

Recent Developments in Monetary Policy, Fiscal Policy, and  
Financial System Design: A Conference to Honor Ben  
Friedman

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This volume brings together the papers and discussant comments presented at a conference in honor of Benjamin Friedman hosted by the Federal Reserve Bank of Boston, April 22–23, 2011. The authors of the papers and the distinguished group of discussants who participated in the conference were drawn from the very deep pool of students and co-authors whom Ben has mentored and inspired over his four decades at Harvard. The range of topics spanned by the papers, discussions, and policymaker panel that concluded the conference reflects the impressive scope of Ben’s own research and its considerable impact on monetary economics, public economics, and financial economics, to name just three fields where Ben and his students have made important and durable contributions as scholars and, in many cases, as policymakers themselves. The papers also embody in many ways Ben’s distinctive style of formulating economic research questions. Again and again, readers will discern in these papers an attention to policy relevance, practical application, and an effort to identify implications that are robust across narrow methodological boundaries. Ben’s work has taught us that to understand the world as it is and not as some would wish it to be, we must accept that markets are incomplete, habitats are preferred, and expectations may not always be well approximated by simple linear functions that would only be “rational” under extreme information assumptions. Ben’s students are indebted to him for so much, not least for providing us with the deep and lasting foundations to conduct research in monetary economics, to contribute to economic policy, and for teaching us that good economics is more about the questions we seek to answer and not so much about the paradigms we seek to promote.

In their contribution, “Tactics and Strategy in Monetary Policy: Benjamin Friedman’s Thinking and the Swiss National Bank,”

Swiss National Bank (SNB) Vice Chairman Thomas Jordan and Stefan Gerlach review the tactics and strategy of monetary policy in Switzerland since the 1970s, focusing in particular on three important episodes and using a selection of Ben's papers to organize the discussion. The paper points out the many cases in which Ben's and the SNB's thinking converged, but also the cases where they diverged, especially with regards to the SNB's experience with monetary targeting in 1975–99. A focus of the paper is the strategy adopted by the SNB in 2000, in which an inflation forecast plays a crucial role. While the SNB views this framework as distinctly different from inflation targeting, the paper asks whether the SNB's strategy reflects some of Ben's concerns about inflation targeting and his arguments in favor of a dual mandate for monetary policy. The paper also reviews the SNB's experiences during the financial crisis that started in August 2007 and compares and contrasts them with the policy conclusion Ben draws from these events.

In his discussion, Riksbank Deputy Governor Lars Svensson reminds us that Ben has often defended the Federal Reserve's dual mandate of price stability and maximum sustainable employment, but he makes the point that he himself does not see any fundamental differences between flexible inflation targeting and the dual mandate. For instance, both are consistent with a standard quadratic loss function. The publication of Federal Open Market Committee (FOMC) longer-run projections for inflation and the unemployment rate makes it possible to identify the mandate-consistent inflation rate, the inflation rate that the FOMC considers to be consistent with its mandate and the analogue of an inflation target, and the FOMC's estimate of the longer-run sustainable unemployment rate. Svensson goes on further to argue that there is no fundamental difference between the dual mandate of the Federal Reserve and the hierarchical mandate of other inflation-targeting central banks such as the Riksbank (which is consistent with the statutes of the European System of Central Banks). The Riksbank's mandate is considered hierarchical because price stability is its primary objective. But here it is important to distinguish between first and second moments, that is, means and variances. The hierarchical mandate applies to the *first* moments, the unconditional means. Regarding the unconditional mean and the average level of inflation, there is an explicit inflation target (an inflation rate of 2 percent per year) that is chosen

and enforced by the Riksbank. As with most inflation-targeting central banks, there is no explicit target level for resource utilization that is chosen by the Riksbank. Instead, what is a sustainable level of resource utilization is determined by the properties of the economy and structural policies and is *estimated* by the Riksbank. Thus, the Riksbank has an independently chosen target for inflation but no independently chosen target for output, employment, unemployment, or any other resource-utilization-related variable. For the *second* moments, the variability of inflation and resource utilization, the Riksbank has a dual mandate in that it aims to stabilize both inflation around the chosen target and resource utilization around the estimated normal level. Looked at this way, Svensson argues, there is no fundamental difference between a hierarchical mandate and a dual mandate. Indeed, in a discussion of dual and hierarchical mandates, Ben himself has noted that a hierarchical instruction to the central bank is, really, a kind of dual mandate as well, the difference being that it is an unspoken one. Thus, Svensson argues, the problem is whether the real-economy objectives are transparent or not. He concludes that Ben is clearly not a skeptic of flexible inflation targeting, as long as the real-economy objectives are sufficiently transparent.

Ben Friedman's views on inflation targeting are well known, and are summarized well by a quote in the second paper in this volume, "How Flexible Can Inflation Targeting Be and Still Work?" by Ken Kuttner and Adam Posen: "Depiction of inflation targeting as maximizing a utility function including both an inflation term AND a term in the output gap... That's what people like me had been doing for decades... the idea that inflation targeting was how one maximized an objective function in output and inflation is what led me to suggest that, like Moliere's Monsieur Jourdain, I must have been talking inflation targeting all along without realizing it." This quote reflects quite clearly Ben's aversion to the rigid "inflation nutter" version of inflation targeting, and highlights his preference for a framework that allows the central bank to maintain two foci. The next two papers consider the flexibility of inflation-targeting frameworks in the United States, the United Kingdom, and Canada.

Many authors have considered what might be the additional benefit to a country like the United States, which embraces a fairly flexible and informal version of inflation targeting, from adopting

an explicit inflation objective and more closely following a flexible inflation-targeting regime. More generally, it is of interest to central bankers whether adherence to an inflation-targeting regime might compel a central bank to be more aggressive in pursuing low inflation—presumably at the expense of higher volatility of employment and output—than a more flexible monetary policy regime. What exactly is the trade-off between reasonable (but flexible) adherence to inflation targeting and increased output volatility? In recent years, this question has taken on added importance, as some have criticized inflation-targeting central banks for inadequately responding to asset price bubbles. This criticism implies that greater flexibility in an inflation-targeting regime might be beneficial. These concerns motivate the central question in Posen and Kuttner’s paper: “How flexible can inflation targeting be and still work?”

Kuttner and Posen address this issue by comparing outcomes between the United Kingdom, which has adopted a formal inflation target and inflation-targeting regime, and the United States, which has not. They gauge the relative flexibility of the two regimes indirectly, by examining the speed of convergence of medium-run inflation forecasts to the central bank’s (implicit or explicit) target rate of inflation in the wake of a shock to the economy that moves inflation away from the target.

A key choice in studying the evolution of inflation expectations is which measure to employ. Kuttner and Posen discuss the pros and cons of financial market measures (pros: high frequency and real-time availability; cons: contamination by volatile term and liquidity premia) and survey expectations (pros: uncontaminated by premia; cons: lower frequency, no real-time availability). They use the financial market data to replicate previous studies’ results on the response of long-run expectations to economic news. The null hypothesis is that long-run expectations should be insensitive to short-run economic news, and in that sense well anchored. They find that while some tests develop statistically significant responses of long-run expectations to news, the responses are generally economically “inconsequential in economic terms.” They conclude that expectations by this measure are indeed well anchored in both the United States and the United Kingdom.

But what if such well-anchored expectations come at the expense of an excessively inflexible commitment to the inflation target,

evidenced by a rapid return of inflation to its target, in spite of disruption to employment and output? To examine this question, the authors utilize survey expectation data for four-quarter inflation forecasts at horizons of one to six quarters. They appeal to the intuition that forecasts made at the same date for neighboring horizons should be related by the rate at which inflation is expected to decay toward the inflation target. They find that (i) the estimates of the implied inflation goal correspond well to those announced and implied by the United Kingdom and United States, respectively, (ii) the United States and the United Kingdom exhibit very similar convergence rates, and (iii) the convergence rate is about 30 to 35 percent per quarter. Together, these results show that the United Kingdom has exhibited as much flexibility in returning inflation to its target as the United States. These results appear to be approximately invariant to whether inflation is above or below its target; there is some evidence that both central banks are *more* flexible (inflation returns more slowly to its target) in response to larger deviations from target.

Both countries should be happy with the outcome: the United Kingdom avoids being labeled an “inflation nutter,” and the United States is perceived as returning inflation to target about as aggressively as the explicit inflation-targeting United Kingdom.

In his discussant’s comments, Gauti Eggertsson largely agrees with the key results presented in the Kuttner and Posen paper, and suggests one simple explanation for the authors’ results is that both central banks *are* inflation targeters, more or less, and that both operate on approximately the same principles.

He notes another interesting feature of the data presented in Kuttner and Posen’s paper. During the crisis period, both actual and expected inflation in the United States ran noticeably below the long-term target of 2.5 percent, while in the United Kingdom, the average for expectations roughly equaled the 2 percent target. This suggests that real interest rates in the United States were higher than in the United Kingdom. Did the United Kingdom achieve better economic outcomes as a result? And were those outcomes attributable to the United Kingdom’s explicit inflation-targeting regime? These are questions, Eggertsson suggests, that we will be studying for some years to come.

Finally, Eggertsson notes that the key monetary policy conundrum during the crisis centered on the inability to reduce the nominal interest rate sufficiently to engender more negative real interest rates. A policy that credibly promised more inflation in the future might be effective in such a case, because by doing so it would lower (expected) real interest rates. Is it possible, Eggertsson asks, that the profession's emphasis on inflation targeting in recent years has biased central banks away from trying to temporarily create higher inflation, which is precisely the remedy that standard models would prescribe in these circumstances?

Canada has practiced the art of inflation targeting for longer than all countries but New Zealand, observing the twentieth anniversary of inflation targeting this year (2011). While Canada's exposure to the financial crisis has been considerably smaller than that of the United States, the United Kingdom, or the euro zone, the crisis has spurred just as vigorous a debate about the appropriate response of monetary policy to financial stability concerns. In his paper, "Inflation Targeting: A Canadian Perspective," Angelo Melino suggests that many Canadians view their avoidance of a financial meltdown as largely attributable to luck. As a consequence, this is an opportune time to consider how to strengthen Canada's financial institutions to better withstand future financial shocks.

In part, the extent to which central banks consider themselves to have a role in maintaining financial stability depends on their legislated role in bank supervision and regulation. While the Bank of Canada holds responsibility for key payments systems in Canada, it does not have regulatory or supervisory authority over banks and other credit providers. One key question, which is related to the appropriate degree of flexibility discussed in Kuttner and Posen's paper, is whether an inflation-targeting country such as Canada may underweight the importance of financial stability.

Melino suggests that it may be difficult to assign new goals to the central bank, because the central bank's overarching goal (to "maximize welfare") already encompasses concerns over financial stability. Many models suggest that a flexible inflation target does very well at maximizing the model's social welfare function. To the extent that other aspects of the economic environment—rules and institutions, for example—affect economic welfare, it is still the case that inflation targeting has not acted as an impediment to maximizing welfare.

The bank's primary policy instrument (the short-term risk-free interest rate) is probably best applied to achieving price stability, Melino avers.

Apart from concerns over how to respond to the recent financial crisis, Melino considers ways in which Canada's inflation-targeting regime might be improved. The relative merits of inflation targeting (IT) versus price-level-path targeting (PLPT), and the importance of the zero lower bound (ZLB) are considered. With respect to PLPT, Melino points out that the obvious advantage of PLPT over IT is that it removes uncertainty about the future path of the price level. Such uncertainty may well be costly to private agents in the economy.

Interestingly, the trajectory of the Canadian CPI since 1995 closely approximates the path that would obtain under PLPT with a 2 percent inflation goal. This outcome could be the result of interest rate smoothing that tends to produce overshooting in response to shocks—that is, as inflation increases, the Bank raises interest rates gradually, stemming the increase, and then lowers them gradually, which on average may allow inflation to fall a bit below its 2 percent goal in ensuing years. This above/below 2 percent inflation behavior will approximate the behavior of inflation under PLPT. Whether private agents do or should expect this near-PLPT behavior to persist into the future is difficult to say but important in determining whether such behavior will provide the purported benefits of PLPT.

With regard to the ZLB, recent experience has understandably renewed discussion of the constraints that the ZLB imposes on monetary policy. While the United States employed a wide array of alternative monetary policy tools during the crisis, some as substitutes for conventional monetary policy when the funds rate was pinned at the ZLB, Canada used only one: the "conditional commitment" to keep its policy rate low until June 2010. Despite this relatively fortuitous outcome, it remains worth considering whether alterations to standard IT might be beneficial. Melino suggests that the temporary adoption of PLPT during a crisis might help to raise inflation expectations, but it could be difficult to persuade the public that the Bank is committed to generating temporary inflation in the future. After years of trying to convince the public that it would take action to keep inflation from bubbling up, the Bank would in this case face a credibility problem that is exactly the opposite.

As for increasing the inflation target, Melino cautions against it. Most academic work suggests an optimal inflation rate that is either negative or very close to zero. Higher inflation is often associated with higher inflation variability and uncertainty. And while U.S. experience with alternative monetary policy tools is not terribly encouraging, Melino suggests that “improvements to microprudential and macroprudential regulation should lower the risk of hitting the zero lower bound.”

In sum, Melino concludes that the IT regime in Canada has served the country well. The details of its implementation may well change over time—perhaps by moving towards PLPT or by gradual reductions in the inflation goal, for example—but “the inertia that comes from success” suggests that any such changes, if they occur at all, are likely to occur gradually.

In his discussant’s comments, Charles Goodhart suggests that a key reason for Canada’s relative success during the crisis lies in its well-managed housing market—characterized by lower loan-to-value ratios, better housing insurance, and rather old-fashioned qualifying criteria. In addition, the smaller number of banks, together with no new entrants during the period leading up to the crisis, may have limited the introduction of “outrageous new types of policies,” such as Northern Rock’s “together” mortgage.

Goodhart is somewhat skeptical of Melino’s hypothesis that the appearance of price-level-path targeting in Canada is due to interest rate smoothing. His recent work raises the possibility that apparent interest rate smoothing is an artifact of the central bank acting based on forecasts that exhibit a systematic bias around turning points: They systematically underforecast during recoveries and overforecast during downturns. This property of the forecasts employed by central banks will impart serial correlation to the policy rate, even though no interest rate smoothing is going on. He suggests that another explanation is the good luck of approximately offsetting positive and negative shocks to the inflation rate, which would keep the price level approximately on a steady path.

Ben’s views on expectations in macroeconomic models are well documented. His early paper on “Optimal Expectations and the Extreme Information Assumptions of ‘Rational Expectations’ Macromodels” (*Journal of Monetary Economics* 5, 1979) makes it clear that he viewed the then-nascent trend towards rational

expectations in macroeconomics with some justified suspicion. The next paper aims to take seriously the limits that actual economic agents face in forming expectations, incorporating the actual forecasts made by private forecasters into standard inflation models.

A growing body of literature explores alternatives to rational expectations in macroeconomic modeling. One should not depart lightly from the rational expectations paradigm, as it brings with it a host of conveniences, including the ability to seamlessly solve, simulate, estimate, and analyze models with multi-period expectations from different expectations viewpoints. Some alternative expectations schema bring with them inherent limits in the flexibility with which expectations can be incorporated into models.

Jeff Fuhrer's paper, "The Role of Expectations in Inflation Dynamics," examines the role of expectations in standard inflation models, comparing the empirical success of survey measures of expectations with rational expectations. The limitations of survey expectations are well known: They are not always unbiased or efficient predictors of inflation; expectations are not available for all horizons of interest to the modeler; and endogenizing survey expectations is not nearly as straightforward as in the rational expectations case.

That said, survey expectations also have desirable features: They are the actual expectations of some economic agents; they do not have to be "solved out" like rational expectations, because unlike rational expectations, they are observable data; and finally, as Fuhrer's paper suggests, they are quite often of greater relevance to the determination of inflation than are the model-consistent rational expectations most commonly used in the literature.

Fuhrer's paper develops several principal results:

- (i) Survey expectations consistently dominate rational expectations in nested empirical tests of canonical inflation models. The short-run (one-quarter-ahead or four-quarter-ahead) expectations are most tightly associated with current inflation, as might be suggested by prevailing theoretical models.
- (ii) The rational expectations implied by a fairly standard dynamic stochastic general equilibrium (DSGE) model are quite different from the survey expectations employed in Fuhrer's paper. The paper extends results first demonstrated in Del Negro and Eusepi (2010).

- (iii) Long-run survey expectations, often used as a proxy for “trend inflation,” enter indirectly in inflation models. When the models are expressed as trend inflation models as in Cogley and Sbordone (2008), the restrictions implied for the coefficients on trend inflation are rejected. However, long-run survey expectations are a very important determinant of short-run expectations, and thus influence inflation indirectly, serving as a long-run “anchor” for short-run expectations.
- (iv) A structural model for inflation that incorporates these features is developed, employing a “survey operator” that imposes some consistency on the behavior of survey expectations. That model achieves partial success, as the paper details.

The paper concludes that its results suggest a renewed emphasis on non-rational expectations measures in inflation modeling. The use of survey expectations may offer a promising direction for inflation and DSGE modelers. While the simplicity of working with rational expectations is sacrificed to an extent, it is possible to use survey data on inflation expectations while maintaining a reasonable blend of theoretical and empirical rigor.

In his discussion of the paper, James Stock emphasizes the difficulty in identifying the role of both survey and rational expectations, in large part due to the problem of weak instruments. Stock performs a battery of regressions that differ in their treatment of trend inflation, the output gap, sample period, the use of total rather than core CPI, and the use of GMM instead of maximum-likelihood estimation. While his results are generally supportive of those in the paper, he develops evidence suggestive of weak instruments, which implies that the “point estimates and confidence sets . . . should be viewed with some skepticism” and highlights the need for additional work that assesses the roles of rational and survey expectations that is robust to weak instruments.

In the spirit of better understanding the determinants of survey expectations, Stock also examines properties of the Survey of Professional Forecasters expectations measures, and he finds that they likely understate the importance of the unemployment rate—understating the Phillips relation, in his words. In conclusion, he

suggests that work that attempts to understand how real expectations are formed is “long overdue.”

In his contribution to the volume, “Get Real: Interpreting Nominal Exchange Rate Fluctuations,” Richard Clarida derives a novel structural relationship between the nominal exchange rate, national price levels, and observed yields on long-maturity inflation-indexed bonds. This relationship can be interpreted as defining the risk-neutral fair value of the exchange rate that will prevail in any model—or, more importantly, any real-world economy—in which inflation-indexed bonds are traded. The advantage of this approach is that it does not impose restrictive assumptions (e.g., complete markets, representative agent) on financial market equilibrium, does not require the estimation of a stable linear time-series model for short-term ex ante real interest differentials or expected future inflation, nor does it require that expectations hypothesis of the term structure hold or, for that matter, that market expectations conform to stable linear projections on a small subset of available macro data. Inflation-indexed bonds have only been widely available over the past dozen years or so. However, the inflation premium embedded in nominal bond yields was studied by Ben in a paper ahead of its time, “Who Puts the Inflation Premium into Nominal Interest Rates?” (*Journal of Finance* 33, June 1978), as well as in “Price Inflation, Portfolio Choice, and Nominal Interest Rates” (*American Economic Review* 70, March 1980). The Clarida paper derives an empirically observable measure of the risk premium that can open up a wedge between the observed level of the nominal exchange rate and its risk-neutral fair value and relates this measure of the risk premium reflected in the level of the nominal exchange rate to the familiar Fama measure of the risk premium reflected in rates of return on foreign currency investments. In the empirical section, theory is taken to a data set spanning the period January 2001–February 2011 to study high-frequency, real-time decompositions of pound, euro, and yen exchange rates into their risk-neutral fair value and risk premium components. The relative importance of these two factors varies depending on the subsample studied. However, subsamples in which, contrary to the Meese-Rogoff puzzle, 30 to 60 percent of the fluctuations in daily exchange rate changes are explained by contemporaneous changes in risk-neutral fair value are not uncommon. Moreover, the model’s attribution of the importance

of the risk premium in accounting for observed exchange rate fluctuations since the onset of the financial crisis in 2007 appears to align well with intuition that fluctuations in risk appetite have become much more important in recent years.

In his discussion of the Clarida paper, Hans-Helmut Kotz points out that the risk-neutral fair-value concept, while logically correct, needs to be interpreted with care since risk premium shocks can and do impact inflation-indexed bond yields. Interpretation does not come theory free. Data do not tell their own story. But nonetheless, he agrees that Clarida's approach is particularly fruitful when thinking about shifting risk perceptions in the context of the euro's evolution since the sovereign debt crisis broke out in the fall of 2009.

Glenn Hubbard, in his contribution to the volume, "Consequences of Government Deficits and Debt," reviews the theoretical and empirical literature on the consequences of structural deficits through higher interest rates and anticipated tax burdens, a topic that was the focus of Ben's 1988 book *Day of Reckoning*. While analysis of the effects of government debt on interest rates has been ongoing for about three decades, including Friedman's important work, the Hubbard paper argues there still is little empirical consensus about the magnitude of the effect. While some economists believe there is a significant, large, positive effect of government debt on interest rates, others interpret the evidence as suggesting that there is no effect on interest rates. Unfortunately, both economic theory and empirical analysis of the relationship between debt and interest rates have proved inconclusive. This is due in part to the number of factors that need to be controlled for to isolate the effect of government debt on interest rates such as the business cycle, expected path of future deficits, Federal Reserve holdings of Treasuries, the elasticity of capital inflows from the rest of the world, and the degree of substitutability between bonds issued by different governments. Based on a simple theory using a Cobb-Douglas production function for a closed economy, Hubbard calibrates that an increase in federal debt by 5 percentage points of GDP would push up real interest rates through the crowding out of the capital stock by roughly 12 basis points. Hubbard then reviews some of his previous empirical work with Engen on government debt and interest rates. These empirical results imply that a 1-percentage-point (relative to GDP) increase in the Congressional

Budget Office's (CBO's) five-year-ahead projection of federal government debt increases the real five-year-ahead ten-year Treasury yield by a little less than 3 basis points, and the estimate is statistically significantly different from zero. The Engen-Hubbard results also suggest that a 1-percentage-point increase (relative to GDP) in the CBO's five-year-ahead projection of the federal government *deficit* increases the real five-year-ahead ten-year Treasury yield by about 18 basis points, and that estimate is statistically significantly different from zero. However, this specification is not consistent with one implied by an economic model of crowding out, so interpreting this result is difficult. The stock of federal debt is most relevant for determining the level of the interest rate, and the deficit, which represents only the most recent period's change in the debt, does not contain all relevant information—specifically, prior accumulated federal debt—contained in the measure of total federal debt. However, because the CBO's projections of federal deficits (as a percentage of GDP) are closely correlated with their projections of federal debt (as a percentage of GDP), the coefficient estimate on the smaller deficit component also picks up the effect of prior accumulated government debt, and the coefficient estimate is larger than when total government debt is used. These results indicate that the estimated effect of projected federal government debt or deficits on a forward-looking measure of the real interest rate depends importantly on the specification. The estimates for the two specifications consistent with the analytical model of crowding out presented earlier imply that an increase in federal government debt of 1 percent of GDP raises the real interest rate by, at most, about 3 basis points.

In his discussion of the Hubbard paper, Alberto Alesina reviews his own work and that of others on successful fiscal consolidations. This literature concludes the following:

- (i) Spending based on adjustments is less costly in terms of short-run recessions than tax-based adjustments.
- (ii) Only spending-based adjustments are likely to lead to a long-lasting stabilization and reduction of the debt/GDP ratio.
- (iii) In some cases, spending-based adjustments have been much less costly than a standard Keynesian model would predict, and in fact they have been accompanied by expansionary effects on the economy.

- (iv) In these cases, a swift response of private-sector investment (in addition to private consumption) has “crowded in” aggregate private demand.
- (v) These “expansionary” fiscal contractions are helped when they are accompanied by a structural reform package which indicates a “regime change.”
- (vi) In small open economies, exchange rate devaluations helped in the short run.

These results are sometimes labeled as “non-Keynesian effects” of fiscal policy, namely the possibility that a fiscal adjustment does not bring about a deep recession even in the short run. Several non-Keynesian channels which could counteract the standard effects of spending cuts on aggregate demand have been discussed in the literature. Alesina argues that countries that are paying a significant premium on their financing needs because of default risk may see significant reduction in their interest burden which would facilitate the adjustment and have positive effects on private demand.

In an interesting theoretical contribution to the volume, “Investment Dynamics with Natural Expectations,” Andreas Fuster, Ben Hebert, and David Laibson study an economy in which agents have systematically wrong beliefs about the dynamic properties of fundamentals, a research program to which Ben was an early contributor. The premise of the approach is that economic agents tend to make forecasts based on statistical models or mental representations that tend to underestimate the degree of long-run mean reversion in fundamentals. In particular, they analyze a standard investment  $q$ -model in which agents underestimate the degree of mean reversion in productivity and thus are overly optimistic during booms and overly pessimistic during busts. They show in a rigorous model that an economy that features such a bias will exhibit the following six properties: (i) procyclical excess optimism, (ii) excessively volatile asset prices, (iii) negatively autocorrelated excess returns, (iv) a negative relationship between current corporate profits and future excess returns, (v) amplified investment cycles, and (vi) negatively autocorrelated corporate profits in the medium run. They interpret their framework as an illustrative model of animal spirits, amplified business cycles, and excess volatility. The model provides

a formal description of investment boom-bust cycles associated with “this time is different” or “new era” forecasting errors.

In his discussion, Paul Willen places this paper in the context of the recent boom and bust cycle in U.S. residential real estate. He provides evidence that financial markets consistently underestimated the transition probabilities for mean reversion in U.S. house prices and, as such, channeled too much leverage into real estate. He also argues that the question of whether rising house prices were a permanent or temporary phenomenon in the 2000s was the subject of some debate among economists and, as such, the profession did not provide adequate counterweight to private-sector animal spirits.

Many of Ben’s research interests have centered on the interaction between financial markets and the real economy. His research in the area dates back to 1976 and includes a 1984 paper that appeared in a volume edited by the next paper’s author, Zvi Bodie. The research assistant for the paper was the discussant for this session, and he was one of Ben’s graduate students at the time. This is a family affair indeed.

Asset-liability mismatch is a problem endemic in financial markets. The Asian currency crisis in the late 1990s arose in part from countries with an imbalance of home-currency-denominated assets and foreign-currency-denominated liabilities. Investment bank liquidity crises in recent years arose from the mismatch between the short-term liabilities (wholesale funds of short maturity) that were used to fund firms’ long-term assets whose value and credit risk could fluctuate significantly.

Bodie’s paper, “Mismatch Risk, Government Guarantees, and Financial Instability: The Case of the U.S. Pension System,” considers the appropriate design of a defined-benefit pension system that also embodies an asset-liability mismatch: the assets are primarily equities, and the liabilities are fixed annuities that pay well into the future. A commonly held belief is that a diversified equity portfolio constitutes an effective hedge against the future pension liability when the investment horizon is long. The intuition is that equities present significant risk in the short run, but for long investment horizons, a well-diversified portfolio is less risky.

As Zvi has emphasized in numerous forums, this intuition is flawed. In the case of adequately guaranteeing that pension assets will be equal to or greater than pension liabilities, the intuition

may be based on the following logic. If the ex ante rate of return on stocks exceeds the risk-free rate, then the longer the horizon, the lower the probability of a shortfall of equity-based pension assets relative to liabilities. In fact, the probability of shortfall *does* decline with horizon. If this were all there was to matching pension assets and liabilities, then the cost of insuring against pension shortfalls would decline with horizon. In fact, the opposite is true.

While the probability of a shortfall declines with horizon, the possibility of a very large shortfall increases with the volatility of the asset and with horizon. Using the probability of shortfall as the measure of adequate coverage ignores the difference between a small and a very large shortfall. Bodie quantifies this point using modern options theory. Taking into account the possibility of very large losses, he shows that contrary to the simple (incorrect) intuition about equities, the cost of insurance *rises* with investment horizon. In a simple base case, the cost of insurance approaches 100 percent of the investment as the horizon extends infinitely, reflecting the increasing probability of extreme shortfalls.

Bodie's paper then turns to the difficulties facing the country's largest pension insurer, the Pension Benefit Guaranty Corporation (PBGC). Bodie notes that the PBGC is in essence a reinsurer, in that the corporate sponsor of the pension plan has the first responsibility for making up the difference between asset values and pension liabilities. Only when the sponsoring corporation goes bankrupt is the PBGC liable to cover the shortfall, and then its payment of individual employee benefits is subject to caps, limiting the benefit to high-compensation employees.

The current structure of PBGC premiums charges more to healthy pension plans so that it can subsidize ailing plans. Over time, that premium structure, combined with the trend away from defined-benefit pension plans, has led to an adverse-selection problem: The remaining pension plans in the PBGC insurance pool are of relatively low quality. In the early 2000s, as low interest rates and falling stock prices eroded the value of the assets backing these remaining pension plans, more plans became seriously underfunded, and the PBGC faced a substantial deficit. The Pension Protection Act of 2006 aimed to address these problems, and it instituted some changes (higher premiums, tightened funding rules,

better accounting for pension liabilities) but did not address the asset-liability mismatch.

The experience of the PBGC highlights a fundamental economic problem with pensions and pension guarantees: If the guarantor does not appropriately charge pension funds for asset-liability mismatches, then the vicious cycle begins. Healthy funds exit, the remaining funds are less healthy, their asset performance will eventually subject some to shortfalls that the corporate sponsor cannot cover, and the PBGC will be asked to cover an ever-increasing pension fund shortfall. The alternatives are (i) to properly price the insurance premiums, but this first requires a clear recognition of the asset-liability mismatch issue, a solution that the Pension Protection Act failed to enact, perhaps because as Bodie suggests, the PBGC has yet to recognize the mismatch problem; or (ii) to enforce a large capital buffer for plan sponsors that expose the guarantor to risk due to mismatch. But this alternative is also problematic, as the most underfunded pension plans are usually sponsored by firms that are under severe financial duress.

In discussing Bodie's paper, Arturo Estrella agrees with Bodie's caveat about the fallacy of believing that the risk to holding equities declines with increasing horizon. But he also notes that diversification is another important investment principle. With that in mind, "a significant investment in equities may be prudent," although it is difficult to know if the current 54 percent share of pension funds invested in equities is optimal. Estrella also notes a number of parallels between Zvi's discussion of maturity matching and pension regulation and related issues in bank regulation. Funding requirements for pension funds are similar to capital requirements for banks (although the time required to address a pension funding shortage is understandably much longer than that required to address a capital shortfall); insurance premiums are a useful way to quantify the risks inherent in a pension fund, but because premiums are essentially expected present values of potential losses, they may also be used to place a monetary value on losses for a wide array of other institutions.

In the closing panel comments, Thomas Jordan discusses the blurring of lines between monetary and fiscal policy in the wake of the financial crisis. In the years leading up to the crisis, a number of developments unfolded that contributed to the blurred

distinction. Fiscal policy became more activist. Monetary policy moved from constrained to nearly unconstrained discretion, and many central banks employed unconventional measures, including expanded lender-of-last-resort measures, large-scale credit and quantitative easing, and expanded eligibility of instruments acceptable as collateral. One result of these monetary policy actions was a central bank preference for some debtors and sectors, which in turn implied stronger distributional effects of monetary policy than in normal times. Thus the new actions exhibited some of the characteristics of fiscal policy. In addition, the actions entailed greater credit risk on central bank balance sheets, greater public and political attention that could threaten independence, and the risk of increased moral hazard, as private entities believe the central bank will truncate some risks that would otherwise be faced by the financial system.

Jordan believes all the actions taken by central banks were well justified by the severity of the crisis. Nonetheless, he draws five lessons for policy from the crisis. First, in order to act at the market level in times of crisis, the central bank needs a sound and flexible balance sheet, with the ability to increase its size in normal times and the commitment to shrink its size after implementing unconventional measures. Second, to the extent that the central bank acts on behalf of another authority, banks must be careful to remain within their mandate. Third, central banks should avoid taking action solely because another authority refuses to do so. Fourth, when undertaking unconventional policies, the central bank should be aware of potential side effects and map out an exit strategy *ex ante*. Finally, when the central bank undertakes significant interventions, it is incumbent upon regulatory authorities to take measures to mitigate the unavoidable moral hazard that this creates.

In a similar vein, Lars Svensson draws important distinctions between monetary policy and financial policy. The instruments and objectives of monetary policy are well known, but Svensson suggests that financial policy can be viewed as “maintaining and promoting financial stability,” where the latter concept is defined as “a situation where the financial system can fulfill its main functions (of submitting payments, transforming saving into financing, and providing risk management) with sufficient resilience to disruptions that threaten these functions.” Its tools include supervision, regulation, and communications that convey

indicators of the current and prospective state of financial stability. While the two are conceptually distinct, they interact in important ways: Monetary policy affects real activity and inflation, and thus can affect credit losses, assets prices, and balance sheets. Financial policy affects the operation of financial markets, and thus can influence the monetary policy transmission channel. Thus both of the two policies must be conducted taking into account the stance of the other.

Svensson suggests that we keep these distinctions firmly in mind when developing the lessons learned from the crisis. The fact that the two policies are interrelated does *not* mean that (for example) monetary policy instruments should be used to address financial policy goals. The central bank's policy rate is a "blunt and unsuitable instrument for achieving financial stability." This does not preclude the location of financial policy responsibilities in the central bank, as long as the central bank is given the appropriate tools for affecting financial stability.

José Viñals highlights four issues that he believes should be "high on the agenda of central bankers" in the wake of the financial crisis. The first emphasizes key challenges in the relationship between financial stability and monetary policy. The good news, as Viñals sees it, is that the effective implementation of macroprudential policy should decrease the size and frequency of future financial crises, thus diminishing the need for the use of extraordinary policies by the central bank. The bad news is that new institutional structures to address macroprudential policy, which often entail a significant role for the central bank, could threaten the independence of the central bank, a tendency against which central banks must be vigilant. He notes further that central banks would do well to better track the build-up of financial imbalances—significant increases in credit, especially when accompanied by rapidly rising asset prices and current account deficits, for example—and "lean against" these in a manner consistent with their primary policy goals.

Viñals cautions against the risks that might arise in the context of widespread build-up of public debt: Central banks must resist the pressure to allow "just a bit more inflation" to reduce the debt burden. Such a temptation obviously risks eroding independence. He also suggests that the crisis exposed a number of vulnerabilities with regard to the management of liquidity risk, and recommends changes

that would reduce the financial system's vulnerability, such as moving the trading of standardized derivatives contracts to exchanges, and imposing systemic liquidity charges that more accurately price liquidity risk by imposing the full cost of a firm's high reliance on continued liquidity.

Finally, Viñals reminds us of the increased challenges posed to central banks by more globalized trade and financial markets. On the trade side, the beneficial effects on inflation of cheap imported goods are likely waning, and may be replaced by the effects of a general rise in commodity prices. With regard to financial flows, Viñals lays out the difficult trade-offs faced by emerging markets whose rapid growth attracts sizable capital inflows. Such countries can allow the exchange rate to appreciate, squeezing their export sector, or intervene in exchange markets to limit the appreciation. But with near-perfect capital mobility, foreign exchange interventions cannot be sterilized, which implies higher inflation in the home country. Fighting inflation with higher interest rates will only spur additional capital inflows. Such complex trade-offs imply the need for new policy tools, and Viñals briefly outlines a few.

The honoree of this conference has the last word. Ben Friedman draws an analogy between the opportunity that Adam Smith saw in drawing lessons from the 1772 banking crisis as he crafted his *The Wealth of Nations* and the opportunity we might take today in drawing lessons from the recent world financial crisis.

The first lesson is that what we typically label "monetary policy" more properly centers on credit, not money. If so, then Ben points out that the profession's focus on money "turns out to have been a half-century-long diversion that did not serve our profession well." Refocusing our attention on credit—inside liabilities and the markets in which they are issued and trade—is already under way, but Friedman cautions that a proper modeling of credit markets requires abandoning one of macroeconomists' cherished assumptions: the representative agent construct. Identical agents have no reason to borrow or lend among themselves, so a proper modeling of these exchanges with heterogeneous agents will necessarily complicate modeling efforts.

A second lesson is that the crisis has made it clear that real economic agents do not possess the knowledge or understanding to behave in a manner consistent with the full-rationality assumption

embraced by most macroeconomic modelers. Friedman suggests that a perusal of economists' accounts of the recent crisis reveals the extent to which the full-rationality assumption constrains their explanations. Given the behavior of even very large and sophisticated actors during the crisis, Friedman suggests that "any analysis that proceeds on the basis that everyone understands the joint distribution of the stochastic influences and the ensuing relationships is bound to come up short."

With regard to fiscal policy, Ben offers two "troublesome" observations. The first is the utter refusal by all parties to pay any more in tax, even when a key cause of the increase in fiscal burden was an attack on our home soil, prompting a war abroad. The second observation is that there is "no political constituency for reduced government spending," despite the widespread "shouting match" between some who cannot find any spending they would cut and others who are determined to "shrink the role of government to its most essential functions such as subsidizing NASCAR racing." Friedman, like many at the conference, finds this impasse disheartening.

On financial system design, Ben offers two more lessons. The first is that market self-regulation is unlikely to be sufficient in today's complex financial system. The reasons for the failure of self-regulation include a failure of participants to understand the risks entailed in their actions (as discussed in the shortcoming of the full-rationality assumption above); a host of principal-agent problems, notably officers of banks exposing their institutions to risks that their shareholders would never have assumed themselves; government policies that encourage risk taking, such as lender-of-last-resort actions and housing subsidies; and the ability of financial market professionals to play with other peoples' money at little risk to their own personal fortunes. A corollary to these lessons is that if voters elect officials who favor self-regulation, and they in turn appoint regulators who are similarly inclined, there will not be effective regulation by government: "Regulation has to be applied, not just authorized." The failure to apply regulation shares as much blame for the recent crisis as the failure to have appropriate regulations in place, in Friedman's view.

What directions do these lessons and observations suggest? With regard to smaller, specific suggestions, Ben joins the chorus favoring enhanced capital requirements for all financial institutions. To be

successful, this action will need to be accompanied by accounting reform, particularly in specifying which assets count as capital. In addition, we need to add resolution *procedures* to the resolution *authority* that is extended in the Dodd-Frank Act. This will tell institutions not just what their new capital requirements are, but what happens to them if they violate them.

More fundamentally, Ben urges the economics profession to undertake a thorough examination of the net value contributed to the economy by our current financial system. The one essential role of the financial system is “to allocate scarce investment capital.” He points out the irony in observing that a very high share of the total return generated by the economy’s capital accrues to the sector responsible for allocating that capital. Beyond the profit allocation, the share of resources—wages and salaries, the rents on buildings, utility and other expenses—devoted to the financial sector is staggering. This is a very resource-intensive sector.

Given the resources devoted to the sector, it is critical to assess the efficiency with which it allocates capital. The crisis suggests that this efficiency is “not all we would like it to be.” The massive losses suffered by financial institutions reflected real mistakes made by these institutions—real misallocations of capital. Inflated prices on mortgage-backed securities meant that interest rates on the underlying mortgages were too low, just as inflated stock prices during the dot-com boom implied the cost of capital to the issuing firms was too low. These mispricings led to overinvestment in housing and capital respectively. That is the definition of misallocated capital.

Ben concludes with two research assignments for the profession. First, the Federal Reserve and the Bureau of Economic Analysis should team up to quantify the cost of operating our current capital allocation system. Second, we should attempt more carefully to assess the system’s efficiency. This latter effort is difficult, as one must compare the current system to some concrete alternative (central planning?). But perhaps one can approach this task incrementally, Ben suggests, starting with the securitized mortgage market. Are we better off (was capital better allocated) because of securitization? Because there was a market for collateralized debt obligations?

As was the case for many of us in graduate school, we might do well to consider completing Ben’s assignments.