

Chicago Fed Letter

2005 Conference on Price Stability: A summary

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On November 3 and 4, 2005, the Federal Reserve Bank of Chicago's Inflation Research Center hosted the "2005 Conference on Price Stability." This conference brought together leading academic economists and policymakers to discuss the latest research on the determinants of inflation and their implications for questions facing monetary policymakers.

Materials presented at the conference are available at www.chicagofed.org/news_and_conferences/conferences_and_events/2005_inflation.cfm.

Six research papers were presented and discussed during the conference. In addition, two panels addressed key questions facing policymakers: "How low should inflation be?" and "Does fiscal policy threaten price stability?" In this *Chicago Fed Letter*, we summarize the proceedings of the conference.¹ We begin with the sessions devoted to research papers and then discuss the policy panels.

In "Shocks and government beliefs: The rise and fall of American inflation," Tom Sargent, New York University; Noah Williams, Princeton University; and Tao Zha, Federal Reserve Bank of Atlanta, tried to understand the pattern of inflation in the U.S. after World War II (low in the 1950s and early 1960s, high in the late 1960s and 1970s, low again since the 1980s) by asking the question: What was the Fed thinking? Sargent, Williams, and Zha suppose that the Fed does not know how the economy works, but bases its inflation policy on *regressions* (a technique of fitting a simple equation to real data points) of unemployment on lagged inflation and unemployment. When running these regressions, the Fed thinks that the regression coefficients might be changing over time in certain ways. Furthermore, the Fed does not perfectly control inflation because inflation is subject to random shocks. It is the interaction between the Fed's changing beliefs and the inflation shocks that explains the rise

and fall of inflation. The authors test their story by estimating their model on U.S. data. Specifically, they estimate the parameters of the Fed's model as well as the parameters of the economy, and they find their model performs well relative to purely statistical benchmark models of inflation.

In his comments, Christopher Sims, Princeton University, expressed skepticism. The estimated parameters of the Fed's model would ascribe to the Fed implausible beliefs about the economy and the costs of stabilizing inflation, particularly in the critical period of 1973–74. The reason, he argued, is that the Fed is allowed to mistrust the data too much; that is, to think that its model of the economy is unstable. Sims' preferred story is one in which the magnitude of shocks to the economy changed over time, and he argued that such a model performs just as well compared with the benchmarks of Sargent–Williams–Zha.

In "Redistribution of nominal wealth and the welfare cost of inflation," Matthias Doepke, University of California, Los Angeles, and Martin Schneider, Federal Reserve Bank of Minneapolis, explored the role of unanticipated inflation in redistributing wealth from borrowers to lenders. Since most financial contracts are not indexed to inflation, an unexpected rise in the price level erodes the real value of debt, benefiting borrowers at

the expense of lenders. They ask the question, “If we experienced an inflationary episode today that would be comparable to the one that happened in the U.S. in the 1970s, who would gain, who would lose, and by how much?” The authors find that richer and older households, which tend to be net lenders, lose between 1% and 3% of their total lifetime consumption. Middle-class and middle-aged households, which tend to be net borrowers, gain up to 5% of their total lifetime consumption. Poor young households also gain slightly—this is not because they borrow large sums but because the redistribution of wealth leads to a net fall in labor supply and increases real wages. Although some of the gain of young and

net worth (relative to total income) fell in the 1970s and rose afterward; stock holdings by households moved similarly; real estate holdings moved in the opposite direction; and after the 1970s, households lent more to each other but less to other sectors of the economy. Piazzesi and Schneider argued that demographics can explain the movements in net worth, but inflation expectations are crucial to understanding the behavior of the components, both in terms of quantities and prices.

In his comments, Per Krusell, Princeton University, pointed out that the most important factor in the portfolio changes is the expectation of low stock returns

overpriced station to another is very low. Knowing this, gasoline retailers adjust their prices almost continuously to match their rivals’. Konieczny and Skrzypacz formalize this story within a model where each price change has an associated cost, and they test it using observations of retailers’ prices from Poland and the United States. They conclude that the differences in search intensity explain a substantial portion of the differences across goods in the frequency of price adjustment.

John Leahy, New York University, clarified how Konieczny and Skrzypacz built on previous theories of product–market search, and cast a skeptical light on some of their empirical conclusions. He questioned whether some of the empirical findings might not be caused by factors omitted from the model. For example, the authors’ model has no formal role for differences in producers’ costs of production. Such cost heterogeneity increases the dispersion of prices, thereby increasing the incentive to search and the frequency of price adjustment. Other omitted factors that could influence both search and pricing are the product’s perishability, the frequency of purchases, and the share of income spent on a particular purchase.

Marco Del Negro, Federal Reserve Bank of Atlanta, presented “On the fit and forecasting performance of new-Keynesian models,” joint work with Frank Schorfheide, University of Pennsylvania; Frank Smets, European Central Bank; and Raf Wouters, National Bank of Belgium. He showed that a superior macroeconomic forecasting performance can be attained by combining some recent general equilibrium models—which incorporate many explicit assumptions about the economy’s structure—with purely statistical models based on vector autoregressions. The technique also allows the researcher to check which aspects of the data seem most at odds with the implications of the general equilibrium models that are used for policy evaluation.

In his discussion of this paper, James Hamilton, University of California, San Diego, argued that the relative weight given to models and statistical representations of the data should vary in favor of the latter as more and more data become available. Accordingly, more sophisticated

One policy panel discussed what inflation rates monetary policy ought to aim to deliver; a second panel explored the connection between fiscal policy and inflation in advanced economies.

low-income households, as well as middle-aged and middle-income households, involves redistribution from older, wealthier households, a fair amount comes at the expense of foreigners, who are major holders of nominal debt in the U.S.

In discussing the paper, John Cochrane, University of Chicago, said he was initially surprised that the effects are so large and commented on which feature of the model might be responsible for these results. Cochrane noted two caveats. First, one of the main beneficiaries of unanticipated inflation today would be the government (given its large outstanding debt), and these benefits might be squandered if the government failed to put its gains to good use. Second, foreigners who are hurt by inflation may be reluctant to hold U.S. debt in the future, and it is important to balance this possibility against the gains from this one-time profit at their expense.

In “Inflation and the price of real assets,” Monika Piazzesi, University of Chicago, and Martin Schneider, Federal Reserve Bank of Minneapolis, studied the impact of inflation on households’ allocation of wealth across stocks, houses, and other nominal assets over the past 50 years. They are interested in explaining the following features of the data: Household

in the 1970s. Although some have argued that they were linked to inflation, the link is not explicit in Piazzesi and Schneider’s analysis. One of the key contributions of the paper, in his view, was showing the importance of housing for understanding other asset markets.

Jerzy Konieczny, Wilfrid Laurier University, presented “Search, costly price adjustment, and the frequency of price changes—Theory and evidence,” which is joint work with Andrzej Skrzypacz, Stanford University. The paper addresses the remarkable similarity across countries in the relative frequency of price adjustments across goods: Service prices adjust very infrequently, the prices of processed manufactured goods adjust somewhat more, and the prices of relatively unprocessed goods, such as gasoline and tomatoes, change almost daily. One hypothesis is that this ordering reflects how intensively customers search for the lowest available price. For instance, the likelihood of finding a barber well matched to your style at a better price is low, so your demand for haircuts responds very little to the barber’s price. Knowing this, the barber delays changing his price to keep up with inflation. In contrast, all gasoline is the same, so the cost of switching from a temporarily

structures that better capture the evolution of the economy will be necessary to keep the general equilibrium models relevant for forecasting purposes.

The last research paper of the conference was “Trade costs, pricing to market, and international relative prices” by Andrew Atkeson and Ariel Burstein, both of the University of California, Los Angeles. The paper is motivated by two facts. The first is that manufacturing terms of trade (defined as the ratio of the price index for imported goods to the price index for exported goods) are significantly less volatile than the international relative price of manufactured goods (the ratio of the Producer Price Index for manufactured goods to a trade-weighted average of the manufactured goods price indexes for the country’s trading partners). This represents evidence of pricing to market, the practice by producers of charging different prices domestically and abroad. The second fact is that fluctuations in real exchange rates for tradeable goods (the ratio of the component of the Consumer Price Index, CPI, covering tradable goods in one country to the comparable component of the CPI in a second country, with both indexes measured in a common currency) are nearly as large as fluctuations in overall real exchange rates (the ratio of the two overall CPIs in the countries, again measured in a common currency).

The purpose of the paper is to develop a theory that can explain these empirical facts. The paper constructs a model of two symmetric countries that produce and trade a large number of goods subject to frictions in the international goods market. The structure of production in the model resembles the kind of aggregation used in constructing price indexes. Goods are imperfect substitutes within a sector, but goods within a sector are more substitutable than goods across sectors. Production costs vary both across sectors and across firms within a sector. In addition to the production costs, there are costs of international trade. Monopoly power and the assumption that goods within a sector are more substitutable than goods across sectors break the link between prices and costs in the model, allowing for the possibility that

firms will not pass through changes in cost one-for-one into prices. This approach also creates the possibility of pricing to market. Atkeson and Burstein find that a plausibly parameterized version of the model can reproduce the two facts about international relative prices described previously.

There is a general consensus that monetary policy ought to be aimed at delivering low and stable inflation. Yet there is no consensus on what inflation rate or rates are optimal policy outcomes. This issue was discussed by Martin Eichenbaum, Northwestern University; Richard Clarida, Columbia University; and V. V. Chari, University of Minnesota, in the first policy forum, “How low should inflation be?” The panel opened by reviewing the costs of inflation: foregone interest on nominal balances, shoe leather costs associated with holding money,² allocative distortions due to the nominal structure of the tax code, and the heightened uncertainty over the future price level that is associated with high and variable inflation. As a result of these costs, it may be optimal for policy to aim for zero inflation or even modest deflation (the so-called Friedman rule). Nonetheless, the panelists did not suggest that deflation was an optimal prescription for the U.S. economy.

Eichenbaum argued that the costs of inflation are likely to be small in a low-inflation economy and that there is little social value in reducing inflation substantially below 1% to 2%. He also noted a potential benefit from unexpectedly higher inflation—because the U.S. is a net debtor internationally, unexpected inflation would transfer wealth to the U.S. from the rest of the world. He warned, however, that the reputational costs of such an implicit default far outweigh the benefits.

Clarida noted that measurement error and Phelps’s optimal tax³ suggest that the optimal inflation rate is positive. He did not suggest that these alone necessarily justified a positive inflation target. Rather, the 1% to 3% inflation rates that have been achieved by most central banks appear to satisfy the optimality laid out in Alan Greenspan’s definition of price stability being an environment in which “inflation ... does not materially enter

into the decisions of households and firms.”⁴ Furthermore, he cited data suggesting that at such inflation rates, relative prices seemed to move enough to allocate resources, yet the variability of inflation remained low.

Finally, Chari discussed how the structure of the monetary policy decision-making process influences the achievement of low inflation. For example, game theoretic strategies become important when policy is decided by a committee whose members may have differing preferences over inflation and when current decision-makers cannot bind the actions of future policymakers. Accordingly, it is important to have institutions that give rise to robust policy rules that ensure low inflation.

The basic proposition that governments with large deficits may resort to printing money to pay for spending suggests there is a connection between fiscal policy and price stability. Given the large deficits that have been run in recent years by the federal government, it is natural to be concerned that price stability is at risk. Still, there remains much controversy among academic economists and policymakers regarding the connection between fiscal policy and inflation in advanced economies, such as that of

Michael H. Moskow, *President*; Charles L. Evans, *Senior Vice President and Director of Research*; Douglas Evanoff, *Vice President, financial studies*; Jonas Fisher, *Economic Advisor and Team Leader, macroeconomic policy research*; Richard Porter, *Vice President, payment studies*; Daniel Sullivan, *Vice President, microeconomic policy research*; William Testa, *Vice President, regional programs and Economics Editor*; Helen O’D. Koshy, Kathryn Moran, and Han Y. Choi, *Editors*; Rita Molloy and Julia Baker, *Production Editors*.

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the U.S. These issues were discussed by Alice Rivlin, Brookings Institution; Marco Bassetto, Federal Reserve Bank of Chicago; and Thomas Sargent, New York University, in the second policy forum, “Does fiscal policy threaten price stability?”

Rivlin focused on the fiscal challenges facing the U.S. She noted that more than about 8% of U.S. gross domestic product (GDP) is currently devoted to funding Social Security, Medicare, and Medicaid. But increased longevity, the baby boom retirement wave, and rapidly increasing medical costs are likely to drive spending on these programs much higher. She projected that, absent changes in the structure and/or financing of these programs, they will account for over 25% of GDP by 2050. The current trends imply growing fiscal deficits. Currently, our deficits are financed largely through massive capital flows from abroad. But this only postpones the inevitable adjustments, since the accumulation of U.S. foreign debt will have to be serviced, and foreign borrowing makes us vulnerable to changing policies of foreign investors. Rivlin noted that the bipartisan cooperation it would take to implement the necessary reforms was not likely in the current political environment.

But do these sorts of fiscal deficits threaten price stability? Bassetto noted that, as a matter of theory, high deficits can increase incentives of a central bank

to raise revenues via *seigniorage* (profit from the difference between the cost of printing money and its face value). Furthermore, high deficits can provide incentives to devalue the stock of nominal debt. Bassetto offered, as an illustration, developments in Italy from the autumn of 1992 to mid-1995. During this period, market interest rates were extremely high and extremely volatile, and appeared to be largely detached from monetary policy. When it became likely that Italy would join the European Monetary Union (with the associated likelihood of fiscal discipline), market interest rates fell and became much more stable. Bassetto took this as evidence that profligate and uncertain fiscal policy can threaten price stability. Having said this, he noted that the fiscal deficit currently experienced in the U.S. is still rather small, both by historical standards and relative to other OECD (Organization for Economic Cooperation and Development) countries. Deficits of this magnitude are unlikely to trigger the sorts of effects illustrated by Italian fiscal policy in the early 1990s. However, Bassetto concluded by reiterating Rivlin’s point that in the absence of entitlement reform, the U.S. debt/GDP ratio could grow large enough to induce inflation instability.

Finally, Sargent took a step back and considered how fiscal policy is traditionally treated in economic theory. Economic theory typically defines a policy as a state-contingent rule that maps economic

conditions (the “state”) into policy actions. Furthermore, standard economic models assume that while there may be uncertainty about future policy actions (because the future state is uncertain), all agents in the economy understand the rule itself. Sargent questioned the empirical relevance of this assumption. Specifically, he asked whether the U.S. government has historically set policy according to clearly defined policy rules and offered some examples of policy ambiguity from U.S. history.

The Chicago Fed’s Inflation Research Center is hosting another conference, titled “Firms’ Price Choices: Exchanging Insights between Industrial Organization, Marketing Science, and Macroeconomics,” on December 15, 2006. The conference’s goal is to foster mutually beneficial exchange between economists from these three fields studying firms’ pricing decisions.

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² To minimize the negative effect of inflation on the purchasing power of money, people have to spend more time and effort protecting the value of their nominal assets—wearing out their shoes on the way back and forth to the bank.

³ See Edmund S. Phelps, 1973, “Inflation in the theory of public finance,” *Scandinavian Journal of Economics*, Vol. 75, No. 1, March, pp. 67–82.

⁴ See www.federalreserve.gov/boarddocs/speeches/2001/20011011/default.htm.