fixed Factors

John F. Helliwell and **Alan Chung**
Working Paper No. 1623
June 1985
JEL Nos. 122, 132, 641

Empirical evidence has long shown that output varies more in the short run than all factor outputs, including employment and hours worked. Also, all factors, including capital, start adjusting within a few months, suggesting that production models should treat all measured factor outputs as quasi-fixed.

In such a context, long-run equilibrium involves the choice of average factor proportions, including an average operating rate that minimize total costs of producing the desired level of output. In response to unexpected or temporary changes in demand or cost conditions, optimal temporary equilibrium involves some changes in factor demands coupled with the joint use of pricing and production decisions to make the best use of the buffering capacity provided by inventories and operating rates.

Applying this framework to aggregate annual data, this paper concentrates on the econometrics of the production or operating rate decision, since the operating rate is the key adjusting variable in the short run. The operating rate decision also reveals most clearly the important consequences of quasi-fixity and shows how our model contrasts with more conventional treatments. Other models of temporary equilibrium of production usually assume either the strict applicability of the underlying production function (requiring the assumption of either completely flexible product prices or at least one fully variable factor if quantity rationing is not to take place) or that current output is determined by aggregate demand without reference to the production function constraint.

The assumed long-run production structure is two-level CES, with the inner function's vintage bundle of capital and energy combining with efficiency units of labor in the outer function. We use assumptions about long-run average cost minimization to derive the parameters of the production function, assuming constant returns to scale and constant growth of labor efficiency. We then test these assumptions about the functional form and properties of the long-run production function against various alternatives in the context of the derived temporary equilibrium output decision.

The Sensitivity of Labor Demand Functions to Choice of Dependent Variable

George J. Borjas
Working Paper No. 1624
June 1985
JEL No. 800

This paper investigates whether the parameters of labor demand functions are sensitive to alternative methods of estimation. The assumption that the production technology is of the generalized Leontief type implies that the demand system can be estimated by analyzing cross-sectional differences in earnings across labor markets, by studying longitudinal changes in earnings within a labor market, or by investigating cross-sectional differences in labor force participation rates across labor markets. The estimation of these models on the 1970 and 1980 Public Use Samples from the U.S. Census reveals that the estimates of labor demand functions are indeed quite robust to major specification changes.

Serial Correlation of Asset Returns and Optimal Portfolios for the Long and Short Term

Stanley Fischer and **George Pennacchi**
Working Paper No. 1625
June 1985

Optimal portfolios differ according to the length of time they are held without being rebalanced. For the

case in which asset returns are identically and independently distributed, optimal portfolios have become less diversified as the holding period lengthens.

We show that the antidiversification result does not obtain when asset returns are serially correlated. We also examine properties of asymptotic portfolios for the case in which the short-term interest rate, although known at each moment, may change unpredictably over time. The theoretical results provide no presumption about the effects of the length of the holding period on the optimal portfolio.

Using estimated processes for stock and bill returns, we show that calculated optimal portfolios are virtually invariant to the length of the holding period. The estimated increases for asset returns also imply very little difference between portfolios calculated while ignoring changes in the investment opportunity set and those obtained when the investment opportunity set changes over time.

A Tax-Based Test for Nominal Rigidities

James M. Poterba, Julio J. Rotemberg,
and **Lawrence H. Summers**
Working Paper No. 1627
June 1985
JEL Nos. 131, 321

In classical macroeconomic models with flexible wages and prices, whether a tax is levied on producers or consumers does not affect its incidence. However, if wages or prices are rigid in the short run, as they are in Keynesian macroeconomic models, then shifting a tax from one side of the market to the other may have real effects. Tax changes therefore provide potential tests for the presence of nominal rigidities. This paper examines the price and output effects of revenue-neutral shifts between direct and indirect taxation. The results, based on postwar data from Great Britain and the United States, reject the view that wages and prices are completely flexible in the short run.

Stock Returns and the Term Structure

John Y. Campbell
Working Paper No. 1626
June 1985
JEL No. 313

It is well known that in the postwar period, stock returns have tended to be low when the short-term nominal interest rate is high. In this paper I show that, more generally, the state of the term structure of interest rates predicts stock returns. Risk premiums on stocks appear to move closely together with those on 20-year Treasury bonds, while risk premiums on Treasury bills move somewhat independently. Average returns on 20-year bonds have been very low relative to average returns on stocks.

I use these observations to test some simple asset pricing models. First I consider latent-variable models in which betas are constant and risk premiums vary with expected returns on a small number of unobservable hedge portfolios. The data strongly reject a single-latent-variable model.

The last part of the paper examines the relationship between conditional means and variances of returns on bills, bonds, and stocks. Bill returns tend to be high when their conditional variance is high, but there is a perverse negative relationship between stock returns and their conditional variance. I estimate a model that assumes that asset returns are determined by their time-varying betas with a fixed-weight "benchmark" portfolio of bills, bonds, and stocks, whose return is proportional to its conditional variance. This portfolio is estimated to place almost all its weight on bills, indicating that uncertainty about nominal interest rates is important in pricing both short and long-term assets.

Estimated Neonatal Mortality Rates from the Heights of Children: The Case of American Slaves

Richard H. Steckel
Working Paper No. 1628
June 1985
JEL No. 041

Undercounting is a familiar problem to people who work with historical demographic records. To overcome the problems in one area, this paper proposes a method for recovering information about neonatal mortality. My approach uses average heights of young children to predict the birth weights of American slaves. The results suggest that slave newborns weighed on average about 5.1 pounds, which makes them comparable to newborns among the poorest populations of developing countries in the mid-twentieth century. The birth weight distribution and a schedule of mortality by birth weight also suggest that previous estimates of infant mortality among slaves are too low. The poor health and size of the children and the relatively large size of adult slaves represent a pattern of growth and development that is unobserved among poor populations of the twentieth century. Thus, slavery may have created an unusual pattern of allocation of food across ages.

Borrowing Restrictions and Wealth Constraints: Implications for Aggregate Consumption

Carl E. Walsh
Working Paper No. 1629
June 1985

Recent empirical studies have found that consumption is more sensitive to current income than the life-cycle, permanent-income hypothesis would predict. This paper studies a model in which the fraction of consumers exhibiting excess sensitivity is endogenously determined. The presence of income uncertainty and restrictions on borrowing generate a distribution of compensation across individuals that is consistent with the recent empirical evidence. The aggregate marginal propensity to consume out of transitory income is directly related to the fraction of constrained consumers and exhibits positive serial correlation in the face of serially uncorrelated income shocks.

Pure Price Effects of Nonwage Compensation

Jeffrey S. Zax
Working Paper No. 1630
June 1985

This paper discusses the pure, static price effects engendered by tax preferences for nonwage compensation. Section II demonstrates that, because of these price effects, optimal consumption bundles will contain larger quantities of the goods included in nonwage compensation, and smaller quantities of other goods, than they would in the absence of tax preferences. In the presence of preferences, the cost of a compensation package to an employer usually differs from its value to an employee.

Under proportional taxation, compensation packages that contain optimal quantities of nonwage compensation may be between 4 percent and 13 percent less expensive than cash compensation sufficient to purchase, at retail, consumption bundles providing similar utility. This difference represents a substantial saving to employers. It is largely attributable to reductions in tax payments, and may represent substantial foregone tax revenues. Optimal provision of nonwage compensation confers greater advantages under progressive taxation—advantages that increase with the degree of progressivity.

These considerations are important in the analysis of any issue to which employee "income" or employer costs are relevant. As examples, Section III demonstrates that conventional definitions of income unavoidably generate incorrect conclusions with regard to evaluations of welfare distribution, tax progressivity, and returns to human capital.

State Personal Income and Sales Taxes: 1977-83

Daniel R. Feenberg and **Harvey S. Rosen**
Working Paper No. 1631
June 1985
JEL No. 324

The two main workhorses of state tax systems are levies on sales and on individual incomes. In this paper, we develop and implement a coherent methodology for characterizing these systems. We then use the measures thus generated to show how the various systems differ across states and how they evolved over the seven-year period 1977-83. We consider the systems' revenue elasticities with respect to income, their average and marginal tax rates at various income levels, and several other issues.

On the Limitation of Government Borrowing: A Framework for Empirical Testing

James D. Hamilton and **Marjorie A. Flavin**
Working Paper No. 1632
June 1985
JEL No. 321

This paper seeks to distinguish empirically between two views on the limitations of government borrowing. According to one view, nothing precludes the government from running a permanent budget deficit and paying interest due on the growing debt load simply by issuing new debt. An alternative perspective holds that creditors would be unwilling to purchase government debt unless the government made a credible commitment to balance its budget in present-value terms. We show that distinguishing between these possibilities is mathematically equivalent to testing whether a continuing currency inflation might be fueled by speculation alone or is instead driven solely by economic fundamentals. Empirical tests that have been developed for this economic question lead us to conclude that post-war U.S. deficits are largely consistent with the proposition that the government budget must be balanced in present-value terms.

Hospital Cost and Efficiency under Per-Service and Per-Case Payment in Maryland: A Tale of the Carrot and the Stick

David S. Salkever, Donald M. Steinwachs, and **Agnes Rupp**
Working Paper No. 1633
June 1985
JEL No. 913

The simultaneous operation of per-case and per-service hospital payment systems in Maryland, and the

varying levels of stringency used in setting per-case rates, allow comparison of the effects of different incentive structures on hospital costs. This paper presents such a comparison using 1977–81 data. Regressions on cost per case and total cost show evidence of lower hospital costs only when per-case payment limits are very stringent. Positive net revenue incentives appear insufficient to induce reductions in length of hospital stay or in use of ancillary services. Our results suggest that these changes in patterns of medical practice are more likely under the threat of financial losses.

Small Countries in Monetary Unions: A Two-Tier Model

Jorge Braga de Macedo
Working Paper No. 1634
June 1985

In a previous analysis of the West African Monetary Union [Macedo (1985a)], size is taken to be a major structural characteristic of a country. That is, large countries are not affected by disturbances originating in small countries but small countries are affected by large countries' domestic disturbances. In this paper, we generalize some of the results and present the structure of the model in more detail.

Using a four-country, two-tier macroeconomic model, I show that the pseudo-exchange rate union of the two small countries with the large partner has no effect on their real exchange rates but does affect their price levels. On the other hand, a full monetary union in principle requires a transfer from the large partner in the union. The allocation of this transfer between the two small countries by their common central bank will have real effects when the allocation rule differs from the steady-state monetary distribution.

Implicit Contracts: A Survey

Sherwin Rosen
Working Paper No. 1635
June 1985

Implicit contracts resolve the distribution of uncertainty and the utilization of specific human capital between risk-averse workers and less risk-averse firms. Incomplete contracts are required to yield involuntary layoffs in contract markets: otherwise, contracts are efficient and pareto optimal by construction.

There is a close relation between contract theory and neoclassical labor market theory. Contracts smooth consumption but increase the volatility of labor supply and labor utilization to demand disturbances, because contractual insurance eliminates the income effects of socially diversifiable risks. The result is similar to the intertemporal substitution hypothesis.

However, the price mechanism in a contract is substantially different. Contracts embody a nonlinear, two-part pricing scheme. The lump-sum part allocates the income-consumption consequences of risks; the marginal pricing part allocates production and labor utilization. This implicit pricing mechanism is "flexible" in all respects, although the observed average hourly wage combines both parts and may give the outward appearance of rigidity. Furthermore, the observed average wage rate in a contract does not reflect marginal conditions necessary for structural econometric estimation. Indivisibilities appear necessary to account for the split between work-sharing and layoffs. I also consider contracts with private information in the nonlinear pricing context.

The Dollar and the Policy Mix: 1985

Jeffrey D. Sachs
Working Paper No. 1636
June 1985
JEL Nos. 130, 430

In 1971, Robert Mundell proposed a stunning solution to three problems then affecting the U.S. economy: high inflation, unemployment, and a weak currency. Mundell suggested that the policy mix of fiscal expansion and monetary contraction could work to raise output, reduce inflation, and strengthen the currency at the same time.

This policy mix has been pursued under the Reagan administration since 1981. When I investigate the contributions of this policy mix to disinflation and output growth, I find that it has contributed as much as three percentage points of the reduction in the inflation rate during 1981–84. However, these gains against inflation are likely to be lost, or more than lost, in the future.

Macroeconomic Interdependence of Japan and the United States: Some Simulation Results

Naoko Ishii, Warwick McKibbin, and **Jeffrey D. Sachs**
Working Paper No. 1637
June 1985
JEL Nos. 430, 130

This paper examines the macroeconomic interdependence between Japan and the United States using

a medium-scale simulation model of the world economy. Our goal is to determine how shifts in macroeconomic policies in the United States or Japan affect the other country and the rest of the world. In particular, we examine the following issues: (1) the likely macroeconomic ramifications of significant budget cuts in the United States for the United States, Europe, or Japan; (2) the macroeconomic implications of a protectionist tariff imposed by the United States; and (3) the scope for policy coordination among the United States, Japan, and Europe.

Hours Restrictions and Labor Supply

William T. Dickens and Shelly J. Lundberg
Working Paper No. 1638
June 1985
JEL Nos. 813, 323

In this study, we present a model of labor supply in which individuals may face constraints on their choice of work hours. We then analyze the sensitivity of parameter estimates and policy conclusions to the usual assumption of unrestricted choice. We set up the labor supply decision as a discrete-choice problem in which each worker faces a finite number of employment opportunities, each offering fixed hours of work. The distribution from which these are drawn, as well as the number of draws, is estimated along with the behavioral parameters of individual labor supply. The standard model with unconstrained hours appears as a special case in which the number of draws approaches infinity. We estimate the mean absolute difference between desired and actual work hours to be about ten hours per week. The results strongly support the notion that hours choices are constrained and suggest that models that ignore restrictions on hours worked may yield biased estimates of the wage elasticity of desired hours. Further, we suggest that analysis of policies such as income transfers and the flat rate tax that does not consider their effects on the distribution of hours offered may be very misleading.

A Vintage Model of Supply Applied to Manufacturing

Pentti J. K. Kouri, Albert J. Viscio, and **Jorge Braga de Macedo**
Working Paper No. 1639
June 1985
JEL Nos. 023, 631

In Kouri, Macedo, and Viscio (1982), we applied a vintage model of supply to data from the French manufacturing sector. The model was, however, solved with a particular parameterization (Cobb-Douglas production function and a quadratic adjustment function). Also, no fixed factors were allowed for in the theoretical treatment, even though fixed labor was found to be significant in the application to France. The treatment of technological progress was equally restrictive.

In Section I of this paper we solve the general case of N variable factors and $\bar{N}$ fixed factors with embodied and disembodied technological progress. It turns out to be simpler than the combination of a Cobb-Douglas production function with a quadratic adjustment function, thus suggesting a manageable framework for the analysis of profitability and employment in industrial countries. We simulate the model in Section II using previously unavailable data on a subsector of French manufacturing from 1959 to 1980. The empirical results confirm the importance of vintage effects.

Are Imports to Blame? Attribution of Injury under the 1974 Trade Act

Robert S. Pindyck and **Julio J. Rotemberg**
Working Paper No. 1640
June 1985
JEL Nos. 422, 632

Under Section 201 of the 1974 Trade Act, a domestic industry can obtain temporary protection against imports by demonstrating before the International Trade Commission (ITC) that it has been injured and that imports have been the "substantial cause" of injury—that is, "a cause which is important and not less than any other cause." To date, the ITC lacks a coherent framework for selecting a menu of other factors that might be considered as causes of injury and for weighing the effects of these other factors against those of imports.

This paper sets forth a straightforward economic and statistical framework for use in Section 201 cases. This framework is based on the fact that if the domestic industry is competitive, injury can arise from one or more of three broad sources: adverse shifts in market demand, adverse shifts in domestic supply, or increased imports. We show how these sources of injury can be distinguished in theory and statistically evaluated in practice. As an illustrative example, we apply the framework to the case of the copper industry, which petitioned the ITC for relief in 1984. Although that industry has indeed suffered injury, we show that the "substantial cause" was not imports but instead increasing costs and decreasing demand.

Wages in the Federal and Private Sectors

Steven F. Venti
Working Paper No. 1641
June 1985
JEL No. 824

This study addresses the legal principle of "comparability" that ties wages in the federal sector to wages in the private sector. First it examines comparability by determining whether workers with similar characteristics receive the same wages in each sector. My estimates, based on data from the 1982 Current Population Survey, indicate that males may have a slight wage advantage in the federal sector but that female workers earn substantially more there than in the private sector. I then develop a choice-theoretic approach to the issue of comparability by applying a simple supply argument: a cost-minimizing federal employer would pay wages no higher than necessary to attract employees and eliminate queues for federal jobs. If the market pays equalizing differences for unique attributes of each sector, then this approach is not consistent with wage equality between the sectors. Finally, I estimate a model that jointly determines sectoral attachment and wage offers by maximum likelihood. The results suggest that eliminating queues will require substantial wage reductions for both male and female federal employees.

Estimating the Continuous-Time, Consumption-Based Asset Pricing Model

Sanford J. Grossman, Angelo Melino, and **Robert J. Shiller**
Working Paper No. 1643
June 1985
JEL Nos. 313, 132

The consumption-based asset pricing model predicts that excess yields are determined fairly simply by the market's degree of relative risk aversion and the pattern of covariance between per capita consumption growth and asset returns. Estimation and testing are complicated by the fact that the model's predictions relate to the instantaneous flow of consumption and point-in-time asset values, but only data on the integral or unit average of the consumption flow are available. In our paper, we show how to estimate the parameters of interest consistently from the available data by maximum likelihood. We estimate the market's degree of relative risk aversion and the instantaneous covariances of asset yields and consumption using six different data sets. We also test the model's overidentifying restrictions.

Employment, Hours, and Earnings in the Depression: An Analysis of Eight Manufacturing Industries

Ben S. Bernanke
Working Paper No. 1642
June 1985
JEL Nos. 824, 131

This paper employs monthly, industry-level data to study Depression-era labor markets. The underlying analytical framework is one in which, as in Lucas (1970), employers can vary total labor input not only by changing the number of workers but also by varying the length of the workweek. This framework appears to be particularly relevant to the 1930s, a period in which both employment and hours of work fluctuated sharply. With aggregate demand treated as exogenous, I show that an econometric model based on this framework, together with some additional elements (notably the workers' pay to permanent but not transitory variations in the cost of living, and the effects of New Deal legislation) can provide a good explanation of the behavior of the key time series. In particular, the empirical model explains the puzzle of increasing real wages during a period of high unemployment.

Is the Strong Dollar Sustainable?

Paul R. Krugman
Working Paper No. 1644
June 1985
JEL No. 431

This paper presents evidence that strongly suggests that the current strength of the dollar reflects myopic behavior on the part of international investors. That is, part of the dollar's strength can be viewed as a speculative bubble. At some point that bubble will burst, leading to a sharp fall in the dollar's value.

Essentially, given the modest real interest differentials between the United States and its trading partners, the dollar's strength amounts to an implicit market forecast that the dollar will very probably remain quite strong for an extended period. The paper shows that such sustained dollar strength would lead the United States to Latin American levels of debt relative to GNP, which is presumably not feasible. If something is done to bring the dollar down before this happens, then the argument that the current value of the dollar is unreasonable is even stronger.

The Efficiency Gains from Social Security Benefit-Tax Linkage

Alan J. Auerbach and **Laurence J. Kotlikoff**
Working Paper No. 1645
June 1985
JEL No. 321

This paper examines the efficiency gains from linking marginal Social Security benefits to marginal Social Security payroll taxes. In the United States, the current combined employer-employee OASI payroll tax rate is 10.4 percent. Recent estimates suggest that the average marginal income tax rate is roughly 27 percent [Barro and Sahasakul (1983)]. If marginal OASI payroll taxes provided no marginal Social Security benefits or were incorrectly perceived to provide no marginal benefits, then the effective marginal federal government taxation of labor supply would average roughly 38 percent. Since the efficiency costs of distortionary taxation rise by roughly the square of the tax rate, the Social Security payroll tax may be more than doubling the dead weight loss of taxation of labor income.

This paper suggests that there may be very significant efficiency gains from tightening the connection between marginal Social Security taxes paid and marginal Social Security benefits received. Indeed, the simulated efficiency gains are very large compared to those from the structural tax reform. Restructuring Social Security to greatly enhance marginal benefit-tax linkage may be infeasible, at least in the short run. However, simply providing annual Social Security reports, indicating how a worker's projected benefits are affected by his or her tax contributions, could provide substantial increases in economic efficiency. Such efficiency gains are potentially as large as increasing GNP by 1 percent this year and every year in the future.

Public Debt and U.S. Saving: A New Test of the Neutrality Hypothesis

Michael J. Boskin and **Laurence J. Kotlikoff**
Working Paper No. 1646
June 1985
JEL No. 320

The substantial postwar decline in the U.S. saving rate has added great impetus to the debate over whether public debt policy crowds out saving. Rather than attempting to reject specific saving models, empirical research on debt policy and saving has focused primarily on the impact of particular policy variables on saving. In this paper, we examine Barro's infinite-horizon, intergenerationally altruistic model. A distinguishing feature of this model is that aggregate consumption depends only on collective resources and not on the age distribution of resources.

To test this proposition, we specify the Barro model under uncertainty about earnings and rate of return, and demographic change. We test whether, given the level of consumption predicted by this model, variables measuring the age distribution of resources influence actual consumption. Data on the age distribution of resources are primarily obtained from the annual Current Population Surveys. Our results imply a rejection of the hypothesis that aggregate consumption is independent of the age distribution of resources. They therefore cast doubt on the contention that government debt policy does not affect consumption and saving.

Banking in General Equilibrium

Ben S. Bernanke and **Mark Gertler**
Working Paper No. 1647
June 1985
JEL Nos. 310, 131

This paper attempts to provide a step toward understanding the role of financial intermediaries (banks) in aggregate economic activity. First we develop a model of the intermediary sector that is highly simplified but rich enough to motivate several special features of banks. Of particular importance in our model is the assumption that banks are more efficient than the public in evaluating and auditing certain information-intensive loan projects. We also assume that banks have private information about their investments that motivates them to rely heavily on debt rather than equity finance and to need buffer stock capital.

We embed this intermediary sector in a general equilibrium framework that includes consumers and a nonbanking investment sector. Mainly because banks have superior access to some investments, factors affecting the size or efficiency of banking will also have an impact on the aggregate economy. Among the factors affecting intermediation are the adequacy of bank capital, the riskiness of bank investments, and the costs of bank monitoring. We also show that our model is potentially useful for understanding the macroeconomic effects of such phenomena as financial crises, disintermediation, banking regulation, and certain types of monetary policy.

Unemployment, Disequilibrium, and the Short-Run Phillips Curve: An Econometric Approach

Richard E. Quandt and **Harvey S. Rosen**
Working Paper No. 1648
June 1985
JEL Nos. 820, 210

This paper specifies a disequilibrium model for the aggregate labor market consisting of: demand and

supply functions for labor; an adjustment equation for wages and prices; a transactions equation; and an equation that relates measured unemployment to vacancies and to excess demand. The model has a more sophisticated treatment of dynamics than earlier disequilibrium models and uses measured unemployment as an endogenous variable. Two of the error terms are assumed to be serially correlated, and the coefficients are estimated by maximum likelihood. The parameter estimates and the goodness-of-fit are satisfactory, and the model's implications for the behavior of several important variables are sensible. Excess demand estimates computed in various ways are reasonable. We use the model to estimate the natural rate of unemployment and a short-run Phillips curve. Finally, we analyze the stability properties of the model by considering the eigenvalues of the system; they are found to have moduli less than one.

The Effect of Unionism on Productivity in Privately and Publicly Owned Hospitals and Nursing Homes

Steven G. Allen
Working Paper No. 1649
June 1985

This paper examines the effect of unions on productivity in a sample of privately and publicly owned hospitals and nursing homes. I hope to determine whether public ownership influences union behavior. My results show that the productivity of union contractors is much greater in private than in public projects. Within the sample of private projects, the estimates of the union–nonunion productivity difference are generally positive but very imprecise.

Estimates of the Value of Patent Rights in European Countries during the Post-1950 Period

Mark A. Schankerman and **Ariel Pakes**
Working Paper No. 1650
June 1985
JEL Nos. 620, 226, 225

This paper examines the distribution of the values of patent rights in the United Kingdom, France, and Germany during the post-1950 period. We infer these values from the way individuals respond to paying renewal fees on their patents. Combining a simple economic model of renewal decisions, data on the proportion of patents renewed at alternative ages, and the renewal fee schedules, we produce estimates of the distribution (and the total) value of patent rights in these countries. The data indicate that there have been changes in the distribution of value, and we follow these changes over the period. Particularly interesting are: (1) the total value of patent rights, and the relationship between changes in that value and changes in the quantity of patents; (2) the skew in the distribution of patent values; and (3) the rate of obsolescence on the returns to patents.

Country Risk, Foreign Borrowing, and the Social Discount Rate in an Open Developing Economy

Sebastian Edwards
Working Paper No. 1651
June 1985
JEL Nos. 430, 440, 320

Most discussions on the social rate of discount have assumed that the economy under consideration is isolated from the rest of the world and that there are no capital movements. This paper explicitly analyzes the determination of the social rate of discount in a small, open developing economy. I show that under general conditions, the discount rate will be a weighted average of the marginal return to capital in the private sector (ρ), the rate of time preference (τ), and the marginal cost of foreign indebtedness (π). I also show that unless the country faces an upward-sloping supply curve for foreign funds, the weights of ρ and τ will be zero. Finally, I show that if the country in question faces a foreign borrowing constraint imposed from abroad, the social rate of discount becomes equal to a weighted average of the domestic marginal return to capital and the rate of time preferences. I then use data for a group of less developed countries (LDCs) to show that financial markets have indeed attached a default country risk premium to LDCs. This provides some evidence in favor of the hypothesis that developing countries face an upward-sloping supply curve of foreign funds, and that, in general, the social rate of discount should be a weighted average of ρ, τ, and π. Finally, I use numerical examples to show that ignoring the open economy aspects can result in a substantial overstatement of the social rate of discount.

Union Maids: Unions and the Female Work Force

Richard B. Freeman and **Jonathan S. Leonard**
Working Paper No. 1652
June 1985

How have women fared in unions in recent years? The major findings of this paper are that unions have been more beneficial for women in the public sector than in the private sector and that unionism among women is primarily a public sector, white collar phenomenon that is not true for males. According to our analysis: (1) Women have come to be an increasingly large proportion of the unionized work force; their numbers are significant in the one area in which unions have recently succeeded—the public sector. (2) In the public sector and in white collar occupations in which women unionists are concentrated, unions raise women's wages more than they raise the wages of men. (3) In the private sector, unions have essentially the same effect on women as men in terms of wages, turnover, employment, and so forth; unions do not deter the efforts of Affirmative Action programs to raise female employment. (4) Comparable worth presents a rare confluence of interests of unions in search of members, particularly in the public sector, and women in search of higher wages; it will likely continue to be used by both, especially within the confines of collective bargaining.

How Do Public Sector Wages and Employment Respond to Economic Conditions?

Richard B. Freeman
Working Paper No. 1653
June 1985

This paper examines the changes over time in public sector wages and employment relative to private sector wages and employment. I use data from surveys of establishments and individuals and find that: The pay of public sector workers relative to private sector workers varies greatly over time. Public sector pay is flexible, and the relative differences between public and private pay are caused as much by fluctuations in public pay as by fluctuations in private pay.

The relatively highly paid public sector worker of the early 1970s has lost much of his or her advantage over otherwise comparable private sector workers within the span of a decade. This has seriously dented if not destroyed the picture of the overpaid public employee that developed in the early 1970s. Blacks and women are the public sector workers who tend to be most highly paid relative to private sector workers. This suggests that the public sector discriminates less than the private sector.

Differentials in public and private sector pay vary greatly depending on the nature of comparisons: Current Population Survey comparisons of individuals with similar human capital show that federal employees are higher paid than private employees; Bureau of Labor Statistics surveys of wage rates in particular occupations show federal workers to be paid lower wages than private sector employees.

Finally, public sector employment follows a very different pattern of change than private sector employment. It has smaller annual variation and moves countercyclically rather than cyclically. In terms of demographic composition, the public sector employs relatively more blacks and women than the private sector does.

Time to Build, Option Value, and Investment Decisions

Saman Majd and **Robert S. Pindyck**
Working Paper No. 1654
June 1985
JEL No. 522

Many investment projects have the following characteristics: spending decisions and cash outlays occur sequentially over time; there is a maximum rate at which outlays and construction can proceed—it takes "time to build"; and, the project yields no cash return until it is actually completed. Furthermore, the pattern of investment outlays is usually flexible and can be adjusted as new information arrives. For such projects, traditional discounted cash flow criteria, which treat the spending pattern as fixed, are inadequate as guides for project evaluation. This paper develops an explicit model of investment projects with these characteristics and uses option pricing methods to derive optimal decision rules for investment outlays over the entire construction program. We use numerical solutions to demonstrate how time to build, opportunity cost, and uncertainty interact in affecting the investment decision. We show that, with moderate levels of uncertainty over the future value of the completed project, a simple net present value rule could lead to gross overinvestment. Also, we show how the contingent nature of the investment program magnifies the depressive effect of increased uncertainty on investment spending.

The Indexation of Interest, Depreciation, and Capital Gains: A Model of Investment Incentives

Don Fullerton
Working Paper No. 1655
June 1985
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Despite much recent interest in a consumption tax, the Treasury's November 1984 proposal has the carefully coordinated features of a more comprehensive income tax, including the indexation of interest, depreciation, and capital gains. The May 1985 White House proposal would also retain some of these indexing provisions. This paper looks at the incentives under alternative tax regimes to make marginal investments in the corporate sector, noncorporate sector, and in owner-occupied housing. It finds that the current system is characterized by effective tax rates that increase with inflation for some assets and decrease with inflation for other assets. Overall rates fall with inflation, and the corporate tax is completely offset by credits, allowances, and deductions. Under the Treasury or White House plans, the corporate tax reemerges, effective tax rates are considerably more uniform, and the interference of inflation is virtually eliminated.

Who Escapes? The Relation of Churchgoing and Other Background Factors to the Socioeconomic Performance of Black Male Youths from Inner-City Poverty Tracts

Richard B. Freeman
Working Paper No. 1656
June 1985

Using data from the NBER survey of inner-city youth and the National Longitudinal Survey of young men, this paper examines the effect of churchgoing and other aspects of the background of youth on their allocation of time, their incidence of socially deviant behavior, and their labor force behavior.

Churchgoing is found to be associated with substantial differences in the behavior of youths, and thus in their chances to "escape" from inner-city poverty. It affects allocation of time, school attendance, work, and the frequency of socially deviant activity.

The diverse background factors examined in this study have different effects. This suggests true causality. For example, the proportion of a youth's family working has positive effects on labor market activity but not on other activities.

In addition to churchgoing, the background factors that most influence "who escapes" are whether other members of the family work and whether the family is on welfare.

Finally, the allocation of time and activities by youth is significantly influenced by market opportunities (or perceptions thereof). Those youths who believe it is easy to find a job are more likely to engage in socially productive activities than others. Youths who see many opportunities to make money illegally are less likely to engage in socially productive activities than are other youths.

Economic Effects of Municipal Government Institutions

Jeffrey S. Zax
Working Paper No. 1657
July 1985

This paper analyzes employment and compensation practices among alternative institutions of municipal government. I find that institutional variations have significant and predictable effects on outcomes in municipal labor markets. For example, municipal institutions in which a single official is responsible for office performance provide incentives for the official to emphasize efficiency in the production of services. On the other hand, institutions in which responsibility is shared provide officials with incentives to emphasize the allocation of resources to their particular constituencies, which may include many municipal employees.

Independently, city managers and mayors chosen through direct election reduce levels of employment and increase employee compensation. Managers offer compensation packages that emphasize nonwage components. In cities that have both a mayor and a manager, competition between the two nullifies reductions in employment and exacerbates increases in compensation. In addition, employment increases with the age of the manager's office.

Members of city councils chosen through at-large or nonpartisan elections increase levels of both employment and compensation. Compensation packages under these types of governments emphasize current components. With both reforms, increases in employment and compensation are compounded.

Optimal Dynamic R and D Programs

Gene M. Grossman and **Carl Shapiro**
Working Paper No. 1658
July 1985
JEL Nos. 621, 022

We study the optimal pattern of outlays for a single firm pursuing an R and D program over time. In the

deterministic case, both the amount of progress required to complete the project and the relationship between outlays and progress are known. In this case, it is optimal to increase effort over time as the project nears completion.

Relaxing the first of these two assumptions, we find in general a simple, positive relationship between the optimal expenditure rate at any point in time and the (expected) value at the time of the research program. We also show that, for a given level of expected difficulty, a riskier project is always preferred to a safe project. Relaxing the second assumption, we find again that research outlays increase as further progress is made.

Special Exchange Rates for Capital Account Transactions

Rudiger Dornbusch
Working Paper No. 1659
July 1985

The exchange rate that is consistent with high employment and a balanced current account is rarely also consistent with asset market equilibrium at interest rates desired by policymakers. Whenever rates are freely determined, asset markets prevail; the results may be hard to live with, or at least harder than would be the case if special exchange rates and capital controls were used to isolate home assets markets from the world capital market. This paper investigates the motive for choosing capital controls and special exchange rates, the principal forms of each, and some of the experiences with them. In particular, I consider three institutional arrangements: dual exchange rates separating current and capital account transactions; black or parallel markets for foreign exchange; and exchange rate guarantees, dollar deposits, and dollar-linked domestic debt.

Predation through Regulation: The Wage and Profit Impacts of OSHA and EPA

Ann P. Bartel and **Lacy Glenn Thomas**
Working Paper No. 1660
July 1985
JEL No. 822

It is important to study the indirect, as well as the direct, effects of OSHA and EPA regulations—for example, the competitive advantages that arise from asymmetrical distributions of regulatory impact on different types of firms. This paper argues that if the competitive advantage gained through such indirect effects is sufficiently large, it can more than offset any direct costs. The result will be a net benefit for the regulated firm and its workers.

Indirect effects of OSHA and EPA regulations arise in two ways: First, there are compliance asymmetries, so that one firm may suffer a greater cost burden than another, even when regulations are evenly enforced. Second, there is enforcement asymmetry; that is, regulations are more vigorously enforced against certain firms than others. Earlier research shows that these asymmetries do exist and are based on firm size, unionization, and regional location.

This paper shows empirically that the indirect effects produced by these asymmetries mitigate the direct costs of regulation for many firms. Specifically, we find that large, unionized firms in the Frostbelt are gaining wealth at the expense of small, nonunionized firms in the Sunbelt.

The Physical State of the British Working Class, 1870-1914: Evidence from Army Recruits

Roderick Floud, Annabel Gregory, and **Kenneth W. Wachter**
Working Paper No. 1661
July 1985
JEL Nos. 800, 900

It is typically easier to discover why people died than to learn how healthy they were when they were alive. However, in both Europe and North America, there is much evidence about the health of young males that exists in records from medical examinations of recruits to the armed forces. This paper discusses the possibility of generalizing from one such source, that of British volunteer recruits, to the health of the male working class as a whole. We conclude that the source is not seriously biased. After some statistical correction, the data suggest a gradual improvement in the nutritional status, measured by average height, of the British working class. This finding contradicts much contemporary opinion that the British were physically deteriorating in the late nineteenth century.

Dimensions and Determinants of Early Childhood Health and Mortality among American Slaves

Richard H. Steckel
Working Paper No. 1662
July 1985
JEL No. 041

This paper uses the birth and death lists of plantations to investigate the causes of low birth weight and poor health among young slave children. It finds that deprivation began in the fetal period. The slaves' work routine was arduous overall and particularly intense during planting, hoeing, and harvesting. The demands of this work, combined with seasonal fluctuations in disease and in the quality of diet, imply that few newborns escaped stress during intrauterine growth. The starchy food supplements that were given soon after birth, and the poor sanitation surrounding feeding, also provided a poor environment for growth during the first year of life.

Monetary Dynamics with Proportional Transaction Costs and Fixed Payment Periods

Sanford J. Grossman
Working Paper No. 1663
July 1985
JEL Nos. 021, 310

This paper presents a general equilibrium model of an economy in which people hold money rather than bonds in order to economize on transaction costs. In any such model it is not optimal for individuals to instantaneously adjust their money holdings when new information arrives. The (endogenous) delayed response to new information causes a response to a new monetary policy that is quite different from what standard flexible price models of monetary equilibrium predict. Although all goods markets clear instantaneously, the monetary transaction cost causes nominal variables to respond with a delay to a change in monetary policy. This in turn causes real variables to respond to the new monetary policy.

The two classes of monetary policies analyzed here are price level policies and interest rate policies. Price level policies keep the nominal rate constant in general equilibrium but change the long-run price level. The money supply must rise gradually to its new steady level if the price level is to be raised without causing nominal interest rates to fall.

When I analyze interest rate policies, I find that aggregate money demand at time t depends on the path of interest rates, not just on the instantaneous interest rate. This is because aggregate money holding at time t is composed of the money holdings of various consumers, who have different but overlapping holding periods. Staggering money holding periods is a necessary condition for general equilibrium. General equilibrium also requires that some consumers must be adding to their cash when others are depleting their cash by spending.

My results show that high-frequency movements of the interest rate cause a much smaller change in money demand than do low-frequency movements, since it is the *integral* of the interest rate over a holding period that determines money demand. Further, at high frequencies, the rate of inflation is not the difference between the nominal interest rate and the rate of time preference.

Capital Accumulation and Uncertain Lifetimes with Adverse Selection

Andrew B. Abel
Working Paper No. 1664
July 1985
JEL Nos. 111, 915

This paper examines the implications of adverse selection for the pricing of private annuities and its consequent effects on consumption and bequest behavior. With privately known, heterogeneous mortality probabilities, adverse selection causes the rate of return on private annuities to be less than the actuarially fair rate (based on population average mortality). However, a fully funded Social Security system with compulsory participation can offer an implied rate of return equal to the actuarially fair rate (based on population average mortality). Thus, since Social Security offers a higher rate of return than do private annuities, consumers cannot completely offset the effects of Social Security by acting in the private annuity market. Using an overlapping generations model with uncertain lifetimes, I demonstrate that the introduction of actuarially fair Social Security reduces the steady-state rate of return on annuities and raises the steady-state levels of average bequests and average consumption of the young. The steady-state national capital stock rises or falls according to the strength of the bequest motive.

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