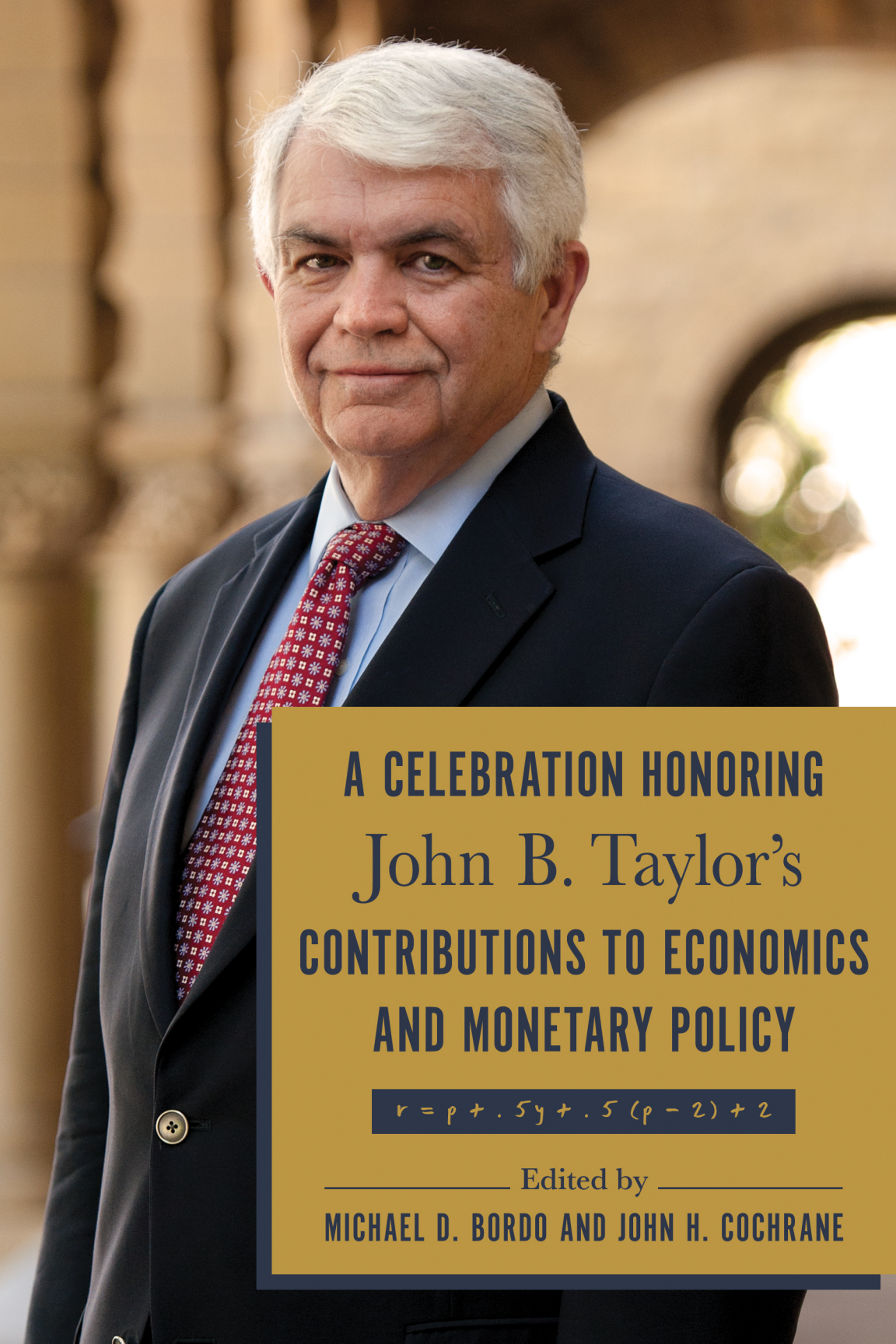

A CELEBRATION HONORING John B. Taylor's CONTRIBUTIONS TO ECONOMICS AND MONETARY POLICY

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Edited by

MICHAEL D. BORDO AND JOHN H. COCHRANE

President George H. W. Bush with (left to right) Chair Michael Boskin and Richard Schmalensee and John Taylor from the Council of Economic Advisers, February 1991

The White House, courtesy of John Taylor

International Monetary and Fiscal Policy and Central Bank Coordination

Introduction

John F. Cogan

I'm delighted to be the moderator of this panel on John's contributions to international economics and to fiscal policy. If I might, I'd like to say a quick word about John. As Andy Levin said, kindness is one of John's most outstanding attributes. I've had the good fortune to work with John for nearly four decades now, and I agree with Andy's assessment.

In all the years, in all the days that I've worked with John, he's been very gentle with me in pointing out my errors of logic and analysis. But I would like to add another characteristic of John, and that is integrity. John is one of the highest-integrity scholars that I know. He never shades his results, never twists his models to achieve a particular outcome. In policymaking advice, he never blends politics with economics. He always has been a straight shooter in giving economic policy advice. Give the economics; let the policymaker decide on the politics. That's the way good economists give economic advice. That's been one of John's hallmarks. So, John, it's been great—more than thirty years working with you—and I'm looking forward to more.

We've decided to break the panel into two parts. First, on fiscal policy, we have Mike Boskin and Valerie Ramey. Then we'll have international finance with Bob Hodrick and Barry Eichengreen.

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John Taylor's Influence on Fiscal and Other Economic Policies

Michael J. Boskin

Let me first start with an elaboration of a theme throughout, and that's about the great person John is, as well as a great economist and a great friend and colleague.

The word *kindness* has come up repeatedly—and *toughness* too. John has very strong views and, as John Cogan said, no pun intended, he doesn't tailor them to suit his audience, as some people do. But I would say of the hundreds of conversations and meetings I've had with John, I've seen him be tough many, many times, but I never once saw him be mean.

That's really an important distinction. It speaks well of him as a human being. So that's part one. Also, there's another session on John in government, but it's mostly going to focus, I think, on John's time in the George W. Bush administration, given the framework. I obviously worked with him on the Council of Economic Advisers (CEA) in the George H. W. Bush administration, so I'm going to say a few words about that. But let me just say it was quite an interesting time. We had the fall of Berlin Wall and the collapse of the Soviet Union. We had a tremendous oil shock. Saddam Hussein invaded Kuwait. Oil prices doubled at a time when we had larger oil import intensity in the economy, and we had a recession.

And at that time, the president's party had 164 seats in the House and 43 senators, so it wasn't exactly like he could wake up in the morning and decide what he wanted to do and get it done. It's also important to point out something that really, I think, hasn't been stressed enough. People have said how well John's work has held up. But it's useful to point out how much has changed in the economy over this period in the global economy, in demography, in technology, and more.

So if you go back to the late 1970s period, there was no personal computer. Deng Xiaoping hadn't opened up China yet—and China was not on

anybody's radar screen until many years later. Most credit was extended by traditional financial institutions, not by the credit market directly, which is totally reversed now, where maybe three-quarters of it is extended by the credit market directly and only 25%–30% by banks and other financial institutions. So I can go on and on in this regard, but a lot has changed. I also want to emphasize that while Valerie [Ramey] added the fiscal aspect to John's tremendous contributions to economic policy—and I'll say a word or two about that in a moment—John's contributions extend well beyond just monetary and fiscal policy.

One of the great things about the CEA is that you get to work on everything. John played a tremendous role across a wide variety of issues. I want to highlight something that hasn't received much attention: He helped us improve our response to the previous financial crisis, which, because it was superseded by the Great Recession, doesn't get much attention. But in fact, back then we had the savings and loan crisis and the Third World debt crisis. It's not often remembered that virtually every money center bank—and this was before all the mergers; Chase and JP Morgan merged, for example, and so on—was effectively insolvent on a mark-to-market basis, and we had to understand why.

Maybe Sebastián [Edwards] will talk about this later on, but Miguel de la Madrid, the president of Mexico, repudiated the debt. Banks had taken on substantial Latin American debt—often encouraged, even egged on, by the US State Department and the Treasury—to support the region's development. But those efforts ultimately left them in extremely difficult circumstances.

If you could trade that debt, it was selling at around 15 cents on the dollar. The bid-ask spreads were enormous, but it was trading at maybe 15 or 20 cents on the dollar. So that had to be worked out. Hence, we issued Brady bonds and set up the Resolution Trust Corporation (RTC). But John played a role there, and I think that deserves some mention. To offer some brief perspective, I'm going to say a word about the evolution of his thought on monetary policy and rules, and rules more broadly across many types of policies, in a moment.

So first, of course, great attention has appropriately been focused today on John Taylor's pioneering work in macroeconomic modeling. And I'm not going to repeat that; I want only to say that it set the stage for thinking more deeply about monetary policy and what it should be and therefore its interaction with fiscal policy. It's probably worth adding for all the people who are talking about Fidland and Prescott and Lucas that I'm old enough to remember a previous debate and discussion about fiscalism versus monetarism. The early

rules-versus-discretion debate went back to Milton Friedman and James Tobin and Paul Samuelson and Bob Solow and a variety of people who worked that out in academic papers, and especially in op-eds and *Newsweek* and policy advice.

It had become clear that fiscal policy especially had involved numerous temporary episodes and that it did little to stabilize the economy, given the frequency of recessions we had from the 1950s and 1960s through the early 1970s. So that's part one. I want to reemphasize what Valerie said about John's (and John Cogan's, with Volker Wieland) real-time estimates of policy, and that's not an easy thing to do. In some sense you have to be conjectural. But it became pretty clear that while much has changed in what the government does, the desire of politicians to hand out money to people when they have an excuse or a putative need and to call it stimulus, even if it has not much chance of stimulating, has not changed.

We have this series of episodes that Valerie mentioned and John doing real-time analysis. But here we were in the summer of 1990 and the economy was growing, but slowly. We had a lot of tension in credit markets with the Basel Accords and so on. Then Saddam Hussein invaded Kuwait. We had the big oil shock and we didn't get data on the economy shrinking at all until, I think, February of 1991. But it became very clear to us that the economy would likely go into recession, and we had been in the middle of negotiating, trying to do something about the budget deficit, with the very weak hand, as I described, that President Bush had. Not making excuses; I think it's just a fact. The Democrats wanted to increase spending a lot, and John and I were very dubious that it would, on a benefit-cost basis, have benefits at all commensurate with the costs that might be incurred and the future problems.

President Bush listened to that advice carefully and, I think, kept his desired interventions to a minimum. We did a few things around the edges. We said: There are opportunities. If you need to do this, there are least-worse ways to do it. But he stuck to doing minimal stuff. Some people think that that was a political mistake. He always thought that it was Ross Perot and his breaking his "no new taxes" pledge that did him in. But any event, let me just turn back to John on rules beyond monetary and fiscal rules, and I'll say a few words about fiscal rules in a moment.

We were trying to negotiate the North American Free Trade Agreement (NAFTA), which we at CEA helped originate along with the secretary of state, and the move to the World Trade Organization. And John got to play an important role in that, assisting our trade representative. And if there's a place where rules matter, even though they're honored, frequently sub rosa, in the

breach, it's in trade policy. We're going through that now, because despite the best intentions, the Trump administration is not going to come down from the mountain with some tablets saying, Here are the trade agreements. It will take many pages of detailed lawyer-speak to finalize the agreements. These are very complex, detailed documents that have to be approved by legislatures in many countries. So he played a key role, I think, in keeping some of the worst stuff out and promoting some good aspects of these changes.

John's advice on trade stemmed again from his deep conviction that setting rules and a framework is essential. We had many discussions about monetary policy during this time. As you can imagine, there was a need to further disinflate the economy, but the economy was softening, so it put the Fed in a bit of a pickle, and it put us in one as well.

We had various discussions with the Federal Reserve Board of Governors and especially the chair, and then we decided to write (CEA 1991). Bob King graciously mentioned earlier, about *The Economic Report of the President*, the desirability of monetary policy rules. For those who aren't aware of what happens when you write that report, you send chapters around to any relevant agency that might be mentioned or involved so they can try to argue against what you're saying, or improve it, or give you additional data, or say, Did you consider this? The Fed was not exactly thrilled with this discussion and this mention, but after many different formulations, I think it's come out in the discussion now what John meant, and what we intended to convey. We came up with the formulation that monetary policy should be rules based, by which we meant it should be anchored, framed in a rule. You should deviate from it only for good reason, and infrequently, as Robert Barro mentioned, and that deviation should be well explained. I think people have emphasized that. So John has always been very proud, as have I, that this is the first time anything like that had ever been written in an official US government document.

So thank you for that, John. I think it had some influence, and he went on to bigger and better things. But now getting back to fiscal rules: John, as Valerie mentioned, carefully tried to analyze separately, or disentangle, automatic stabilizers from discretionary spending. Trying to disentangle that in the data isn't the easiest thing to do. Not mentioned often enough is how important it is to disaggregate the type of spending. Particularly, one of the big global changes is that the governments around the world are no longer primarily purchasers of goods and services, as they were in the 1950s, 1960s, and early 1970s, but they're primarily redistributors of income with social insurance and transfer payments. Even through all this discussion of infrastructure in the

American Recovery and Reinvestment Act, it was something like 7% of the total—it turns out that, as President Obama finally admitted, the shovels weren't exactly ready. You don't take an unemployed carpenter and make them into a tower crane operator overnight. So this was a big issue. John did a great job of that. But in addition, John and John Cogan disentangled the payments to state and local governments and tried to trace through where those went, and so on. I think it really is a thoughtful and important contribution that sets a high bar for everybody else's work to do likewise.

Then, getting back to fiscal rules: First of all, Valerie, you're a macroeconomist, and microeconomists, I know, don't always agree with you on everything. But let me say that one of the easiest ways to increase the automatic stabilizers would be to have much steeper progressive taxation and much larger unemployment insurance benefits. I personally think the harmful incentive effects of that would dominate any potential modest automatic stabilization benefits. Indeed, one of the important developments—something I was also working on around the same time as John—was the growing incorporation of incentives and effective tax rates into macroeconomic analysis. Economists such as Robert Barro and Charles Redlick (2011) have explored this in aggregate data, examining how these factors influence the broader economy. I'll go into this more tomorrow in my talk late in the Monetary Policy Conference (see Boskin 2026). But I do believe that tax rates and expectations of tax rates in the future play a role, both in the long run and in the effectiveness of short-run stabilization policy or stimulus.

But in any event, there have been many attempts to try to come up with new fiscal rules, and presidents have tried to have enhanced rescission or line-item vetoes. They were stopped by the courts. Back when we thought we had very large budget deficits in the Reagan administration, cyclically adjusted, they were pretty small compared to today. In any event, they were deemed too large, and we had lots of discussions. So, Gramm–Rudman–Hollings was adopted, which was basically a requirement to project that you would gradually reduce the deficit to zero over a span of years. What happened was that the projections were optimistic, and we didn't get there, and they were extended.

The same thing wound up happening with the Maastricht rules (EU 1992), where they became inconvenient, but anyway, out of this came one of the things that I think perhaps was reasonable. People will disagree, because that was the PAYGO (pay-as-you-go) rule (OMB 2010), which was basically a marginal balanced-budget rule—we couldn't deal with the inherited debt, and we couldn't deal with a variety of other things—but I'll leave it to you to

decide. Even though the PAYGO rule was kept for quite some time, it was then deleted, and then it was put back on again, so it's had at least some modest restraining benefit on the elected officials. But it turned out that Democrats hated it because it constrained their ability to increase spending, and Republicans because it constrained their ability to cut taxes. We've had commissions, and we may have another commission, but we're dealing now in uncharted waters where we have very large debt—very large deficits adjusted for the cycle. We have too often descended into an anodyne discussion just describing the situation as unsustainable, so I'll talk more about that tomorrow. Most importantly, John, you've been a great giant in the profession. You've been a wonderful friend and colleague to me, and I look forward to many more years of that. Thank you.

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10

John Taylor's Contributions to Fiscal Policy Research

Valerie A. Ramey

It is a great pleasure to join in the celebration of John Taylor's many accomplishments. John is best known for his contribution of the Taylor rule to monetary policy, modeling wage and price stickiness with overlapping contracts, and the incorporation of rational expectations. He has also made important contributions to fiscal policy research, and these are the contributions that I will be discussing. Before discussing these contributions, I would like to share two reminiscences about John.

The first reminiscence is about John as a mentor. I was a graduate student here at Stanford when John arrived in the mid-1980s. Unfortunately, I'd already completed my coursework and was working on my dissertation by the time he arrived, so I didn't have the opportunity to take his class that taught cutting-edge macro techniques. Because of the paucity of graduate macro textbooks at the time, this gap in my knowledge was hindering my progress on my research on inventory investment. Fortunately, John agreed to join my dissertation committee. During our initial meetings, he patiently helped me fill in my knowledge gaps so that I could get up to speed on the dynamic modeling techniques and rational expectations methods that I needed to rigorously model my ideas on inventories. He was always kind and patient in advising me.

My second reminiscence is about the November 1992 Carnegie Rochester Conference where John presented his Taylor rule paper (Taylor 1993a). I also presented a paper at the conference. I recall that John Taylor's conference paper didn't arrive in time to be included in the packet of papers sent out before the conference (everything was on paper back then), so it was the only conference paper I hadn't read in advance. When John presented the paper, he was very low-key and humble about it. Perhaps his manner was too humble, because the editors, Alan Meltzer and Charles Plosser, didn't realize the blockbuster they had on their hands and ended up putting John's paper near the end

of the published 1993 volume. It was in the part of the table of contents that appeared on the back cover. Fortunately, posterity figured out its value. (As a side note, Meltzer and Plosser were very kind to a young assistant professor—me—and put my paper on the credit channel of monetary policy first in the published volume, followed by the remarks of my discussant, Ben Bernanke.)

John Taylor has made considerable contributions to fiscal policy. His website displays his numerous books, articles, opinion pieces, congressional testimony, and service in government. I will focus on three of his contributions to fiscal policy: his 1993 book *Macroeconomic Policy in a World Economy: From Econometric Design to Practical Operation* (Taylor 1993b), his analysis of the advantages of automatic stabilizers over discretionary fiscal policy, and his real-time analysis of discretionary fiscal stimulus during crises.

Policy Analysis Meets Rational Expectations

John's 1993 book *Macroeconomic Policy in a World Economy: From Econometric Design to Practical Operation* presented one of the first large-scale models that rigorously incorporated the rational expectations revolution. It used advanced econometric methods to estimate the parts of his multicountry macro model, including wage and price equations based on his theories of overlapping contracts as a source of wage and price stickiness. Although the model did not have the optimizing behavior that current dynamic general equilibrium models now have, his model incorporated rational expectations and it allowed him to address the Lucas critique, at least to some extent.

His model made great strides because it allowed analysts to analyze policy in a way that accounted for rational expectations. It allowed analysts to distinguish temporary from permanent changes in policy as well as the different effects of anticipated versus unanticipated policy variable movements. It also incorporated interactions and spillovers of policy to other countries. John was one of the first to study the different predicted paths of the economy in response to unanticipated and anticipated changes in government spending, something that would be near impossible to do in a model that didn't incorporate rational expectations. His analysis anticipated the later work on "fiscal news," because he was able to distinguish differences in effects if the changes in government spending were anticipated. While his model did not allow for a labor supply response, which meant that it couldn't capture the effects of an increase in government spending on labor supply, his analysis nevertheless captured a number of the key macroeconomic effects.

Conducting this analysis with cutting-edge econometric techniques and rational expectations in the early 1990s for one country would have been very impressive, but John took it to another level by analyzing the effects of policies in an international context. He specified the structure of the economies of each of the G7 countries and modeled spillovers of policies between countries through exchange rates and other macroeconomic channels. Thus, he could answer important questions such as the effects of particular monetary or fiscal policies in the United States on the other countries in the G7. This book was a giant step forward for international macro policy analysis.

Rules Versus Discretion in Fiscal Policy

A second contribution to fiscal policy is John's analysis of rules-based versus discretionary fiscal policy. These ideas are the focus of his *Journal of Economic Perspectives* article "Reassessing Discretionary Fiscal Policy" (Taylor 2000). This paper is a wonderful piece that lays the issues out very clearly. For example, it offers several disadvantages of discretionary fiscal policy, such as the implementation lags, the difficulty of reversing policy if the economy recovers more quickly than expected, and political constraints. These are variations on arguments that had been discussed previously by others.

However, John also offers several new arguments against the use of discretionary fiscal policy and in favor of rules-based fiscal policy, i.e., automatic stabilizers. First, he points out that by 2000 the conduct of monetary policy had improved substantially since the 1970s. Monetary policy had evolved from being an often destabilizing force to being a rules-based stabilizing force for the economy. He thus argues that monetary policy should be the main policy for stabilizing the business cycle. He goes on to discuss an important idea based on the interaction of monetary and fiscal policy. In particular, he argues that less uncertainty about the behavior of fiscal policy facilitates the conduct of monetary policy. The possible use of discretionary fiscal policy introduces uncertainty into the environment in which monetary policy must operate. In contrast, automatic fiscal stabilizers are rules based, so monetary policy can take those into account when plotting out its own course.

One worries, however, about setting up automatic stabilizers to do the work of fiscal policy in recessions, because politicians always want to be seen as doing something in response to a crisis. Since they cannot claim that they are doing something already being done by automatic stabilizers, one worries that they will layer discretionary policy on top of the automatic stabilizers,

resulting in higher debt. Nevertheless, John's arguments in favor of automatic stabilizers are compelling.

John also considers the problem of the zero lower bound on interest rates. It is interesting that he specifically addresses this possibility in 2000, long before it was even considered a risk for the United States. At that time, many thought of the zero lower bound as a strange anomaly that affected only Japan. John discusses the constraints that the zero lower bound imposes on monetary policy and asks whether that would change one's recommendations concerning discretionary fiscal policy versus automatic stabilizers. He concludes that automatic stabilizers continue to dominate discretionary fiscal policy even in this situation.

Real-Time Fiscal Policy Analysis During Crises

A third contribution of John Taylor to fiscal policy analysis that I want to highlight is his real-time analyses of the various discretionary fiscal policies adopted during the Great Recession and COVID. During the Great Recession, he analyzed the effects of both the George W. Bush 2008 tax rebates and the Barack Obama American Recovery and Reinvestment (ARRA) stimulus. During the pandemic, he analyzed the effects of the various stimulus packages.

Soon after the economy went into a recession in 2008, President Bush and Congress enacted legislation in February 2008 that distributed tax rebates to households from spring through summer 2008. Within a few months, John had analyzed the aggregate data and concluded that the rebates were mostly saved rather than spent. In a November 2008 *Wall Street Journal* opinion article, John showed a simple graph of disposable personal income and personal consumption expenditures (Taylor 2008). The graph, titled "Rebates Failed to Jump-Start Consumption," showed that disposable personal income spiked up when the rebates arrived but personal consumption expenditures did not. Figure 10.1 shows my version of his graph, which extends the sample and uses revised data. It plots real disposable income and personal consumption expenditures from July 2007 through June 2009 from the Bureau of Economic Analysis. The story is the same that John told—disposable income spikes up when the rebates arrive, mostly from May 2008 through July 2008, but consumer expenditures show only a small hump.

In a 2009 article in the *American Economic Review Papers and Proceedings*, John also analyzed the aggregate data with some simple regressions. He found a coefficient on the rebates that was not different from zero, either quantitatively or statistically (Taylor 2009). John's estimates were downplayed for two

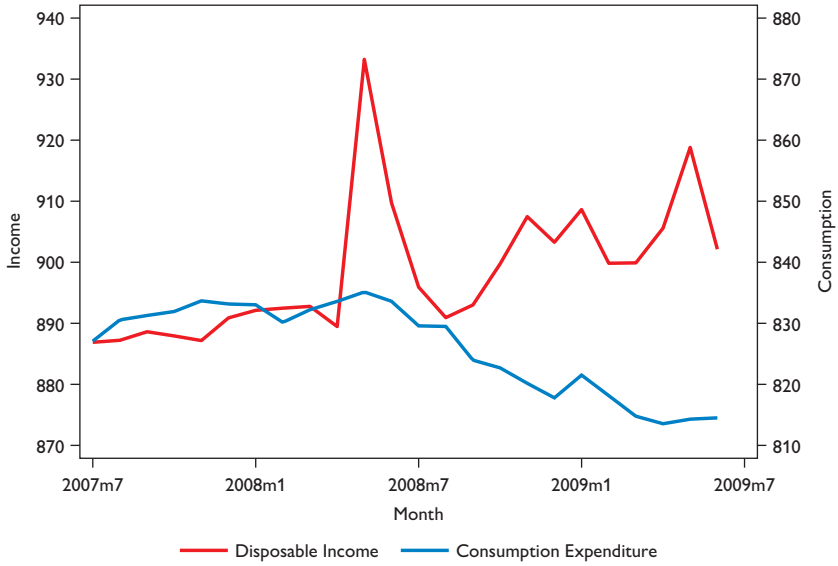

Figure 10.1. Real disposable income and personal consumption expenditures, circa 2008

Notes. Data are from the BEA. Real values are in January 2008 dollars. Income and consumption are on different axes, but they are scaled so changes are comparable.

reasons: First, some macroeconomists criticized his methods; and second, some new applied microeconomics studies estimated high marginal propensity to consume measures (MPCs). From the macro side, in a speech at Hamilton College in November 2011, "What Do We Know About the Effects of Fiscal Policy? Separating Evidence from Ideology," Christina Romer presented John's chart (figure 10.1) and questioned his analysis. She pointed out correctly that since the rebates were adopted in reaction to a worsening economy, John's estimates might be subject to downward bias. She particularly singled out the steep decline in household wealth during 2008 and reproduced Mark Zandi's (2010) figure as a counterpoint (figure 10.2).

To investigate this critique, I use local projections to estimate the dynamic effect of the payout of the rebate on real disposable income, real consumption expenditures, and real household net worth. The sample is monthly from 1984 through 2019. The control variables include four lags of the rebate, real consumption, real disposable income, real oil prices, and real household net worth. The rebate series includes both the 2001 and 2008 rebates. To adjust for exponential growth and normalize the variables so that

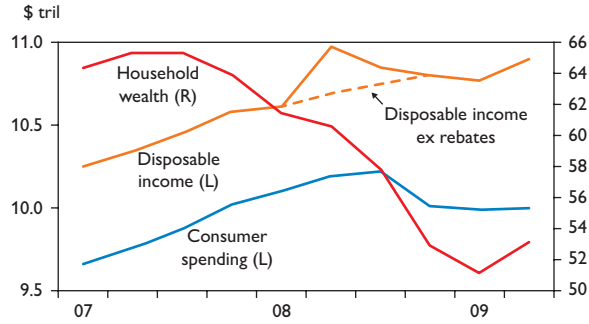

Figure 10.2. Temporary tax cuts support consumer spending

Source: Zandi (2010)

coefficients can be interpreted as MPCs, the rebate, consumption, income, and net worth variables are divided by trend disposable income, estimated from a model with log income following a linear trend. Real oil prices are in logs. The impulse responses of the variables to a shock to the rebate payout are estimated through a set of monthly regressions of consumption, disposable income, and household net worth at months t, $t+1, \ldots, t+10$ on the rebate in month t plus the lagged controls.

Figure 10.3 shows the estimated impulse response functions. The first panel shows that $1 of rebate raises real disposable income by approximately $1 on impact, as one would expect. The continuing effect of the rebate on disposable income for the subsequent month occurs because the rebate itself is serially correlated; both the 2001 and 2008 rebates were paid out over several months.

The second panel shows that the effect on consumption is near zero, both quantitatively and statistically, for the first four months. In the ensuing months, the response of consumption becomes negative, though the coefficients are estimated imprecisely. The third panel offers a likely explanation for the downward path of consumption. It shows the response of real household net worth to the rebate. If the rebate is exogenous, there is no reason that real household net worth should fall in response, yet the graph shows that it falls and reaches –100 after ten months in response to $1 of rebate. The fact that real household net worth falls significantly "in response" to the rebate offers support for Romer's (2011) point that the rebate was adopted because policymakers could foresee the path of the economy. Thus, consumption might not appear to respond only because the counterfactual is that it would have fallen.

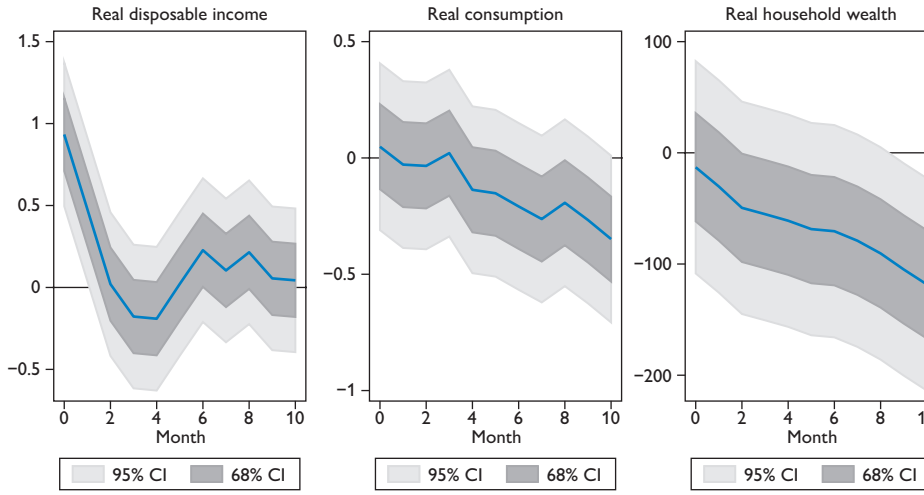

Figure 10.3. Local projection estimates of the reactions to the rebate payout

Notes. Rebate data are from Shapiro and Slemrod (2003) and Sahm, Shapiro, and Slemrod (2012). Other data are from the BEA, the BLS, and the Federal Reserve via FRED. All real values are constructed using the PCE deflator. Quarterly data on household net worth begins in 1987 Q4. I extended it back to 1984 using the growth rate of household plus nonprofit net worth. The series was then interpolated to monthly.

The second reason that the profession downplayed John's results was the emergence of new data and estimates of household responses to the rebates. For example, Parker et al. (2013) added questions to large existing consumption surveys asking households about the amount and timing of receipt of their rebates. They estimated household MPCs to consume between 0.5 and 0.9 within the first few months, which suggested that most of the rebates were spent.

In a 2025 paper in the *Quarterly Journal of Economics*, Jacob Orchard, Johannes Wieland, and I asked how the aggregate consumption data could show such a small response if household MPCs were so high. Using historical counterfactuals, dynamic general equilibrium models, and new econometric methods, we concluded that the aggregate consumption effects of the rebates were very small. The new econometric methods revealed significantly lower MPCs in the household data, and our analysis revealed that even those MPCs were dampened by the behavior of relative prices. Thus, using very different methods, we were led to John's conclusion: The 2008 rebates did not stimulate the economy.

John also analyzed the effects of the 2009 American Recovery and Reinvestment Act (ARRA) in a paper coauthored with John Cogan, Tobias Cwick, and Volker Wieland, "New Keynesian Versus Old Keynesian Government Spending Multipliers" (Cogan et al. 2010). The first draft of this paper was circulated in February 2009 just as the ARRA was passed, so they were conducting real-time analysis of an important policy. In the paper, they questioned the Romer–Bernstein Old Keynesian model predictions of the effects of the ARRA, which suggested that the ARRA cumulative multipliers would be substantially above unity.

John and his coauthors compared those multipliers to ones generated by the then new Smets–Wouters (2007) medium-scale, New Keynesian model. They carefully calibrate the parameters and projected path of government spending from the ARRA package and find multipliers substantially below unity. Even in extensions with hand-to-mouth consumers, the simulated multipliers remain below unity. These conclusions were at odds with some of the later cross-state estimates of government spending multipliers, most of which were estimated to be around 2. However, my 2019 *Journal of Economic Perspectives* article (Ramey 2019) re-estimated the cross-state ARRA multipliers with different weighting and found that they were below unity; and my published *NBER Macroeconomics Annual* discussion (Ramey 2021, from a 2020 conference) re-estimated multipliers on government defense spending across states and also found they were below unity. Thus, my subsequent empirical research also supports Cogan et al.'s conclusions about the ARRA. Once again, John Taylor was right.

John also studied the effects of the stimulus payments during COVID in a 2021 Hoover working paper, "The Economic Impact of the Economic Impact Payments" (Taylor 2021). This paper was written soon after the third round of stimulus, so once again he was doing important real-time analysis of an important fiscal policy. He conducted the same kind of straightforward graphical and regression analysis he had used for the 2008 rebates. He did not find evidence of any stimulus effect on consumption. I haven't had a chance yet to study the COVID episode in detail but may do so in the future. I don't have strong priors on the outcome, but I wouldn't be surprised to learn that John Taylor was again right on this one!

Conclusion

John Taylor has contributed in a number of fundamental ways to the analysis of fiscal policy. In the early 1990s, he pushed the frontiers of rigorous policy

analysis. His incorporation of rational expectations into large-scale models opened the doors to a truly dynamic analysis of policy that allowed distinctions between unanticipated and preannounced policies. He was prescient in the questions he asked, such as the trade-offs between rules and discretion, and what to do if interest rates should hit the zero lower bound. Finally, his real-time analysis of the most important fiscal policies of the twenty-first century meant that he was there, front and center, providing well-founded answers to important questions. Thank you, John, for all your contributions as well as for being such a wonderful mentor to so many of us.

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11

On John Taylor's Foundational Contributions to International Economics

Robert J. Hodrick

I first met John in 1980 when I was an assistant professor at Carnegie Mellon University and he was invited to present a seminar there. Instead of having an in-office discussion, he suggested that we walk around the beautiful Schenley Park next to the university. I was quite intimidated to meet him, as he had already established himself as an intellectual thought leader and I had yet to publish a major paper. He immediately put me at ease as we discussed our common Pennsylvania heritage, our undergraduate experiences at Princeton, and his interest in my research. I came away from the hour feeling that I had made a friend. Over the years, we saw each other at a few conferences, but we hardly talked. I was therefore quite gratified when I was on sabbatical at Stanford as a Stanford Institute for Economic Policy Research (SIEPR) fellow in the fall of 2012 and John stopped me on the quad, saying, "Hey, it's great to see you. What brings you to campus?" I explained my situation, and he invited me to attend the seminars of the Hoover Economics Working Group. I've been going ever since. Thus, I can say with confidence that while being an intellectual giant of the profession, John is also a gracious, caring, magnanimous individual who has been incredibly kind to me. It was therefore an incredible honor for me to be asked to speak at this conference in his honor.

The organizers of the conference asked me to highlight John Taylor's contributions to international economics and policy. Given the time limit associated with the presentation, I decided to focus on the foundational contributions in John's 1993 book, *Macroeconomic Policy in a World Economy: From Econometric Design to Practical Operation*. This is John's treatise on how to do normative economics. As the preface of the book notes, much of the research was conducted in the mid-1980s, and while some parts were

published then, other parts might have been published earlier had John not served on the President's Council of Economic Advisers from 1989 to 1991. John notes, though, that the book benefited greatly from the experiences he had on the council.

The book is divided into three parts. The first part consists of two chapters that lay out theoretical and empirical foundations. These represent state-of-the-art theory and econometric ideas. The second part contains three chapters that develop and estimate an international macroeconomic framework for the G7 countries—Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States—using the ideas in part one. Finally, the third part contains three chapters that simulate the estimated model with alternative policy rules to investigate interesting questions in international economics such as: Is a fixed-exchange-rate regime better than a floating one? Should monetary policy be coordinated internationally? And what is the best rule for setting monetary policy?

The Theoretical Foundations of the International Macro Model

Taylor's first chapter discusses the theory of dynamic, stochastic, rational-expectations models. It demonstrates how one solves such a theoretical model, beginning with a model of a single endogenous variable and generalizing to multiple endogenous variables with multiple state variables. It also provides beautiful discussions of the Lucas (1976) critique and the need to have rules for policy, as discussed in Kydland and Prescott (1977).

The second chapter then demonstrates how to estimate such models and how to simulate them to evaluate alternative government policies while providing classic insight into why these policies must be rules. The exposition of these chapters is so clear that they could be assigned in PhD courses now.

As should be expected from John's early research (Taylor 1985), for example, the foundation of the theory is a staggered wage-setting framework as in Taylor (1980),

$$x_t = \frac{\delta}{3}\sum_{i=0}^{2} E_t\left(w_{t+i}\right) + \frac{1-\delta}{3}\sum_{i=0}^{2} E_t\left(p_{t+i}\right) + \frac{\gamma}{3}\sum_{i=0}^{2} E_t\left(y_{t+i}\right), \qquad (1)$$

where x_t is the log of the nominal contract wage negotiated this quarter, w_t is the log of the nominal wage currently prevailing in the economy, p_t is the log of the price level, and y_t is the log of real GDP. The nominal contract

wage negotiated this quarter depends on the current market wage and expectations of future market wages, on current prices and expectations of future prices, and on current real GDP and expectations of future real GDP.

The current market wage is simply an average of past contract wages:

$$w_t = \frac{1}{3}\sum_{i=0}^{2} x_{t-i}. \tag{2}$$

The price level is determined by a weighted average of the current nominal wage, reflecting markup pricing over costs, as well as on the nominal prices of foreign goods,

$$p_t = \theta w_t + (1-\theta)(e_t + p_t^*), \tag{3}$$

where e_t is the log of the nominal exchange rate measured as the domestic currency price of the foreign currency and foreign variables are superscripted with an asterisk.

Aggregate demand depends negatively on the expected real interest rate, positively on the real exchange rate, and positively on foreign real GDP,

$$y_t = -dr_t + f(e_t + p_t^* - p_t) + gy_t^*. \tag{4}$$

with the usual definition of real interest rate, r_t, as the difference between the nominal interest rate, i_t, and the expected rate of inflation,

$$r_t = i_t - E_t(p_{t+1} - p_t). \tag{5}$$

Two equations describe the asset side of the economy. The first is a typical demand for real balances that depends negatively on the nominal interest rate and positively on real income,

$$m_t - P_t = -bi_t + ay_t, \tag{6}$$

where m_t is the log of the nominal money supply.

The second asset market equation is a perfect capital mobility equation, often called uncovered interest rate parity, in which the domestic nominal

interest rate equals the foreign nominal interest rate plus the expected rate of depreciation of the domestic currency:

$$i_t = i_t^* + E_t\left(e_{t+1} - e_t\right). \tag{7}$$

If the domestic nominal interest rate is higher than the foreign nominal interest rate, the domestic currency must be expected to depreciate. The model is closed with a money supply function that can depend on other variables in the model and with corresponding equations for the foreign country. In all, there are fifteen endogenous variables and fifteen dynamic equations.

By postulating some plausible values for the parameters, John is able to demonstrate the impulse-response functions caused by shocks to policy variables. For example, a permanent increase in the money supply initially lowers the nominal interest rate in the domestic country to clear the money market. It creates expected inflation that further lowers the expected real interest rate, causing an increase in the demand for goods and an increase in output. A depreciation of the domestic currency temporarily lowers the foreign price level, causing an increase in foreign real balances, a fall in the foreign nominal interest rate, an increase in foreign expected inflation, and a rise in foreign output. The exchange rate overshoots slightly, as in the classic Dornbusch (1976) model, in order to be expected to appreciate in response to the interest differential.

Empirical Methods

Taylor's second chapter discusses the econometric aspects of estimating rational-expectations macroeconomic models. He first considers a five-variable, closed-economy model of the United States. The variables are real GDP; the GDP deflator; the wage measured as compensation per man-hour, *Ml*; and the inverse of the unemployment rate. The model is estimated as a constrained autoregressive-moving-average process with seven autoregressive lags and eleven moving-average lags. John estimates the model with full information maximum likelihood subject to all of the model's cross-equation restrictions that arise from the presence of rational expectations of future variables in the different equations. While such methods are tractable in small-scale models, they are intractable in the larger model in the following section.

An International Macroeconomic Framework

Chapter 3 estimates a multicountry empirical model. John enhances the model of chapter 1 by specifying a substantially more complex model while retaining

the fundamental character of the simpler framework. Contract wage determination depends on current and expected future wages and output gaps, and current wages are again a weighted average of past contract wages. Now, though, rather than specifying a single aggregate-demand equation, demand is broken into components for consumer services, nondurables, and durables, as well as investment-demand equations for nonresidential structures and equipment, residential investment, and inventories. Each of these demand equations depends on permanent income and the long-term real interest rate.

Demand for exports depends on the terms of trade and the weighted average of foreign country GDP gaps, while demand for imports depends on the terms of trade and the domestic GDP gap. Finally, the price level is modeled as a markup over wages and foreign prices, and the prices of imports and exports are also modeled as markup equations.

The model adds risk premiums, which are treated as unobserved, serially correlated shocks, to the uncovered interest rate parity equations and to the relations between long-term nominal interest rates and the paths of expected future short rates. Each of the equations in the model is estimated with the two-stage least-squares version of the generalized method of moments of Hansen (1982). Across the G7, there are ninety-eight stochastic equations in the full model.

Structural Residuals and Impulse-Response Functions

Having estimated the structural parameters of the model, chapter 4 sets about developing the structural shocks present in each stochastic equation that are necessary for policy evaluations. The residuals from the estimated equations are not the structural shocks, because the equations contain expectations of future variables and, in the estimation, these expected variables are replaced with realizations. Thus, the estimated residuals contain both the structural shocks and the forecast errors associated with the expected variables.

To determine the structural shocks to the model, John simulates the model dynamically into the future conditioned on the data through each sample point, developing new endogenous variables that are used to replace the expectations. This procedure is done repeatedly until convergence and represents an application of the extended-path method that was first developed by Fair and Taylor (1983). John (Taylor 1993, 109) describes this procedure as "straightforward, but computer intensive."

Armed with the structural residuals, chapter 5 explores how the endogenous variables respond to unanticipated changes in the exogenous policy

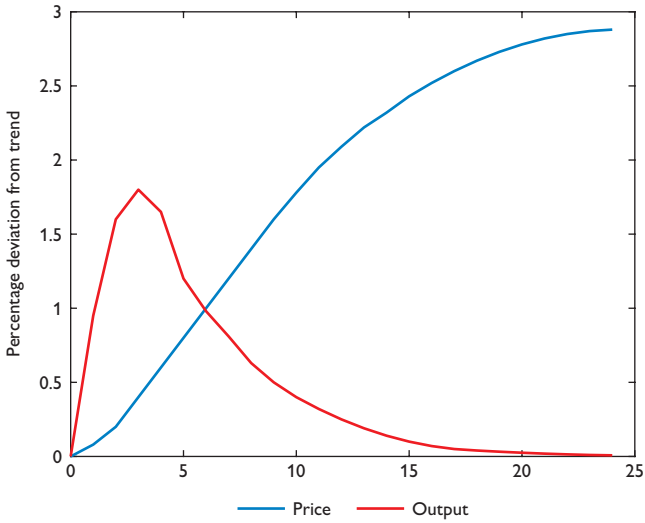

Figure 11.1. Impulse responses of the price level and real output to a 3% increase in the money supply

Source: Taylor (1993)

variables, with a special emphasis on changes in the money supply. There are a total of 136 figures presented.[1] In one experiment, John examines the effects of a permanent 3% increase in the US money supply that is initially announced but is implemented over four quarters. The empirical results are quite interesting and are illustrated here in figure 11.1. We know from the theory that prices and nominal wages will eventually rise by 3%, but they will adjust sluggishly, which creates expected inflation. John finds that it takes four years for prices and wages to increase by 2.5%. Figure 11.1 also shows that in the first quarter after the shock, output jumps 1% above trend, peaks at 1.8% above trend two quarters later, and stays more than 0.5% above trend for three more quarters.

The relatively rapid increase in output with a delayed response of inflation provides precisely the sort of temptation that a discretionary policymaker would try to exploit and that a rules-based monetary policy defends against. A discretionary policymaker faced with an adverse supply shock to real output would be tempted to increase the money supply immediately to offset the shock, perhaps not realizing that inflation would respond later.

In asset markets, as illustrated in figure 11.2, the short-term interest rate falls sharply over three quarters to equilibrate the money market due to the increase in real balances, and this combines with the increase in expected

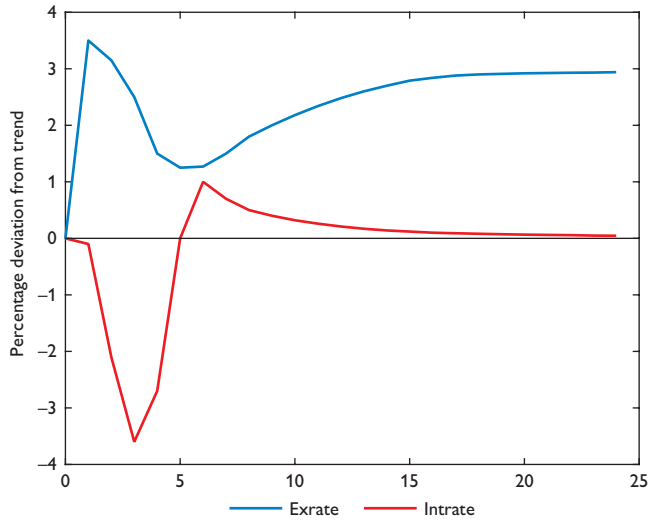

Figure 11.2. Impulse responses of the exchange rate and interest rate to a 3% increase in the money supply

Source: Taylor (1993)

inflation to reduce the expected real interest rate. The dollar depreciates immediately, overshooting its long-run equilibrium increase of 3% by an additional 0.5%. To my knowledge, this represents the first formal empirical evidence of exchange rate overshooting, which is a notable contribution in and of itself.

The fall in the real interest rate and the real depreciation of the dollar increase the demand for output, which also increases the demand for money. After initially overshooting its equilibrium, the dollar appreciates over the next year before beginning a steady depreciation to its eventual equilibrium.

Design of Policy Systems

John's goal in designing government policy is to develop rules for monetary and fiscal policy that minimize a weighted average of the variances of deviations of prices and output from their nonstochastic trends. His chapter 6 begins the search for the best monetary policy rule. Whether it was due to the magnitude of the errors in the money-demand equations during the sample period of the estimation or because of the time that John spent as a policymaker in Washington, or both, the focus of the policy rules moves from a discussion of changes in the money supply to the first explorations of what will become the Taylor rule.

Three questions are addressed. First, is a system of fixed exchange rates better than a system of floating exchange rates? To answer this question, John simulates permanently fixed exchange rates in the model, which, given the capital mobility assumption, requires a common interest rate policy for the G7 countries. Given that such a fixed exchange rate system would require agreement across countries, he specifies that the interest rate rule depends on the current and expected future rates of average world inflation. By comparing the standard deviations of output and inflation to those of a flexible exchange rate regime, in which each country responds with its nominal interest rate to its own current and expected future rates of inflation, John finds that the flexible-exchange rate regime dominates the fixed-rate regime, as independent policies are significantly better at reducing output and price fluctuations.

The second question is whether significant improvements in the goals of reducing output and inflation volatility can be had through coordination of monetary policy rules across countries. By experimenting with different feedback coefficients, John finds that the effects of changes in foreign monetary policy coefficients on domestic output and price variability are minimal. As long as each country follows a Taylor rule, little is gained from coordinating on the values of the coefficients of these rules. The Nash equilibrium with independent reaction functions is thus found to be quite similar to the cooperative equilibrium.

The third question asks, what is the best feedback rule for the interest rate? Should it be focused solely on the price level or on nominal income, or should it have separate coefficients for prices and output? Thus, we see the beginnings of the classic Taylor rule equation, albeit in terms of deviations of the price level and real output from their desired trend rates:

$$i_t = i^* + E_t\left(\pi_{t,t+4} - \pi^*_{t,t+4}\right) + g_1\left(p_t - p^*_t\right) + g_2\left(y_t - y^*_t\right), \tag{8}$$

where $\pi_{t,t+4}$ is the four-quarter rate of inflation and the steady-state trend rates desired by the monetary authority are superscripted with an asterisk. Thus, John argues that the nominal interest rate should be set by the policymaker to be higher than the desired steady-state level of the interest rate if expected inflation is higher than the desired trend inflation rate, if the current price level is higher than the desired trend price level, and if current output is higher than the desired trend output. Pure inflation targeting sets g_2 equal to zero, and nominal income targeting sets $g_1 = g_2$.

Of course, John recognized that in simulating these rules, implied values for the nominal interest rate could turn negative, and he imposed a lower bound of 1% for the nominal interest rate. The simulations demonstrate that setting more weight on price deviations and less on output deviations also gave better performance in most countries.

Conclusions

In this short paper, I have tried to summarize the thought process that John offers in his treatise on normative economics. The four basic steps in going "from econometric design to practical operation" are the following: First, one must develop a state-of-the-art theoretical model of the important aspects of the macroeconomic environment. Second, one must estimate the equations of this model with state-of-the-art econometric methods. Third, one must undertake the difficult task of finding the structural shocks in each equation and their distribution. Fourth, simulating paths of the econometric model with alternative policy rules produces alternative values of the ultimate objective function, which is reducing the variances of output and inflation. Finally, armed with the best policy, you should do as John did. Get involved in the policy debates by interacting with policymakers and politicians to help them understand how best to set policy rules.

Note

1. John examines the effect of an increase in the money supply and an increase in fiscal spending in each of the seven countries in eight graphics including ones showing the effects on output and prices in the country, on interest rates and exchange rates in the country, on nominal and real net exports ratios in the country, on wages and import prices in the country, on the demand components of the country, on exports and imports of the country, on output abroad, and on prices abroad. There are also eight graphics associated with an increase in the Japanese money supply under an assumed fixed-rate system, as well as eight graphics associated with anticipated increases in US monetary and fiscal policy.

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12

International Cooperation in the Age of Taylor: Collective Action Clauses and Exceptional Access Policy

Barry Eichengreen

Among John Taylor's signal achievements as under secretary of the Treasury for international monetary affairs were to successfully promote the inclusion of collective action clauses in sovereign bond contracts subject to US (more precisely, State of New York) governing law and to encourage adoption by the International Monetary Fund (IMF) of what is now known as its exceptional access policy. Most academics and officials would agree that these were important steps in strengthening the international financial architecture. It is said that context is everything, and the context for these initiatives was the Mexican debt crisis of 1994–95. The Mexican crisis led to an unprecedentedly large program (some would say "bailout") of the country by the IMF. The size of the rescue package created concerns about moral hazard. Some observers worried that the Mexican rescue might encourage risk-taking by policymakers in emerging markets by creating the expectation of lavish aid if things went wrong. Others worried that it might encourage additional risky lending by fostering the belief that banks would be paid back in full despite difficulties, courtesy of official funding.

My own involvement with these issues also goes back to the Mexican crisis. In 1995 Richard Portes and I organized a study that concluded that the solution to these problems was to make it easier for sovereigns in debt distress to restructure (Eichengreen and Portes 1995). If restructuring could be completed more quickly and efficiently, we argued, the IMF would feel less pressure to provide a large relief package to avoid the deep and lengthy recession that would otherwise accompany rescheduling of negotiations. Both

forms of moral hazard alluded to above would thereby be avoided, or at least greatly reduced.

Our suggestion for facilitating restructurings, what we called "orderly workouts," was to add collective action clauses to sovereign loan agreements. Collective action clauses (CACs) are provisions in the bond covenant that allow a restructuring to proceed on a positive vote by a qualified majority of creditors. If the specified majority so votes, the terms of the restructuring are then imposed (crammed down) on the dissenting minority. These clauses can specify how the creditors' committee undertaking negotiations with the sovereign is organized (so-called collective-representation provisions) and other procedures to follow. Such clauses were conventionally included in sovereign bonds issued in London, where they were found already in the nineteenth century, but for obscure historical reasons not also bonds issued in New York.

This was the gauntlet and idea taken up by Under Secretary Taylor in 2002. To accomplish the task—to see that CACs became the standard in sovereign bonds issued in New York—John had to overcome multiple obstacles. A fear of higher borrowing costs limited the willingness of emerging-market issuers to adopt the provision. They worried that issuers might be seen as sending a negative signal about their own creditworthiness—as anticipating a need to restructure. First movers also faced a potential novelty premium, CACs being unfamiliar to many market participants in New York. Further complicating the situation was that there also existed an alternative IMF proposal (or, more precisely, the IMF first deputy managing director's proposal) in Krueger (2002). That Taylor and Krueger were both Stanford professors on leave and longtime golfing partners did not prevent the press from characterizing them as rivals and even bitter enemies.

Rather than by a great leap forward, history was made through a series of small steps. In March of 2012, John wrote a one-page memo to Treasury Secretary Paul O'Neill making the case for collective action clauses. On April 2 he made a speech at the IMF Spring Meetings announcing the Treasury's "action plan," which included steps to encourage the adoption of CACs. On April 19 the Group of Seven (G7) countries signed on to the action plan. In the summer of 2002, the Treasury led an international effort to develop model clauses. At the IMF's Fall Meetings that year, the United States brought together stakeholders, both private and public, in the Treasury Cash Room with the goal of achieving a consensus, but no agreement was reached. All the while, however, lobbying proceeded behind the scenes.

Finally, in January 2023, Mexico agreed to go first, issuing a sovereign bond with collective action provisions. Before long, scores of other countries followed.

The associated literature considers the hopes and fears associated with this initiative. Comparing bonds issued on the London and New York markets, Eichengreen and Mody (2004) find that CACs are associated with lower borrowing costs for sovereigns with high credit ratings but higher borrowing costs for those with low ratings. An interpretation is that sovereigns with good credit and every intention of repaying are regarded more favorably; they can restructure even more quickly, with a minimum of disturbance, if the untoward unexpectedly happens, while sovereigns with poor credit, whose willingness and ability to repay is suspect, are seen as becoming even more inclined to restructure. Thus, CACs have the constructive effect of encouraging investors to differentiate even more strongly between good and bad credits, encouraging the latter to work to improve their ratings. Eichengreen and Mody (2000) previously showed that this result carries over to corporate as well as sovereign bonds. Eichengreen and Mody (2003) likewise report the same finding for CACs including aggregation clauses, where the bondholder vote is not for individual bond by individual bond but rather aggregated across various issues of the sovereign. A later study incorporating an additional decade and more of data (Chung and Papaioannou 2020) finds that these so-called enhanced collective aggregation clauses, widely introduced in 2014, are associated with lower borrowing costs for both noninvestment-grade and investment-grade issues. Once investors became familiar with these provisions, it appears, they did not associate them with moral hazard but rather with the benefits of efficient, orderly resolution processes that limit the pressure on the IMF and creditor governments to lend in the event of debt distress.

Simultaneous with advocating for CACs, John sought to limit the size of IMF loans directly, advocating the adoption of hard-and-fast rules. Formally, the Fund limits access at 200% of a country's quota annually and 600% of quota cumulatively over the life of a program. In practice, however, access limits were honored mainly in the breach, often in instances of large-scale capital flight, where IMF finance was used to pay off foreign (and domestic) credits seeking to exit. The 1995 Mexican loan, for example, was seven times quota (when the $17 billion standby credit is included). Taylor's advocacy of hard-and-fast rules was clearly influenced by work on monetary policy, such as Kydland and Prescott's (1977) seminal argument for the superiority of rules over discretion.

With US prodding, a formal exceptional access policy (EAP) was adopted in 2002 and revised in 2016, specifying procedures and criteria for loans

above the Fund's normal access limits. The original 2002 policy required the presence of "exceptional balance of payments needs" owing to pressures on the capital account; a systematic analysis indicating the high probability that a country's debt will be sustainable; good prospects of the member regaining private-capital market access so that IMF funds constituted only a temporary bridge; and strong prospects of successful internal and external adjustment, including the institutional and political capacity to deliver the last of these desiderata. The revised policy differs mainly by mandating a more extensive analysis of debt sustainability. The policy also specifies decision-making procedures, involving a higher burden of proof than in the case of a normal program.

The Fund's Independent Evaluation Office (2024) recently evaluated the policy. It concludes that the EAP policy succeeded in encouraging "deliberate and systematic consideration" of large programs. But the lack of clear numerical and other benchmarks has raised questions about evenhandedness—whether members are being treated equally, irrespective of political circumstances. It notes repeated ad hoc changes in the framework as special cases arise—the "systemic exemption" for systemically important countries, for example. Staff is said to have reverse engineered whether cases qualify, to allow preferred programs to go forward.

The average size of IMF arrangements in fact declined slightly (as a percentage of recipient country GDP) with adoption of the strengthened policy in 2016. But there are exceptions, such as the controversial 2025 program for Argentina, whose market access and successful adjustment remain a question but whose loan is nonetheless 500% of quota.

Thus, John Taylor's international financial achievements while at the Treasury were considerable. Collective action clauses have become the norm, largely because of his efforts. That said, efforts to limit the size of IMF programs remain a work in progress. This situation will not surprise monetary economists familiar with the problem of time inconsistency and the argument for rules over discretion.

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GENERAL DISCUSSION

David Papell: I want to say something about the intersection of kindness and students. In the spring of 1990, I was in Washington, DC, when John Taylor was a member of the Council of Economic Advisers. I tried calling his office to see if I could see him sometime. His secretary was, let's say, not particularly friendly or encouraging. And then she said something like "Who are you again?" I happened to mention I was an ex-student. She responded, "John always wants to go to lunch with ex-students. When would you like to come?" It's just yet another testament to his character.

John A. Gunn: One of your panelists mentioned how John made the world a better place. I'd like to offer another instance. I want to give you a pragmatic view that I know something about. In his tour as under secretary of Treasury for international affairs, he worked with Iraqi officials to establish the central bank. John was back at Stanford when the Iraqi civil war still had a few years to go. The reforms moved slowly but now are accelerating, and the fundamental change in the Iraqi financial system has remained intact. In the last five years the number of Iraqi bank accounts has risen from two million to approximately twenty million. The Baghdad skyline is full of cranes with a construction boom. With Turkey, Iraq is building an alternative trade route to Europe bypassing the Suez Canal.

The Iraqi central bank has had one devaluation since its inception. I believe since the inception of the postwar 2003 dinar, the currency of Iraq, in a little over twenty years has appreciated against the dollar by approximately 40%. This reform John Taylor helped launch is an instance where pragmatic application of economic theory has helped lead to a meaningful increase in the quality of the lives for forty-two million Iraqis with a median age of 22.

John F. Cogan: Thank you, John. And thank you, panelists, for the time and effort you took to make these presentations.