



FEDERAL RESERVE BANK
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The Credibility of Government Policies: Conference in Honor of Guillermo Calvo

The Credibility of Government Policies

Andy Neumeier and Martín Uribe

Calvo, Currencies, and Commitment

Maurice Obstfeld

Among the Many Lessons on Credibility from Guillermo: From Inflation Stabilization to Sudden Stops

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It's Still Time to Get Back to Rules-Based Monetary Policy

John B. Taylor

Final Remarks

Guillermo Calvo



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The Credibility of Government Policies

Conference in Honor of Guillermo Calvo

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In the late 1970s and early 1980s, Guillermo Calvo was a leading member of a group of economists that revolutionized the field of macroeconomics by modeling how each agent's microeconomic incentives and the anticipation of future policies shape the current macroeconomic equilibrium. In celebration of his work, a conference was held in his honor on February 22-24, 2023 at the Federal Reserve Bank of New York and at Columbia University. The conference's program, videos, and papers can be found on the website.

The conference's program and participants represented Guillermo Calvo's interests and legacy in academia and policy circles. The conference featured the presentation and discussion of seven academic papers, five invited lectures, and five policy round tables.

The conference celebrated the 45th anniversary of the publication of the paper (Calvo 1978). This paper shows how a conflict between the interests of the current government and those of a future government, both of which share the same objective of maximizing social welfare, gives rise to a credibility problem. This seminal paper kickstarted a broad research agenda, which includes, for example, the problem of inflation stabilization, the unintended consequences of non-credible policies, balance of payments crises, sovereign debt crises, and the design of sustainable public debt management strategies.

Several presentations at the conference circled around the theme of optimal policies and their credibility. Nobel laureate Christopher Sims's "Optimal Fiscal and Monetary Policy with Distorting Taxes" (Sims 2022), Giancarlo Corsetti's "Gambling to Preserve Price (and Fiscal) Stability" (Corsetti and Maćkowiak 2022), Marina Halac's "A Theory of Fiscal Responsibility and Irresponsibility" (Halac and Yared 2022), Şebnem Kalemli-Özcan's "Monetary policy cyclicalities in emerging economies" (De Leo, Gopinath, and Kalemli-Özcan 2022), and Pablo Ottonello's "Fiscal Stimulus under Sovereign Risk," (Bianchi, Ottonello, and Presno 2019).

The conference also celebrated the 40th anniversary of the publication of Calvo's (Calvo 1983) - the paper behind the term "Calvo pricing." Two presentations at the conference were motivated by the slow adjustment of prices. Fernando Alvarez's "Price Setting with Strategic Complementarities as a Mean Field Game" (Alvarez, Lippi, and Souganidis 2022), and Ivan Werning's "Expectations and the Rate of Inflation" (Werning 2022).

Guillermo Calvo's practical interest in the emerging economies of Latin America led him

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to work as a senior advisor in the International Monetary Fund's research department (1988-1993), during the time when it was led by Jacob Frenkel, and as the Inter-American Development Bank's chief economist (2001-2006). He has also been a perennial sounding board for policymakers. The conference policy panels "Monetary Tightening, Inflation, and Debt Sustainability," "Fireside Chat on Taming Inflation," "Managing External Shocks: Global Inflation Pressures, Supply Disruptions, and Global Monetary Tightening," "Back to 2% Inflation?," and "Decision-Making with Limited Credibility" reflected this interest. The panelists included former or current central bank governors and finance ministers from Argentina, Brazil, Chile, Colombia, Israel, Mexico, the United Kingdom, and Venezuela; chief economists of the International Monetary Fund; high-ranking policymakers for Presidents Bush and Obama; an advisor to the Italian prime minister Mario Draghi; three members of the Federal Reserve's FOMC; and a former president of Mexico.

Inflation was the focus of attention for most panelists. John C. Williams reiterated the Fed's commitment to the 2 percent inflation target and stressed the importance of keeping expectations anchored. James Bullard argued that this anchoring of inflation expectations makes analogies with the Volcker disinflation misguided. The Fed had very little credibility back then and, as a result, had to take costly steps that may not be required in the current environment. Mervyn King analyzed the role of expectations in pinning down the inflation rate and argued that past credibility alone cannot maintain price stability in the face of a large and unwarranted expansion of the broad money supply. Francesco Giavazzi and Silvana Tenreyro emphasized the role of supply shocks on the economy. Giavazzi discussed the role of fiscal policy in mitigating supply shocks, while Tenreyro stressed that the rise in energy prices was a large terms-of-trade shock that could not be fully offset without running the risk of substantial overtightening and undershooting of the target in the medium term. Federico Sturzenegger, on the other hand, warned against reading too much into specific shocks, as relative price adjustments cannot be the source of prolonged inflation, and highlighted the danger of focusing on high-frequency data for a complex phenomenon like inflation. Jacob Frenkel argued that it is the goal of monetary policy to ensure that shocks are transitory rather than permanent and that discussions on the nature of the shock cause policymakers to "fall behind the curve" by construction. Richard Clarida argued that both the Fed and US fiscal policymakers had the wrong assessment of supply conditions and engineered a demand level that was too high for price stability. Pierre-Olivier Gourinchas also focused on fiscal policy during the pandemic as a driver of imbalances between nominal spending and actual production, which resulted in price adjustments.

The closing policy session was composed of distinguished policymakers in Latin America and dealt with the issue of decision-making with limited credibility. Ernesto Zedillo discussed his past experience as president of Mexico during a run on the country's public debt and how Calvo's academic papers helped Mexican authorities understand and navigate the crisis. José Antonio Ocampo, Colombia's current finance minister, tackled the issue of earning credibility during a time of complexity due to multiple competing shocks. Ilan Goldfajn also shared his experience in policymaking to stress the enduring relevance of Calvo's insights.

Three of Calvo's colleagues at Columbia in the 70s and 80s— Maurice Obstfeld, John Taylor, and Michael Woodford— and his student Carmen Reinhart gave special lectures during the conference.

Michael Woodford and Maurice Obstfeld discussed Calvo (1978) in their presentations.

According to Woodford, the paper is one of the key references in the development of one of the biggest ideas in macroeconomics in the latter part of the 20th century: the recognition that if people's expectations are endogenously shaped by the predictable character of government policy, then conventional optimal control approaches to the design of an optimal policy are invalid. The problem with applying Bellman's principle of optimality to the choice of an optimal policy reaction function is that it would lead the optimizing policymaker to choose actions that do not continue the plans that were the basis for their own previous calculations of optimal policy. This choice gives rise to the time inconsistency that is in the title of Guillermo's paper. This might seem like only a technical issue related to the correct way to calculate optimal policies using theoretical models, but it has profound implications for thinking about policy, and monetary policy frameworks in particular. Kydland and Prescott (1977) and Guillermo's 1978 paper imply that a purely discretionary approach to policy can lead to very sub-optimal outcomes, even when the discretionary policy is being calculated using a model that is precisely correct, the state of the economy is recognized with total precision at all times, and optimal policy is correctly calculated using a correct loss function to evaluate alternative outcomes. Instead, they show that there are, at least in principle, large potential gains from commitment in advance to constraint policy.

Maurice Obstfeld offered his conjecture on the origins of Calvo's time consistency paper, which, even if it is wrong, reflects his vision of the world. Robert Mundell, another colleague at Columbia, published the paper "The Optimum Balance of Payments Deficit" in 1972 (Mundell 1972). In this paper, Mundell tried to model a vision of the international monetary system in which the United States, by issuing a global currency, extracts seignorage from the rest of the world. Calvo built on the paper and took the conversation in a completely different direction. Mundell was looking at an empire that provided money to a colony. His paper was largely a steady-state analysis. Calvo, building on insights from Auernheimer (1974), who studied the revenue-maximizing rate of inflation, started to look at the dynamics of this problem. He quickly found that under rational expectations, if you write down an optimization problem, you find a time inconsistency result. He took the further step of arguing that money demanders would anticipate this, and this would result in a very unfortunate equilibrium far from any sort of optimum that a central planner with commitment would pick. That was the argument in the original working paper version of Calvo (1978) from February 1976. At some level, the fundamental idea fed into the *Econometrica* paper, which made crystal clear, as his first paper did not, that even if you are a benevolent planner maximizing the representative consumer's welfare, you will still run into this problem. In a sense, for governments, the road to hell may be paved with good intentions.

Obstfeld's lecture then pursues the implications of this literature for the international monetary system. He argues that the literature on the dollar's global role has gone down the path pioneered, perhaps unwittingly, by Bob Mundell and by Guillermo Calvo. A modern branch of the literature on the US' exorbitant privilege stems from the fact that US public debt serves as the world's liquid asset. Effectively, the US government is producing and, in some sense, selling the liquidity services of these bonds (Chris Sims's keynote presentation at the conference touched on this issue). The credibility problem is central because saying "safe assets" implies a commitment to make them safe. And how this commitment takes place is not at all clear. This is what has been called the "new Triffin problem" by Farhi, Gourinchas, and Rey (2011). It is deeply related to Calvo's classic paper on servicing the public debt

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(Calvo 1988b), and the possibility of multiple equilibria and runs on the public debt when the issuer cannot commit to making it safe. Corsetti's presentation at the conference revisited this problem, pointing out that the government's inability to actually commit to the safety of its "safe" assets results in welfare losses all around. There are some other even more recent contributions, still in working paper form, on this theme that the supply of US safe assets may be inadequate when the US determines the supply in a way that maximizes some policymaker's occasional objective. See Coppola, Krishnamurthy, and Xu (2023), and Choi, Kirpalani, and Perez (2022).

Obstfeld went on to pose yet a new dimension of the time inconsistency problem. A new vintage of external liability devaluation takes place through interference with the foreign government's official international reserves. This is a big issue with Russia, Afghanistan, and, going back in history, Iran when its reserves were frozen. This is central to the Triffin problem of whether the US would be able to meet its obligation to redeem official reserves in gold at \$35 dollars an ounce. If you go back to 1940, the US froze Japan's foreign reserves when Japan moved militarily further into Southeast Asia, and doing so helped set off the attack on Pearl Harbor. With the seizure of reserves of a major player like Russia, we may be entering new territory, and we do not know yet the ramifications for the global system.

Reinhart's presentation paints the garden of insights that sprouted from Calvo (1978). She toured the important work of the Calvo crowd in Washington in the late 1990s including contributions on inflation stabilization, the determinants of capital flows, contagion, public debt management, the transition of Eastern Europe to a market economy, sudden stops, and the Mexican financial crisis (see the bibliography).

John Taylor's presentation assessed the current monetary stance in the United States through the lens of a simple Taylor-type interest rate feedback rule. He argued that given the current rate of inflation, to achieve its inflation target of 2 percent, the Fed should continue to tighten monetary conditions. His speech highlighted the value of following a rule as a way to build and maintain credibility, a theme that is present in much of Calvo's work.

We now turn to another topic in Woodford's lecture that is central to Calvo's thought. Woodford's lecture emphasized the influence that Calvo's paper, (Calvo 1983) has had on all the modern literature on the theory of monetary policy and on the kind of model-based policy analysis that goes on in central banks. The paper contributed to literature initiated by Ned Phelps and John Taylor, both of whom were colleagues of Calvo's at Columbia. This literature pointed out that Lucas (1972) had obtained a strong conclusion about the pointlessness of monetary stabilization policy, not simply by assuming rational expectations but by assuming that wages and prices were determined in instantaneously clearing spot markets. Phelps and Taylor pointed out that one could assume rational expectations but have wages or prices that were not constantly adjusted to fit current market conditions, and still have a role for monetary stabilization policy. Guillermo's paper was an important step forward in two dimensions. On the one hand, it had much more explicit micro-foundations for the problem of the price-setting firm on those occasions when a firm reconsidered its prices, as well as explicit micro-foundations for the rest of the macro model. But the influence of the paper on the New Keynesian literature is probably, due even more to its progress in making models with sticky prices and/or wages analytically solvable in a way that provides insight into how they work. Calvo (1983) had the advantage over the previous literature of yielding (quantitative) dynamics that were independent of any arbitrary period

length, a parametric degree of price flexibility that could be set to be empirically realistic values, and a clever choice of an exponential distribution of time intervals between price changes. It was a model that aggregated very neatly, allowing the dynamics of the model to be written in terms of a very small state space. This allowed for the construction of fully articulated dynamic stochastic general equilibrium models that remain simple enough to be computed and estimated on the basis of a few time series, usually using relatively straightforward econometric methods.

Calvo's model of staggered prices not only provides a rationale for monetary stabilization policy but also developed a new approach to evaluate the welfare costs of inflation. Having a micro-founded tractable model with staggered price adjustment also implies that there are welfare losses from deviations in the inflation rate from zero. Specifically, a deviation of the overall inflation rate from the rate at which prices are changing when they are not being reoptimized by the price setters. It implies welfare losses when the inflation rate deviates from a rate such as zero and not just from deviations of the inflation rate from whatever rate was expected at an earlier point in time, which is what the Lucas-type model of the Phillips curve trade-off would imply. This provides micro-foundations for a policy needing to aim at targeting a low rate of inflation and not simply at ensuring that the inflation rate is predictable at whatever level it has. Thus, the Calvo model of price adjustment yields a welfare-theoretic theory of optimal monetary stabilization policy.

The conference closed with Calvo's reflections on the three days of discussions. Here, we focus on the lessons he drew from the development of macroeconomics from the mid-1950s to the 1970s. Macroeconomics at the time did not have a framework to think about the future. Dynamic macroeconomics started to grow when it tried to liberate itself from the IS-LM static model. The problem was that at the time, we did not know how to deal with the model when you had a future and perfect foresight. The dominant model at the time was one with adaptive expectations, and adaptive expectations keep you looking backward. Calvo recalled that he was personally concerned because he was always obsessed with issues of credibility, so he could not even formulate the problem. The exercise of credibility and time consistency was impossible. Models with perfect foresight were dismissed because the natural assumption at the time was that prices cannot jump (since they are sticky), so dynamic models with perfect foresight and an initial condition for the price level led to hyperinflations or hyper-deflations, even with a constant money supply. We now know that Sargent and Wallace (1973) fixes this problem by solving the same dynamic equations forward and letting the initial price level be a free variable. In their new framework, the equilibrium price level was the only one that did not explode. Calvo reflected that this paper was written in 1973, and the paper by Phillip Cagan on hyperinflation (Cagan 1956). It took macroeconomics two decades to grow out of backward-looking economics. The part of the rational expectations revolution that he recovers as a positive addition, independently of many other things, is precisely that it helped to develop a framework where we can talk about the future and where rationality makes sense. Of course, one can disagree on the details, which is interesting because **models are there to be changed, not to be admired**. Calvo has always thought of models as a tool you use to have insights into the real, complicated world. But in Calvo's own words, sometimes "*models are also cages. Golden cages that prevent you from seeing beyond them. That is why thinking in a more outside-of-the-box way is good. One must be doing that exercise constantly. By the way, for the young generation who are*

A Stylized Model of Staggered
Wage Contracts
 (Basic Equations)

by Guillermo A. Calvo
 April 1979

We assume

$$(1) Y_{t+h} = \hat{Y}(\tilde{w}_t, p_{t+h}, \tilde{w}_{t+h})$$

where

\tilde{w}_t = nominal wage set at time t

p_{t+h} = price level at time $t+h$

\tilde{w}_{t+h} = average nominal wage at time $t+h$

Y_{t+h} = nominal profit at time $t+h$

Objective of wage setter at t is

$$(2) \text{Max}_{\tilde{w}_t} \int_0^{\infty} \hat{Y}(\tilde{w}_t, p_{t+h}, \tilde{w}_{t+h}) e^{-\int_t^{t+h} [\delta + i_s] ds} dh$$

where

$\delta e^{-\delta h}$ = probability that contract will last for h periods

i_t = nominal interest rate at t .

Figure 1

Obstfeld's Handwritten Notes of an Early Draft of Calvo (1983)

still very productive, that is one very simple way of writing a paper that may be influential."

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Calvo, Currencies, and Commitment

Lecture in *The Credibility of Government Policies: Conference in Honor of Guillermo Calvo*

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It is a great pleasure, as well as an honor, to celebrate Guillermo's career and influence in this distinguished company.

As we all know, Guillermo has had his immense impact not only at the macro level, through his writings and lectures, but also at the micro level of personal intellectual interchange and kindness. Many of you at this conference have lauded Guillermo's macro contributions, and I certainly will not shy away from that. But let me start with something less familiar, my own micro story.

I came to Columbia in 1979, fresh out of MIT and eager to pursue macroeconomics. At the time, the two hot, young, newly tenured macroeconomists at Columbia were Guillermo Calvo and John Taylor. I knew Taylor's work well before finishing at MIT: Stanley Fischer, a member of my dissertation committee, was working on similar questions concerning nominal contracts. I did not encounter Guillermo's work until later in my graduate-school years. However, my introduction to it was memorable.

It was December 1978. I was finishing up my dissertation and getting ready to go on the job market, living in a shabby second-floor apartment with three other economics graduate students at 46 Dana Street in Cambridge. At the time, I was awaiting the arrival by mail of the November *Econometrica*, the one journal I subscribed to then. Returning from Kendall Square one cold and windy afternoon, I found that a window pane in the downstairs entryway door had been smashed in. Winter air would have been rushing in but for the quick thinking of one of the building's residents, who had picked up the *Econometrica* that the mailman had left and nailed it to the door to cover the missing glass.

Unhappy about this, I carefully extracted the nail and examined the cover. I saw some familiar names. The lead paper (Hausman 1978) was one I already knew well because its author had taught me econometrics and was on my dissertation committee. Another was a paper by Bob Lucas (Lucas 1978), which I knew because Lucas had presented it the year before in a seminar at MIT. But just ahead of Lucas was a paper with a very intriguing title by Guillermo Calvo (G. Calvo 1978a). This one was new to me. Figure 1 shows my own copy of this landmark issue of *Econometrica*, which I have kept through the years. You can see the exact position of the hole by which the journal was fastened to block the New England winter wind. I like to think that the marginal product of this object (despite the

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Figure 1
Hole left by the nail

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hole) has been higher in my library, and I assume someone has repaired that broken window by now.

Guillermo's influence in macroeconomics — and I mentally see “international” in parentheses here because he has been particularly influential in international macroeconomics — permeates every corner of the field. His mentorship shaped me. His appreciation for the classics, the history of the field, has, for me, always made his encyclopedic perspective on current research especially memorable. I had the remarkable good fortune to be a beneficiary at the start of my career. While I am deeply intellectually indebted to more senior scholars at Columbia who were central to its ecosystem of international and macroeconomics at the time — notably Jagdish Bhagwati, Carlos Díaz-Alejandro, Ron Findlay, Bob Mundell, and Ned Phelps — it was Guillermo who spent the most time with me and from whom I learned the most.

Last night, however, the tribute by Andrés Velasco put me in mind of one of my greatest gifts from Guillermo. Andrés talked about his curiosity, his uncertainty, and his wonderful remark about other economists: “I wish I could be as sure of anything as they are about everything.” I think this attitude, this openness to being surprised, is one key to my connection with Guillermo. My entire upbringing in economics took place at MIT, where Rudi Dornbusch and Fischer were the role models, and in the general Cambridge environment. It would be fair to say that more than a few of the Harvard and MIT professors in macro and related fields had a degree of swagger. Expressing doubts and admitting knowledge gaps were not a big part of the *modus operandi* — and still often aren't. Iván Werning's confession of uncertainty yesterday therefore was quite refreshing, coming from someone based in Cambridge! Given my personality type, I could never quite be comfortable with Cambridge “attitude.” Thus, one of the most important things Guillermo modeled for me was a different way of engaging intellectually — not by pretending to know things you do not know or by making overly strong assertions or by intimidating your debate opponents but by acknowledging that the world is complex, admitting how much we do not understand, and being humble and open to questioning in the face of that uncertainty. In light of Guillermo's gentle approach, the scope of his intellectual influence is all the more impressive. At Berkeley, where I later landed, George Akerlof had much the same disposition and set the tone through his example.

My other great experience with Guillermo is that I never, in our conversations, felt that his time was limited. He seemed never to be aware of the clock. In some sense, the Lagrange multiplier on his time constraint has always been zero for me and that has also been an incredibly rare and valuable gift, which I am sure many of you share.

My office was on the tenth floor of this building (Columbia's International Affairs Building), where most of the Economics Department was located in those days. Guillermo's office was one floor up on the eleventh, and I often would climb the stairs to see him and escape the more manic energy that sometimes gripped the tenth floor. The door was open, the environment was serene, and anything other than intellectual conversation seemed far away. I came away from every visit with deeper insight and broader horizons.

Guillermo was pushing the research envelope in a multitude of directions. In retrospect, I am amazed at how much he was able to accomplish. John Taylor also was doing cutting-edge work at Columbia then. Fast forward to 2023, and the policy models commonly used in all central banks have Calvo contracts and the Taylor rule (along with the policy modeling

approach in Taylor 1979) among their key components. Who knew? I have no clue how Guillermo and John had the sheer time needed for their foundational research. Teaching loads in economics were heavier than they are today (and real wages lower). When I arrived at Columbia, for example, I taught two courses per semester — and in addition, joined in running seminars in trade and macro. Indeed, in my first semester, Department Chair Stan Wellisz had me teach graduate econometrics, of all things. If I recall correctly, both Karnit Flug and Miguel Kiguel, who are here in the room, were subjected to that class. So, the teaching burdens were heavy, and yet a lot of consequential research was coming out of Columbia. Guillermo and John were in the forefront, but they were not alone.

Guillermo was always humble about his ideas. On one memorable day, he pulled three pages of handwritten notes from a file cabinet, handed them to me, and said, “Take a look at this. Do you think it could turn into something someday?” So, I read the notes, which are reproduced in Appendix A. I do not think I contributed anything to the final product, G. Calvo (1983), which is pure Calvo. But consider how much we talked about that paper in this conference yesterday and how much of modern macroeconomics is based on it. We are not here to celebrate G. Calvo (1983), but perhaps we will need another conference for that one.¹

Let me return to the 1978 paper in *Econometrica*, G. Calvo (1978a). As I told you, I first encountered this paper nailed to a door, which puts me in mind of Martin Luther’s ninety-five theses. The analogy is not so far-fetched. Like Luther’s theses in religion, Calvo’s thesis had a revolutionary effect in economics, and has left its mark widely. His central finding has sent out many branches and runners, resulting in an amazing garden of insights. Carmen Reinhart’s wonderfully comprehensive talk this morning gave you an idea of the general reach of Guillermo’s research, but here today, I want to trace just one offshoot of his work on dynamic inconsistency. The offshoot concerns the nature of the international monetary system (IMS). For many of you, this focus may look marginal in terms of its salience in the wider macro literature. I would argue, however, that the topic is of central importance to any understanding of how the global economy actually works.

Over the years, I have formed a view of the origin of Guillermo’s 1978 *Econometrica* paper. Having chatted with Guillermo more recently, I do not think this story is totally inaccurate. In any case, it fits well with the account I will offer of the importance of Calvo’s work on time inconsistency and commitment in thinking about the IMS.

As I have noted, Guillermo has a great reverence for his predecessors, and one of them was Bob Mundell, our Columbia colleague. I believe Guillermo’s thinking was catalyzed in part by a little-known and, frankly, rather odd paper that Mundell published in 1972. One Calvo quality that has always impressed me is that he is never dismissive: bring him anything, and he will find something interesting. That was the case with this paper too. Mundell wished to model a vision of the international monetary system in which the United States is the monopoly issuer of a global currency and thereby extracts seigniorage from the rest of the world. In a vague way, the setup was intended capture the dollar’s central role in the Bretton Woods system, though Mundell never quite explains how. Notwithstanding that gap, Guillermo built on this paper to take the conversation in a totally different direction. And that has proven to be a durable legacy of Mundell’s paper. Figure 2 shows the first page of the Mundell seigniorage paper, Mundell (1972) along with a photo of Mundell as he was when he was on the University of Chicago faculty and editing the *Journal of Political*

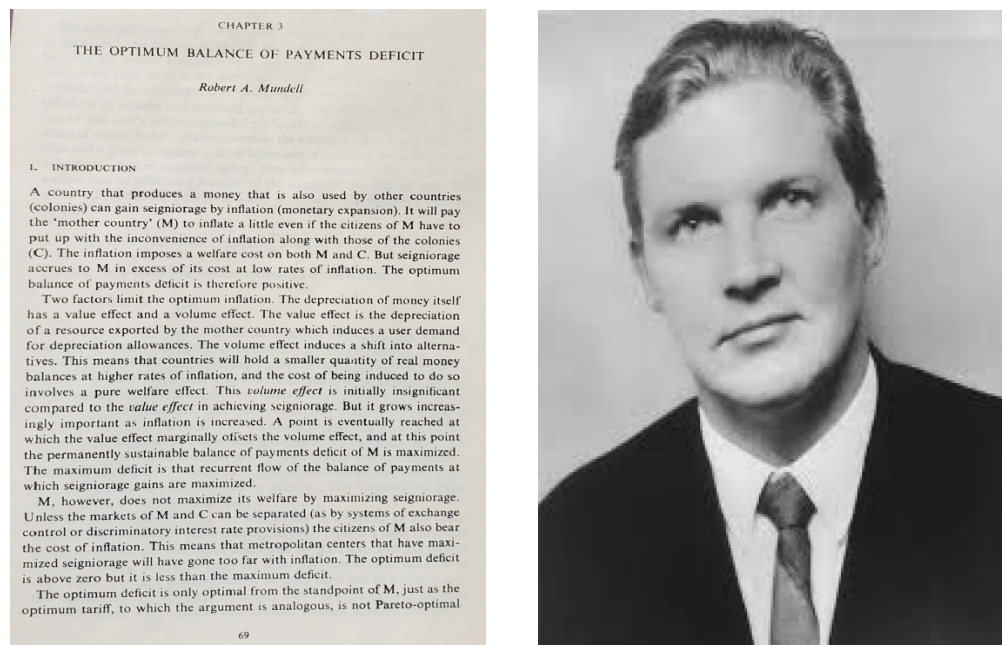


Figure 2
Robert Mundell and his paper on seigniorage

Economy, which he did between 1967 and 1970.

Mundell’s framework postulated an “empire” that sells money to a “colony.” It is largely a steady-state analysis, in the mode of the celebrated optimal seigniorage rule derived by another Columbia character, Phil Cagan (Cagan 1956). Guillermo had long been fascinated by the topic of seigniorage and had been struck in particular by a 1974 paper of Leonardo Auernheimer (Auernheimer 1974). Guillermo has discussed this paper’s influence on him elsewhere (G. Calvo 2011). Auernheimer’s point was that to analyze the seigniorage gain from a change in the rate of monetary growth, steady-state analysis might be misleading owing to the dynamic downward adjustment of desired real balances to the change. If the government allowed the price level P to jump upward initially as people reduced their real money demand in response to higher inflation expectations, then this expropriation of private real money balances would raise the resulting present value of seigniorage revenue, compared with the value under an “honest” government that reduced the nominal money supply so as to hold P initially fixed.²

Conscious of Auernheimer’s contribution, Guillermo started to look into the dynamics of the Mundell problem and quickly saw that under rational expectations, writing down an intertemporal optimization problem leads to a time inconsistency result. He then took the further step of arguing that money demanders would anticipate this, which would lead to a very unfortunate equilibrium far from any sort of optimum that a central planner with commitment would pick (G. Calvo 1978b). This finding is actually mind-blowing, but put yourself in the place of people who were reading the February 1976 Columbia working paper version for the first time. The first time you read the paper, you might say, “This is wrong.” And then, looking again, you understand a bit more and say, “Okay, yeah — but

this is totally trivial. Why would anyone write a paper on that?” Finally, though, after fully understanding, your reaction is different. You now say, “This is really profound. This is going to change the way we think about macro policy.”

I believe that this fundamental insight fed into the *Econometrica* paper, which made crystal clear, as the earlier paper on the Mundell problem did not, that even if you are a benevolent planner, even if you are maximizing the representative consumer’s welfare, you will still run into this problem. For governments, the road to hell may be paved with good intentions.

I now want to pursue some implications of this line of thought for the international monetary system, which is where Mundell first situated the discussion. To my mind, much of the literature on the dollar’s global role has followed a path that was pioneered, perhaps unintentionally, by Bob Mundell and Guillermo. Commitment and time inconsistency issues are now seen as absolutely fundamental, but the issues of a global currency and the seigniorage gains to its issuer remain in a new form. Back in the early 1980s, when I first learned of Mundell’s seigniorage model, I considered it to be a bit misguided because foreigners do not hold dollar bills (outside of the underground economy) and the dollar international reserves held by foreign official holders are not dollar bills. They are interest-bearing US Treasury obligations. However, the United States is indeed a monopoly issuer of those safe assets, as it is of US currency. And US Treasuries underpin much of the international financial system in the roles of standard of value and collateral. They are central to a web of network externalities in trade and finance that make the U.S. dollar effectively a world currency (Gopinath and Stein 2021). Accordingly, recent literature stresses a convenience yield of US government bonds for global investors, above and beyond the interest yield. Furthermore, the monopoly issuer, the US government, faces a downward sloping demand curve for its bonds in the sense that greater supply compresses the marginal convenience yield, raising the required interest yield and reducing bond prices. These insights and the supporting evidence have motivated a range of research on the international monetary system, including questions as diverse as exchange-rate determination and the adequacy of global liquidity.³

One of the earlier contributions signaling a renewed interest in the liquidity of bonds was the 2012 paper by Arvind Krishnamurthy and Annette Vissing-Jorgensen (Krishnamurthy and Vissing-Jorgensen 2012), which was motivated (in part) by the question of how much Chinese intervention purchases of US government liabilities were depressing their yields. But there are several precursors, not least Guillermo’s work with Carlos Végh in the *Economic Journal* in 1996 (Calvo and Végh 1996). Guillermo continues to explore these issues in a recent paper with Andrés Velasco (Calvo and Velasco 2022).

The new literature on the United States’ alleged “exorbitant privilege” expands the discussion beyond the original narrative of the Bretton Woods days. A nice survey is Gourinchas, Rey, and Sauzet (2019). The newer debate focuses on a number of issues. One, which Chris Sims touched upon yesterday, is how an exorbitant privilege due to the bond liquidity premium may enhance US fiscal policy Sims (2022). Effectively, the US government is producing and marketing the liquidity services of its bonds, which make room for higher spending or lower taxes in the government and national intertemporal budget constraints. A related literature homes in on the price-making power of the United States in the market for global safe assets, which I mentioned a moment ago. Let me offer some

thoughts on that literature.

The credibility problem is of course fundamental here, because when we utter the words “safe assets,” there is the presumption of a government commitment to make them safe. How this commitment is effected and the factors that might endow a promised commitment with credibility are not clear. This conundrum was called the “new Triffin problem” by Farhi, Gourinchas, and Rey (2011) a few years ago, and I offered my take on it in Obstfeld (2013).

Farhi and Maggiori (2018) is one very recent paper in this area, one in which another contribution by Guillermo is absolutely central. In this model, a government that issues an internationally held reserve asset faces a downward sloping demand curve, not because of liquidity concerns, not because issuance is driving the marginal liquidity yield to zero, but because of the risk aversion and portfolio diversification motives of global investors. In the monopoly solution of the model, bonds may be unconditionally safe, but if too many are issued, they might become unsafe and subject to a devaluation risk. In other words, a sufficiently high level of issuance may drive the bond market into an unstable region in which there can be multiple equilibria, along the lines of Guillermo’s classic 1988 paper, (G. Calvo 1988), which Giancarlo Corsetti cited in his talk yesterday (Corsetti and Maćkowiak 2022). In the Calvo sovereign default model, the government’s inability to actually commit to the safety of its “safe” assets results in welfare losses all around.

There are several even more recent contributions, still in working paper form, on the theme that the supply of US safe assets may be inadequate when the US determines the supply in a way that maximizes some policymaker objective. Two very nice recent papers are by Coppola, Krishnamurthy, and Xu (2023) and Choi, Kirpalani, and Perez (2022). These encapsulate issues that Guillermo’s research put on the table and have consequences for how we think about global crises — a big topic in Guillermo’s work.

The Choi, Kirpalani, and Perez (2022) model is focused on the US government as a monopoly issuer. The authors argue that one should think of a crisis as a situation in which the demand for safe assets becomes more price-inelastic. When this happens in their model, the United States reduces the supply of Treasury securities, and their price rises, which means that their yield falls.

I find this interpretation and the authors’ evidence fascinating, and quite worthy of further study. When I consider real crises, though, I ask whether this is the right way to think of what is going on. For example, look at the spring of 2020. It is true that there is a big reduction in the supply of Treasuries in the short run because the Fed jumps in with large-scale asset purchases and a new repo facility for foreign official holders of US Treasuries. But this fall in supply then reverses as deficits come online and, of course, the anticipation of deficits is also important for pricing.

Moreover, the supply of Treasury debt to the market depends on actions by two big players, the Fed and the US Treasury, which may not always be coordinating in a way that produces a monopoly-level seigniorage flow. (Of course, foreign central banks’ sales or purchases of dollar reserves may also play a role.) In the short run of the spring of 2020, we know why the Fed did what it did, and the main motivation was not (consciously) to reduce government borrowing costs. The goal was to ease US and global financial conditions. The Fed’s actions in particular undid the sharp capital outflows from emerging markets that occurred in the spring of 2020, and sent capital rushing back in. This chain of events is very much reminiscent of the work in Calvo, Leiderman, and Reinhart (1993, 1996). Carmen

Reinhart, a coauthor, described this morning how the approach in these classic papers, which stresses push factors behind capital flows to emerging markets, was received when first proposed in the International Monetary Fund (IMF). But the insights are now universally accepted and help to motivate the important recent work on the global financial cycle by H el ene Rey, Hyun Song Shin, and others. We see the push mechanism at work in recent global crisis episodes — before, during, and after.

That said, there is an important sense in which the demand for US Treasuries definitely can become quite inelastic in crises, and that is through the evaporation of market liquidity. The greater fragility of market liquidity is partly an unintended and undesired consequence of reforms following the Great Financial Crisis, such as Basel III. Far from wishing to take advantage of this through monopoly pricing, I suspect most thoughtful US policymakers would see advantage in measures that enhance Treasury market liquidity, such as those proposed by Duffie (2020) and others, especially during crises.

In thinking about models of the IMS, I wonder further if it really makes sense to imagine the US Treasury market as somehow being segmented between external and internal debt holders, with a distinct foreign demand curve. The foundation of the global dollar system is world integration into the broad and deep US financial markets. That is a large part of what gives the dollar its global role and supports the network externalities that make the US dollar the global currency. That is why the Chinese yuan cannot displace the US dollar under current conditions. If you recognize that reality, it becomes clear that the determinants of US debt supply bring into play a host of other factors beside seigniorage, some of which were discussed yesterday by Marina Halac, for example, in her very nice paper with Pierre Yared Halac and Yared 2022.

Real-world US fiscal decisions may not be driven much by the Mundell-Calvo seigniorage paradigm, but I believe that nonetheless, the general issues Guillermo’s research has brought to the fore – policy commitment and credibility – are of the highest relevance. To illustrate, I would like to share an anecdote (hopefully not at excessive length) from my one experience as a US fiscal policymaker, at the Council of Economic Advisors (2014–2015). Every year, the council helps develop the president’s Budget through a process of collaboration with the Treasury and the Office of Management and Budget. The three agencies are collectively known as the “troika” for the purpose of this exercise. Congress never actually adopts the president’s Budget, which is merely an aspirational summary of the administration’s legislative proposals. A central component, however, is an economic forecast of the path of the US economy and, importantly the fiscal deficit path, conditional on the recommended economic measures. The forecast requires assumptions about how a number of key future variables –including productivity growth, the natural rate of unemployment, and interest rates –will evolve under the president’s suggested policies.

Jack Lew, who was Treasury secretary when I participated in the troika, made a big impression on me. Jan Švejnar tells us that Jack coincidentally is visiting Columbia’s SIPA this semester and has an office downstairs. Jack is an observant Jew. From the moment the Jewish Shabbat started at sunset on Friday (after the markets closed) until sunset on Saturday, Jack abstained from electronics. If anyone needed to contact him, even about a crisis, they would have to send a messenger or go to his house in person. This Treasury secretary was obviously a guy who believed in rules. And that came through in his budgetary approach.

In forecasting the implications of the president’s Budget, which, as I have said, is a

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political document, –one is obviously tempted to set out rosy scenarios. One way to get there is to assume that regardless of what fiscal policy will do, regardless of tax cuts, regardless of spending increases, interest rates will remain low. Jack Lew took the opposite approach. He was always trying to get the Troika to nudge *up* the interest rate forecast. “Do you think that is realistic, Jack?” we asked. “Well, maybe not,” he responded. “But we shouldn’t ever talk our own book.” Jack’s message was “do not promise too much to the markets. If anything, manage expectations so that markets will be pleasantly rather than unpleasantly surprised. Over the long term this will enhance credibility and result in an equilibrium with lower borrowing costs for the government.”

I find this message very consistent with Guillermo’s research. Jack Lew was an economic policymaker who was willing to try to put the lessons into practice. I strongly suspect he had not read Guillermo’s papers, but he seemed to grasp their gist instinctively. If we had more finance ministers like him in the world, the quality of fiscal policies surely would benefit.

As for the dollar’s present and future role in the IMS, our understanding remains a work in progress, and the international monetary-financial system continues to evolve under the pressure of economic and political changes. One factor going forward may be a form of external liability devaluation that could have either an economic or a geopolitical motivation—namely, defaults, seizures, or freezes relating to official foreign exchange reserves. The classic twentieth century issues of the sterling balances, the Triffin dilemma of gold convertibility, and the end of the dollar-gold link in 1971 all illustrate the economic motive (although in cases involving international reserves, economics and geopolitics tend to be intimately mixed). Russia in 2022 is the recent striking example of the geopolitical motive, but there are also Afghanistan and, going a bit further back in history, Iran. If we look *way* further back, the United States froze Japan’s foreign reserves in 1940 to deter its military penetration into Southeast Asia; that US action (along with other economic sanctions) helped set off the attack on Pearl Harbor. With the freezing of the reserves of as major a global player as Russia, unprecedented since the early 1940s, we may be entering new territory, and we do not yet know the ramifications for the global system. Unresolved questions of international law are at stake and will surely play out as the future of Russia’s foreign exchange reserves is deliberated.

Speaking of international law, I want to turn to my last topic today. It is about a predecessor of Guillermo, a namesake, a relative. Luckily for me, Sara Calvo was able to provide important background information on the Calvo family. Why engage in genealogy? It is important in showing that the topics Guillermo has worked on and the way he has approached them may be no accident. I therefore want to recall a gentleman whose full name was Carlos Eulalio Calvo Díaz, shown in Figure 3. He is better known to the world as Carlos Calvo, and he is an undisputed giant in the world of international jurisprudence. His bust rightly resides in the Peace Palace at the Hague along with those of Albert Schweitzer, Jean Monnet, Nelson Mandela, and Mahatma Gandhi.

Who is this man, and what is his relationship with Guillermo? He was born in Buenos Aires in March of 1822, or 201 years ago, and he was the brother of Guillermo’s great-great-great grandfather, Cipriano Francisco Calvo Díaz, a prominent urban planner who helped develop the Belgrano quarter in Buenos Aires. Carlos Calvo is known for a principle of international law called the Calvo doctrine (first discussed in Spanish in C. Calvo 1868 and expanded in subsequent French-language editions of this fundamental text). You are



Figure 3

Carlos Eulalio Calvo Díaz

very lucky if you have even a lemma named after you. A proposition may be next in the hierarchy, and then a theorem, a law, a critique, a principle, a problem, a puzzle, a paradox, a hypothesis, or a conjecture (preferably never proved or disproved). But a doctrine? Wow! Even Guillermo does not have a doctrine. I don't think anyone in economics does.

The Calvo doctrine continues to have ramifications today in both practice and theory. The doctrine holds that disputes over foreign investments should be resolved within the judicial system of the host country. Now, that principle sounds fairly technical and maybe even non-controversial, but it had a huge significance and was radical in the context of its time. It escapes the notice of us non-lawyers only because it is so commonly practiced that we take it for granted.

Of course, in the 19th century, one way to collect the debts of a defaulting developing country was just to send battleships and soldiers. A prominent example of armed debt collection in Carlos Calvo's time was the invasion of Mexico by France, Spain, and Britain in 1861-1862. British and French officials came to control Egypt's public finances after the country's bankruptcy in the 1870s. In the 1880s, European powers took up the direct collection of the Ottoman Empire's debts.

So, this was a very different world from ours today. What Carlos Calvo envisioned, however, was a world in which international law would rule. In such a world, a poorer region could have access to global capital for growth and development, yet remain sovereign. A system of international law, respected by all countries, would govern international capital flows. For more details on Carlos Calvo, I refer you to the excellent article by Facundo Pérez

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Aznar Pérez Aznar 2022 in the blog of the *European Journal of International Law*. This tribute was written last year to commemorate the 200th anniversary of Carlos Calvo's birth, and it documents how far the scope of his many writings went, even beyond the famous doctrine. Significantly, Carlos Calvo was one of the first writers to use the term "Latin America" in his writing and help bring it into general use.

The Calvo doctrine is central in motivating the modern economic theory of international borrowing and lending between sovereign nations. Prior to the general acceptance of the doctrine, an answer to the question of why sovereign governments ever repay their debts might revolve around the threat of military enforcement. Economic sanctions remain as enforcement tools, of course, but post-Calvo doctrine, the answer also depends critically on the factors of commitment, reputation, and expectations that have been so central to Guillermo's research – and naturally, multiple equilibria abound (see Gelpern and Panizza 2022 and Aguiar and Amador 2022 for recent surveys).

Reading about the life's work of Carlos Calvo, I realized that five generations later, Guillermo has basically gone into the family business. Through his writing, his policy advice, and his service at the IMF and the Inter-American Development Bank, Guillermo has promoted a world of cooperation and rules, not one of unlimited discretion by governments. Like his ancestor Carlos Calvo, he has worked hard for the development and stability of Latin American countries and emerging markets in general within a fair and predictable multilateral system. He has been an example for scholars throughout Latin America and worked tirelessly to promote and provide intellectual connection in the region. He has done so both formally, through associations like LACEA, and informally. Indeed, he is a role model for scholars the world over.

The Calvo project of rules, good, governance, and shared prosperity within a stable world system seems especially relevant today, February 24, 2023, the first anniversary of Russia's invasion of Ukraine. Russia's continued violent breaches of international law have tragically illustrated some of the worst of what humanity can be. Celebrating Guillermo's career here yesterday and today reminds us of the best.

Notes

1. I like to believe (based on no research, just wishful thinking) that I was the first person to cite this work in a journal (Obstfeld 1982). Sadly, I did not utilize the framework myself until Obstfeld (1995).

2. I believe that the analytics of seigniorage are under-taught in contemporary macroeconomics courses, so I developed some notes on seigniorage and the Auernheimer problem for first-year graduate students at Berkeley (see my lecture notes). You can easily detect Calvo's influence. Treatments that push seigniorage into the background are common nowadays in New Keynesian models (the cashless limit) and even in models of the fiscal theory of the price level (Cochrane 2023). As I observe below, however, the concept is important in thinking about the IMS.

3. In the 1960s, there were important precursors of this approach. For example, Swoboda (1968) argued that the eurodollar market arose from international banks' ability to reap "private" or "denomination seigniorage" – part of the lower interest rate on dollar-denominated foreign exchange reserves – owing to the dollar's vehicle-currency status. Swoboda (pp. 11-12) cited earlier authors, including Robert Aliber, Herbert Grubel, and Mundell. He was a visiting assistant professor at the University of Chicago's business school, interacting regularly with Mundell, when he published his Princeton Essay.

Appendix A Early handwritten notes for G. Calvo (1983)

A Stylized Model of Staggered
Wage Contracts
(Basic Equations)

by Guillermo A. Calvo
April 1979

We assume

$$(1) Y_{t+h} = \hat{Y}(\tilde{w}_t, p_{t+h}, \tilde{w}_{t+h})$$

where

\tilde{w}_t = nominal wage set at time t

p_{t+h} = price level at time $t+h$

\tilde{w}_{t+h} = average nominal wage at time $t+h$

Y_{t+h} = nominal profit at time $t+h$

Objective of wage setter at t is

$$(2) \text{Max}_{\tilde{w}_t} \int_0^{\infty} \hat{Y}(\tilde{w}_t, p_{t+h}, \tilde{w}_{t+h}) e^{-\int_t^{t+h} [\delta + i_s] ds} dh$$

where

$\delta e^{-\delta h}$ = probability that contract will last for h periods.

i_t = nominal interest rate at t .

We assume

$$(3) \quad \hat{Y}(\cdot) = p \left[\ln \frac{\tilde{v}}{p} - \alpha \frac{\tilde{v}}{H(\tilde{w}, p)} \right], \quad \alpha > 0$$

where H is linear homogeneous and positive for $\tilde{w} > 0, p > 0$.

(2) and (3) imply:

$$(4) \quad x_t = \frac{\alpha}{R_t} \int_t^{\infty} \frac{1}{h(w_s)} e^{-\int_t^s [\delta + r_k + \pi_k] dk} ds$$

where

$$x_t \equiv P_t / \tilde{v}_t \quad ; \quad r_t = \text{real interest rate at } t (\equiv i_t - \pi_t)$$

$$w_t \equiv \tilde{w}_t / p_t \quad ; \quad \pi_t = \text{rate of inflation at } t (\equiv \dot{p}_t / p_t)$$

$$h(w) \equiv H(w, 1) \quad ; \quad R_t \equiv \int_t^{\infty} e^{-\int_t^s [\delta + r_k] dk} ds$$

Hence, if $r_t \equiv r$,

$$(5) \quad \dot{x}_t = - \frac{\alpha (\delta + r)}{h(w_t)} + (\delta + r + \pi_t) x_t$$

We assume

$$(6) \quad \tilde{w}_t = \delta \int_{-\infty}^t \tilde{w}_s e^{-\delta(t-s)} ds$$

or

$$(6') \quad w_t = \delta \int_{-\infty}^t x_s^{-1} e^{-\int_s^t [\delta + \pi_k] dk} ds$$

Hence

$$(7) \quad \dot{w}_t = \frac{\delta}{x_t} - (\delta + \pi_t) w_t$$

The system must obey Eqs. (5) and (7) with $w_0 = \tilde{w}_0 / P_0$;

\tilde{w}_0 is given by past outstanding contracts. The simplest way

to close the model is to assume

$$(8) \quad M^d = \text{demand for money} = k \cdot p \quad ; \quad k > 0$$

$$(9) \quad M^d = M^s = \text{money supply}$$

$$(10) \quad \dot{M}^s / M^s = \mu \quad (\text{a constant})$$

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Among the Many Lessons on Credibility from Guillermo
From Inflation Stabilization to Sudden Stops

Lecture in *The Credibility of Government Policies: Conference in Honor of Guillermo Calvo*

Carmen M. Reinhart
Harvard University

I am going to say next what is usually said at the beginning of a talk at a conference like this one. I am honored to be here—but, in this case, I REALLY mean it. No one has had the impact on my career, the way I think about economics, and the topics I work on and write about that Guillermo Calvo has had. What can I say? I am just so delighted to be here and to be able to share with you my recollections about a remarkable period in the late 1980s and 1990s during which I had the good fortune to work with Guillermo at the International Monetary Fund’s (IMF) Research Department and later at the University of Maryland.

Guillermo was my professor here at Columbia University, but I am going to be very honest about this, I liked Maury Obstfeld better, at least at that time. Some years later our paths crossed again when I joined the IMF at a time when Guillermo was a senior advisor at the Research Department. It was then that I got to know Guillermo. Just like at the end of the classic movie *Casablanca*, I thought, “This is the beginning of a beautiful friendship.”

In what follows, I will focus on Guillermo’s rich body of work those years and also, very importantly, on how he inspired and influenced the group of young economists he collaborated with. This is not meant to be a comprehensive list of his research during this very productive period; rather, these are some of the highlights. It is also about people he worked with. The IMF roster includes Fabrizio Coricelli, Pablo Guidotti, Enrique Mendoza, Carlos Végh, and myself.

We heard from Carlos Végh yesterday; Enrique Mendoza is here; Pablo Guidotti is here; Fabrizio Coricelli is also here. Leonardo Leiderman and Ernesto Talvi are not, but they were also a part of this group.

The global economic setting

I think the international setting importantly shaped the topics and questions that Guillermo and his circle of coauthors worked on. The time was the tail end of the emerging market debt crisis of the 1980s, and there was a lot of work at the IMF and elsewhere on debt-related topics (including the work of Guillermo with Eduardo Borensztein, and also Graciela Kaminsky in this broad field). Debt restructuring was a big topic. While the advanced economies had already significantly reduced their inflation rates, many emerging markets were still coping



Figure 1
Bloomberg Businessweek, April 22, 2019

with high and chronic inflation. The breakup of the Soviet Union brought new entrants to the IMF membership and many interesting transition-to-market challenges which also included several hyperinflations and major output collapses. After the long drought of the 1980s crises, capital inflows were returning en masse to many of the emerging markets. At the IMF, there was much discussion and debate on what were the main drivers of the sudden resurgence in capital inflows and how to best manage the capital flow bonanza.

During the past two decades, it looked like some of the topics and challenges of those IMF years were a relic of the past. For instance, we declared inflation dead (Figure 1)! As the most recent *Economist* issue highlights (Figure 2), we see that only a couple of years after declaring the death of inflation, policymakers are rediscovering the challenges of getting it under control.

Inflation

I think it is perfectly appropriate that we start out our narrative with Guillermo's body of work on inflation stabilization and the role of lack of credibility and temporariness.

I would also call attention (see Figure 3, right panel) to a trend that I think is of particular interest to Guillermo (if I know him). This figure shows the share of developing and emerging countries that have inflation over **40 percent** at the moment. As is clear the time profile looks like a *U*. Very high inflation has also made a comeback in emerging markets; a lot of the progress that we had seen in the early 2000s has been little by little clawed back. My personal take on this is that we should be re-reading a lot of the work on inflation stabilization. Let me reiterate that I am being selective on the papers referenced here. The short list includes



Figure 2
Article in The Economist, February 18, 2023

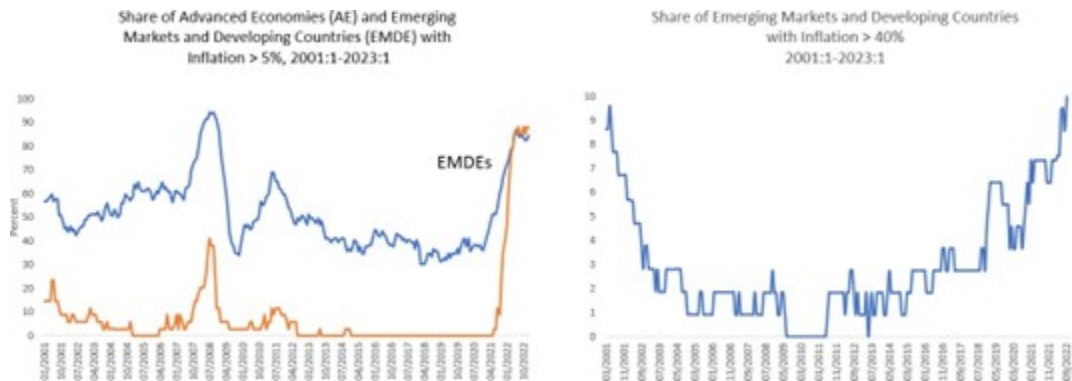


Figure 3
Sources: (Reinhart and Luckner (February 11, 2022)), based on International Financial Statistics, IMF, Trading Economics, assorted country sources.

- Calvo (1986), “Temporary Stabilization: Predetermined Exchange Rates,”
- Calvo (1987), “On the Costs of Temporary Policy,”
- Calvo (1988), “Costly Trade Liberalizations: Durable Goods and Capital Mobility,”
- Calvo (1989), “Anticipated Devaluations.”

I have to highlight here that when I started reading his body of work on inflation stabilization and lack of credibility, it was love at first sight. At that time, there were a lot of Exchange-Rate Based Inflation Stabilization plans (ERBS). Mexico had one; Argentina would undertake one in 1991. Many of the transition economies, based on advice from the IMF, also took to pegging the exchange rate to stabilize inflation.

Hence, ERBS were widely embraced at the time, and Guillermo’s insights basically connected some of the recurring stylized facts of those plans and wove them into a tale of lack of credibility. Importantly, the pegging of the exchange rate was not seen as lasting. Because the peg was not credible, consuming today was cheaper than consuming tomorrow, and this idea helped explain the recurring consumption booms during ERBS plans. When I presented many years ago my work with Carlos Végh on ERBS plans and the idea (and evidence) that inflation stabilization could be associated with an economic boom, it was a shocker at the Federal Reserve!

I said earlier that it was love at first sight, because of dynamics of the temporariness hypothesis. The consumption boom came with a widening current account deficit (capital inflow surge) and a significant real exchange rate appreciation. ERBS plans usually ended badly. The initial boom and current account deficits were followed by spectacular crises and capital outflows. The overvaluation was quickly reversed, and in sum, other than sex and violence, the whole ERBS story had everything. It was a really amazing insight for me. This was an area where Guillermo and Carlos Végh made many contributions:

- Calvo and Végh (1992), “Currency Substitution in Developing Countries: An Introduction,”
- Calvo and Végh (1993), “Exchange-Rate Based Stabilization under Imperfect Credibility,”
- Calvo and Végh (1994b), “Stabilization Dynamics and Backward-Looking Contracts,”
- Calvo and Végh (1994a), “Inflation Stabilization and Nominal Anchors,”
- Calvo and Végh (1990), “Credibility and the Dynamics of Stabilization Policy: A Basic Framework,”
- Calvo and Végh (1995), “Fighting Inflation with High Interest Rates: The Small Open Economy Case under Flexible Prices,”
- Calvo and Végh (1999), “Inflation Stabilization and BOP Crises in Developing Countries.”

This duo also studied inflation stabilization in a broader context and tools such as interest rates and monetary anchors. Given the inflation challenge that many emerging markets are currently facing, I think academics and policymakers would do well to read the beautiful encompassing handbook piece (Calvo and Végh 1999) that summarizes much of this literature.

Crisis and contagion

His work with Enrique (Mendoza) influenced many; I again will be selective:

- Calvo and Mendoza (1996b) - “Petty Crime and Cruel Punishment: Lessons from the

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Mexican Debacle,”

- Calvo and Mendoza (1996a) - “Mexico’s Balance-of-Payments Crisis: A Chronicle of a Death Foretold.”

Guillermo also did a lot of work with Enrique on contagion, and I am not even covering that here. I am touching the tip of the iceberg. But a major episode of an ERBS plan gone bad was the Mexican crisis of 1994-1995. The first illustration is a “little” paper (I say “little” because it was a short one in AER Papers and Proceedings). I think people may not fully grasp the lasting and significant impact that this paper had on how we think about financial vulnerability. The IMF at that time tended to look at international reserves solely in terms of how many months of imports these could cover. The balance sheet dimension was largely ignored. The role of reserves in backing debt, particularly short-term debt, was off the surveillance radar screen. This role is amplified by the fact that emerging and developing countries do not have a lender of last resort. In stressing the role of balance sheets and financial issues in crisis vulnerability at a time when the IMF did not grasp the impact of devaluation on public and private balance sheets, Guillermo and Enrique helped reshape how we gauge crisis risks. Balance sheet effects are nowadays a key ingredient of modern vulnerability exercises; and the indicators stressed by this duo are among the ones they consider.

Public debt

Guillermo did a lot of work also on public debt and also a lot of work with Pablo Guidotti. Their work explored the connection between debt and inflation and issues of maturity. But before turning to their joint work, I would also add to the list a paper that appeared in *IMF Staff Papers*, “The Perils of Sterilization” (Calvo 1991) that many of you may not be aware of. It tells us a story where you have a capital inflow, and the central bank intervenes to stabilize the exchange rate but feels compelled to sterilize the intervention and issues short-term debt where the shorter debt carries a higher rate. The issue of how you manage capital inflows and the perils of sterilization has been an enduring and recurring policy issue for many countries during the inflow phase of the cycle.

Turning to another debt-related topic, I recall that when I started working with Ken Rogoff on “The Forgotten History of Domestic Debt” (Reinhart and Rogoff 2011), a comprehensive literature review revealed that domestic debt was largely ignored. For emerging markets, the theory and empirics were all about external debt. Guillermo and Pablo’s work (and Pablo’s work with Mohan Kumar) was a welcome exception. Times have changed. The IMF just released two working papers on the topic of domestic debt and domestic debt restructuring. But, once again, Guillermo was well in the lead in making contributions, including at the policy level. Indeed, this line of work offers strong insights on debt management:

- Calvo and Végh (1990), “Credibility and the Dynamics of Stabilization Policy: A Basic Framework,”
- Calvo and Guidotti (1990), “Indexation and Maturity of Government Bonds: An Explanatory Model,”
- Calvo, Guidotti, and Leiderman (1991), “Optimal Maturity of Nominal Government Debt: The First Tests,”
- Calvo and Guidotti (1992), “Optimal Maturity of Nominal Government Debt: An

Infinite-Horizon Model.”

Output collapses and transition economies

Guillermo worked with Fabrizio Coricelli and Jacob Frenkel on some of the challenges faced by transition economies. The list includes

- Calvo and Frenkel (1991), “Credit Markets, Credibility and Economic Transformation,”
- Calvo and Coricelli (1992b), “Stagflationary Effects of Stabilization Programs in Reforming Socialist Countries: Enterprise-Side and Household-Side Factors,”
- Calvo and Coricelli (1992a), “Stabilizing a Previously Centrally Planned Economy: Poland 1990,”
- Calvo and Coricelli (1993), “Output Collapse in Eastern Europe: The Role of Credit,”
- Calvo and Frenkel (1992), “Transformation of Centrally-Planned Economies: Credit Markets and Sustainable Growth,”
- Calvo and Coricelli (1994), “Inter-enterprise Arrears in Economies in Transition,”
- Calvo and Kumar (1994), “Money Demand, Bank Credit, and Economic Performance in Former Socialist Countries.”

Guillermo and Fabrizio had a wonderful contribution that I would like to highlight and that I think Alan Taylor (our chair) would appreciate greatly. This duo was ahead of the curve in stressing the role of the total breakdown in bank credit in explaining the huge output collapses in the transition from central planning to markets in Eastern Europe (output collapses of 40-50 percent). At the time, the received wisdom at the IMF was that the output collapse was primarily due to the widespread obsolescence of the capital stock and issues of (mis) measurement. The implosion in the financial system and the erosion of real balances as inflation surged were compelling factors Guillermo and Fabrizio examined.

Capital flows

Then, of course, there is Calvo et al. on capital flows - I am “al.” and Leonardo Leiderman is the et. We joked a lot about our new names. This strand of work includes

- Calvo, Leiderman, and C. M. Reinhart (1993), “Capital Inflows and Real Exchange Rate Appreciation in Latin America: The Role of External Factors,”
- Calvo, Leiderman, and C. Reinhart (1994a), “The Capital Inflows Problem: Concepts and Issues,”
- Calvo, Leiderman, and C. Reinhart (1994b), “Capital Inflows to Latin America: The 1970s and 1990s,”
- Calvo, Leiderman, and C. Reinhart (1996), “Inflows of Capital to Developing Countries in the 1990s,”
- Calvo, Sahay, and Végh (1996), “Capital Flows in Central and Eastern Europe: Evidence and Policy Options.”

It is now taken for granted that common external factors are key drivers of cross-border capital flows. This was not always so, as IMF and other studies tended to focus on domestic pull factors as the central drivers of cross border capital movements. IMF management and staff were often very keen on giving credit to credible and sound policies and reforms. Capital inflows were a reward for good behavior. A problem in the early 1990s was accounting for

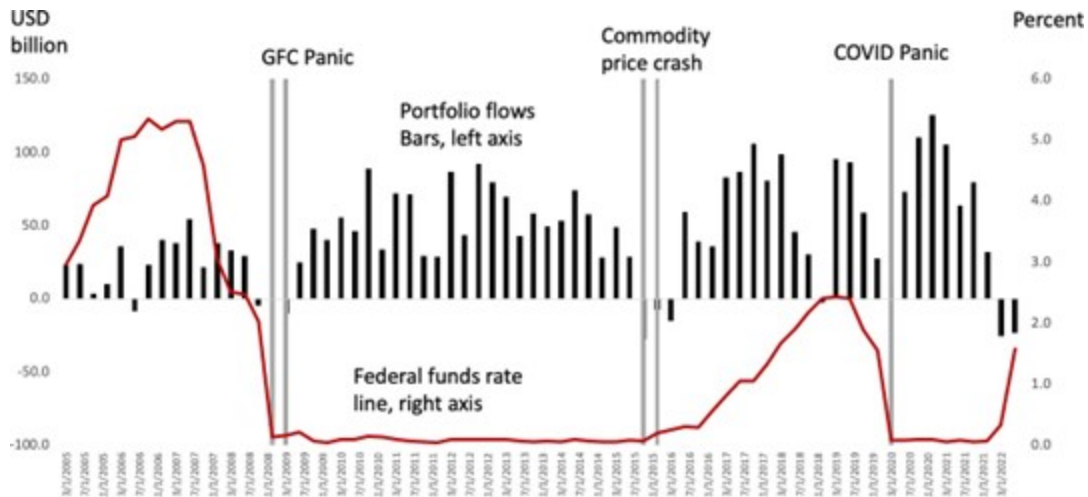


Figure 4

Sources: (Total Portfolio Flows to EMs and the US Federal Funds Rate: Quarterly, 2005:1- 2022:2 (Source: IIF)

the many countries that had not done those virtuous things and were still attracting large capital inflows. And so Guillermo would round us up from time to time, and we would have these wonderful discussions. This resulted in a line of work that, as I said, now seems really tame, but at the time, you have no idea how many people we annoyed within the IMF and outside the IMF. Our first discussant (an emerging market policymaker), did not like the conclusion/implication that capital inflows to Mexico at the time had more to do with Federal Reserve policy than with Mexico's macroeconomic conditions and reforms.

Bringing the topic to the current situation, we turn to Figure 4. Bars indicate portfolio flows (the data is from the Institute for International Finance), and the solid line is the federal funds rate. So, once again, rising US interest rates have impacted capital flows to emerging markets—the phenomenon is not confined to the past. Many of the issues that Guillermo has brought to our attention are not external; they are eternal.

Sudden stops

- Calvo and Mendoza (1998), “Capital Flows and Capital-Market Crises,”
- Calvo and Reinhart (2000b), “When Capital Inflows Come to a Sudden Stop: Consequences and Policy,”
- Calvo, Izquierdo, and Talvi (2004), “Sudden Stops, the Real Exchange Rate and Fiscal Sustainability: Argentina’s Lessons,”
- Calvo, Izquierdo, and Loo-Kung (2006), “Relative Price Volatility under Sudden Stops: The Relevance of Balance Sheet Effects.”

The observation that interest rates in financial centers go down and then go up and that the large capital inflows of today become the large capital outflows of tomorrow is a part of the sudden stop concept, but there is more to it, as the papers show. As the saying goes, “It is not the speed that kills, it is the sudden stop.” The insights into the economic damage

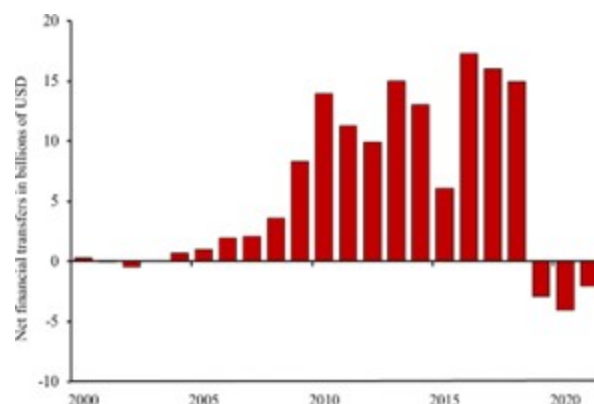


Figure 5

Sources: (China's Overseas Lending—A Sudden Stop for Many Countries. (In 2019, net transfers turn negative) (Source: hornparksreinharttrebesch2023<empty citation>)

caused by sudden stops are also an important contribution of some of the papers. Guillermo, in his work with his co-authors, highlights that the sudden stops are associated with very significant relative price swings, deep and adverse impacts on economic activity, and (again, going back to the credit channel) big changes in the financial sector's ability to support economic activity.

Now, I wanted to bring to the discussion a new kind of sudden stop. We tend to think of sudden stops as coming from the West (Federal Reserve hiking interest rates). But I want to stress that, at the moment, emerging markets are not just getting a sudden stop from the West, and that was here (Figure 4) – and these are mostly middle-income countries so it is not just that international financial conditions are tightening – but also that there is a sudden stop from the East. Chinese lending has also come to a screeching halt (Figure 5). Slowing growth and financial sector woes in China (push factors) and rising debt servicing difficulties in countries that had borrowed from China (pull) have combined to produce the first sudden stop from the East that I am aware of.

I cannot possibly capture all contributions of those years, because this was an incredibly productive and flourishing time for all of us who had the benefit of working with Guillermo. It is actually a miracle that it was so productive because I remember these interminable coffee breaks with Pablo and Carlos. We would go on and on, and the coffee break was just, in theory, 15 minutes, but it would last a lot longer. We were actually discussing the very fascinating work we were doing with Guillermo at the time.

Let me say a little bit about my work with Guillermo when we shifted from the IMF to the University of Maryland. I do want to bring up an issue that occupied our thoughts a great deal: credibility, or lack thereof, as it translates to fear of floating.

Now, many might say that fear of floating has been overcome, that it is a thing of the past. I do not believe that. I think many countries, typically middle- to high- income countries, have much less fear of floating today than they did a couple of decades ago. I think that is true, but when you look around the world to middle-low- and low-income countries, we find plenty of examples. For instance, not very long ago, we saw Egypt devalue its currency. Egypt, in theory, had been floating since 2016, and, in effect, it had re-pegged. I think one of

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the things that is often singled out as to why there is less fear floating is that countries and policymakers perhaps have been more mindful of currency mismatches after the Asian and Mexican crises. I would note that the whole emphasis on banking and balance sheets at the IMF only came after the successive Mexican and Asian crises. Before that, it was very much a shop that dealt mostly with fiscal policy, with some exchange rates, but the whole financial sector was underplayed.

Overcoming balance sheet problems, I think, has certainly helped countries move to a more flexible arrangement. But that is not the whole story, and I point to a paper that is a companion piece that Guillermo and I did to “Fear of Floating” (Calvo and Reinhart 2002), in which we highlight that the issue of fear of floating is not just about balance sheets effect but that it encompasses various dimensions of lack of credibility:

Taken together, the evidence of the preceding subsections suggest that EMs may have solid grounds for resisting and fearing devaluations and exchange rate variability at large. Not only are currency crises contractionary, but they are associated with large and significant changes in countries’ ability to borrow from international sources. The marked and systematic declines in credit ratings for EMs following currency crashes, in contrast to the relatively unscathed developed economies, suggest that the large adjustments in the current account—the sudden stop problem—that we observe in the data may be largely owing to an abrupt and involuntary loss of access to international capital markets. If such is the dire outcome of a currency crisis for EMs, one may expect to find a generalized tendency in their policies to limit exchange rate fluctuations, at least when compared to the currency swings we observe in the developed economies that allow their exchange rate to float freely. - From “Fixing for Your Life” (Calvo and Reinhart, 2000a)

This can show up as less anchored inflation expectations and a bigger pass-through from the exchange rate to inflation. So, if you care about inflation, you may have to be more mindful of what happens to the exchange rate. You care about exchange rate volatility because emerging markets lose capital market access much more readily than advanced economies, as we show in our paper on sudden stops. Fragile credibility in its many manifestations can also enhance this fear of floating.

Let me just move to conclusions. In 2023 much of Guillermo’s work is as prescient as ever. I think inflation is a bigger hurdle for a longer time and a broader array of countries and importantly, as I said, countries with extreme cases have resurfaced to new highs since the early 2000s. The exit from the “low forever” interest rates implies a risky period for many emerging markets that are highly leveraged. And right now, in pretty much the majority of these countries (I will not say all), both public and private leverage is an issue. And what is private debt before a crisis often becomes public after the crisis, so rising and higher interest rates pose risks to capital flows and debt sustainability and increase the odds of sudden stops.

The credibility problems that have often been encapsulated in much weaker credit ratings for emerging markets have resurfaced with a vengeance. After the global financial crisis, we saw the reverse. Emerging markets were upgraded, and advanced economies were downgraded. After COVID, what we have seen is the gap widening again. Of course,

credibility issues have also resurfaced in advanced economies. The time is ripe for rereading many of Guillermo's classics.

I will conclude with something that is politically incorrect. I actually really do not care if it is politically incorrect, or if it is inappropriate. Guillermo - This is for you...



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It's Still Time to Get Back to Rules-Based Monetary Policy

Lecture in *The Credibility of Government Policies: Conference in Honor of Guillermo Calvo*

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Stanford University

It is an honor and a privilege for me to speak here with my friends. In fact, what I would like to do is a little reminiscing, if you don't mind, Guillermo. I would also like to apply in my talk some of the things that I learned while working with Guillermo; you'll see that as we go through. I want to touch a little more on the international situation as it is so important right now. So, I want to do that, and then towards the end of my remarks, I want to go back to some of the papers that Guillermo wrote way back then.

First of all, I don't know how many years you have known Guillermo, but I've known him for a long time. We met here, as I recall, in January 1973 - that's 50 years ago, 5-0; that's a long time to remember. We came pretty much newly minted PhDs. I came from Stanford; Guillermo came from Yale. We were looking forward to doing lots of research and lots of teaching, which we ended up doing, and we remained at Columbia for most of the 70s. At least I did. There are wonderful memories. We talked about economics all the time - every day maybe. That's a bit of an exaggeration, but that's how I remember it. We just loved it. We had great colleagues. It was a great time to do research in macroeconomics. We were working on - and I'll talk a little bit about this in my remarks - dynamic quantitative techniques to model expectations under uncertainty. That's what we were doing, and whether you call it forward-looking or rational expectations, it was all over the place, and I say we benefited from conversations like these informal ones. I want to make sure I leave some time for comments, since you know so much more about this subject.

We debated the reforms; much of it was economic policy, and much was monetary policy. I think it's changed for the better, and the ideas that Guillermo was developing at the time at Columbia really paid off big time. So that was 50 years ago. There were reforms that I remember, some of which we've already discussed in this meeting. There were big differences from what I call old Keynesian models, but Guillermo worked on time inconsistency, as he called it, because expectations play such a big role and have their own predictable effects. Papers written about that were influential. Then, of course, staggered price setting, which we've heard a little bit about already. The Phillips curve wasn't working so well; we needed to have some forward-looking and rational expectations in this analysis, and so we did that. And the third thing I'll mention - which I'm going to spend some time on today - is that there was a lot of emphasis on policy regimes, and this was sort of a way to

do policy; not just one time. Still, there's a lot of talk about one time, maybe too much, but I want to talk a little about what we spoke a lot about. I call it "rules" or "regimes"; whatever it happens to be, it became a big part of what we were doing, and we talked about it all the time.

I just remembered I wanted to mention high points and saddle points. In the 2004 IMF conference in honor of Guillermo, I talked about a backpacking trip that I went on many times in the Sawtooth Mountains in Idaho. I described the rugged terrain and the tough climb up to what appeared to be a mountain in the mist that looked like a high point. But when I got there, I saw that it was not a high point; it was a saddle point. We joked a lot about this with Guillermo, and he said, "Yeah, John, life is just one saddle point after another." I think the same can be said of the policy reform process, so today I'll try to talk about how to explain a series of policy reforms that can be interpreted as a high point. Because of this influential work, we're all in better shape to keep making progress as we move forward from one policy to another and to get rid of these saddle points. Let's hope we're not on a saddle point.

I want to talk today about how this has influenced me. Let's call this the basic story, and I'll go back and quote some policymakers. We have policymakers in the room who could comment themselves, but Jay Powell said, not too long ago, "I find these rule prescriptions useful." Mario Draghi was then president of the ECB and said, "We would all clearly benefit from improving communication over our reaction functions." Raghuraj Rajan, then governor of the Reserve Bank of India, said, "What we need are monetary rules." So that's where we were three years ago. This was interrupted big time. Rules were out; in fact, rules were in the monetary policy reports, like the Taylor rules, which I'll talk about in a minute. But in early 2021, they decided to put them back in. Rules were back in the Fed's monetary policy report, but they didn't last all that long. Rules were out again in February of last year. And our chair was bugged about this a little bit. "Where are these rules? Where are these rules, guys?" He said, "I'll put them back in." So he put them back in the monetary policy report released in June of 2022. Policy rules were back, including the Taylor rules. There was still not much of a change in the policy; the rules were there but there still wasn't a change in the policy. Eventually, policy changed, but I think the bottom line is that we're still not there yet, in the Fed and certainly internationally, unless more actions are taken. I think the recent issues in Ukraine and Russia raised inflation questions that are just part of the same story. I want to say it's a new story, but it's the same story in different ways.

Let me begin with Figure 1. This is a monetary aggregate. It shows the total assets - mortgage-backed securities and Treasuries - purchased by the Fed. There was a gigantic increase during the crisis; you can see the crisis marked there by the solid line. It has not really changed tremendously since January 5, 2022, but it's continuing down. This massive increase of total assets purchased by the Fed has really reversed. The other thing that is important to note in this conference is that the money supply, M2 (see Figure 2), also jumped during the crisis and grew very rapidly, but it also slowed down tremendously. That's another change, and you could think of why that is the case. Why has M2 growth declined so much?

What I tend to look at is neither the asset purchases nor the money growth, but rather the interest rates. I want to talk about interest rates, as we go through this, but those are things that happen that are related to the interest rate decision.

Table 1 shows the Federal Reserve monetary policy report on July 9th, 2021. It's got five

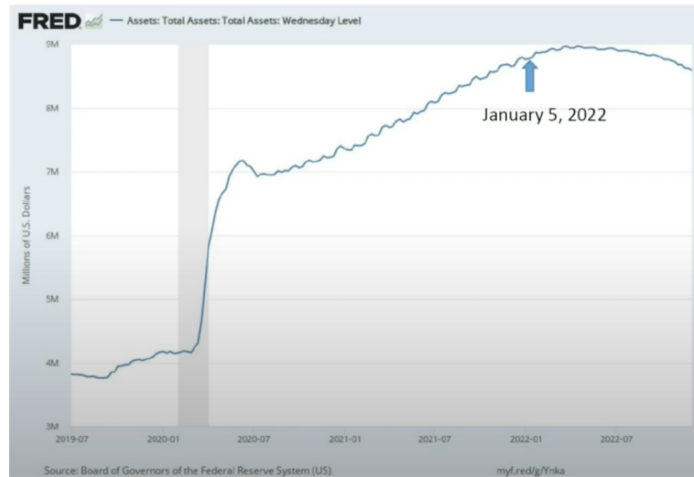


Figure 1
Total Assets Purchased by the Fed

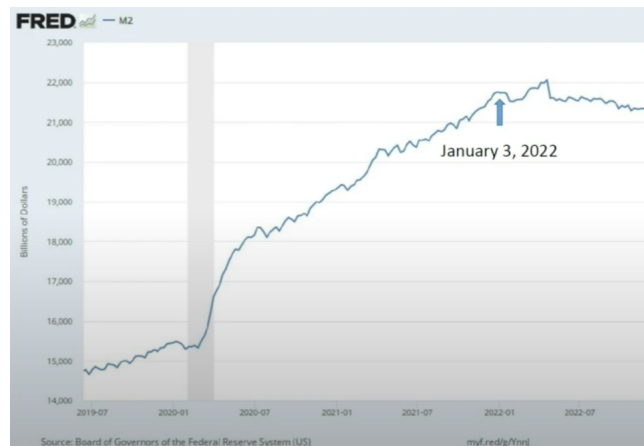


Figure 2
Money Supply - M2

rules: they've always been the same, but they get in and out. The first one is the Taylor (1993) Rule. Your interest rate (they called it T93) equals some measure of the long-term interest rate, inflation rate, half the inflation rate minus the long run, and the unemployment rate, which they use here rather than the GDP gap. I use the GDP gap, but they're very closely related, so it doesn't make too much difference whether you use the unemployment rate or not. Then there's the balanced-approach rule, which puts more weight on the unemployment rate, and the balanced-approach shortfalls rule, which means you don't go the extra mile if it's negative. The report also shows the adjusted Taylor Rule, and the first-difference rule, which is going to find popularity. So this is what the Fed, our own Fed here in the United States, has tried to bring in and out - this is the in period.

It's Still Time

Taylor

Taylor (1993) rule	$R_t^{T93} = r_t^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + (u_t^{LR} - u_t)$
Balanced-approach rule	$R_t^{BA} = r_t^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + 2(u_t^{LR} - u_t)$
Balanced-approach (shortfalls) rule	$R_t^{sBA} = r_t^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + 2 \min\{(u_t^{LR} - u_t), 0\}$
Adjusted Taylor (1993) rule	$R_t^{T93adj} = \max\{R_t^{T93} - Z_t, ELB\}$
First-difference rule	$R_t^{FD} = R_{t-1} + 0.5(\pi_t - \pi^{LR}) + (u_t^{LR} - u_t) + (u_{t-4}^{LR} - u_{t-4})$

Table 1

Monetary Policy Rules

I also want to mention that John Cochrane, Mike Bordo and I did this book (see Figure 3) *How monetary policy got behind the curve* - they were behind the curve completely. We'll talk about whether they're still behind the curve or not, and then more about how to get back. So, in some sense, this is not new. This is something we've been talking about for a while.

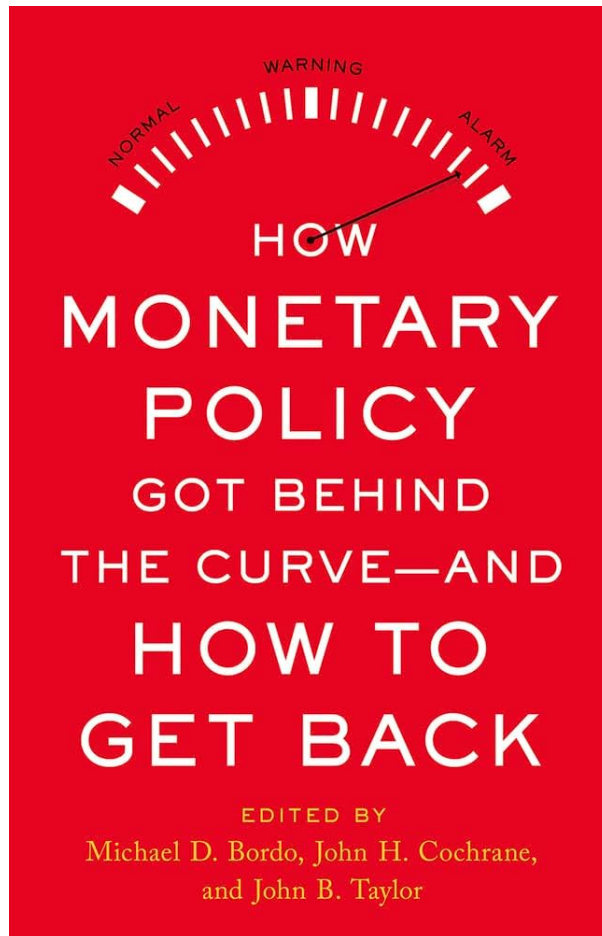


Figure 3

“How Monetary Policy Got Behind the Curve - and How to Get Back”

Figure 4 shows what actually happened to the interest rate. You can see it's over 4 percent now; you can see these three steps of 75 basis points, which started around April

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2022. One thing that we’re trying to analyze in this meeting is whether this is right, wrong, enough, or satisfactory, and what other countries are doing. I can see a lot of people from other countries, which is useful here. But it’s important to note this is a rule. This is obeying a rule that I just showed you. They’re raising the rate because the inflation rate had already been high in early 2022.

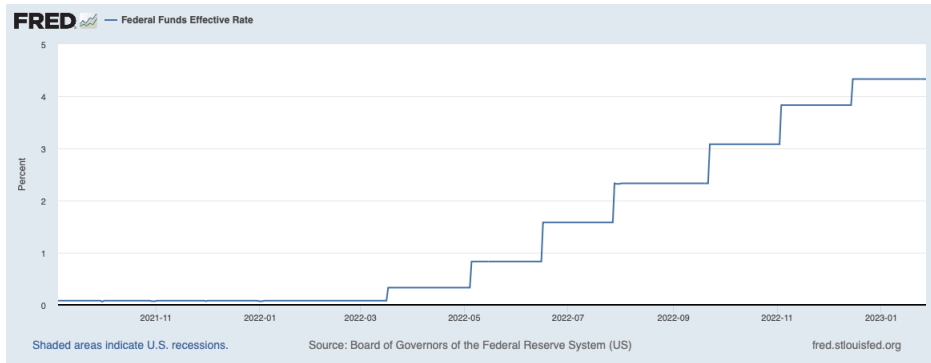


Figure 4
Federal Funds Effective Rate

This is where we are; the question is whether we’re going to go forward or not. We all have differences of opinion about that, so let me put up this Taylor rule (1). This is from way back when. It’s written slightly differently from the Fed’s reports but not that much differently:

$$r = p + .5y + .5(p - 2) + 2. \tag{1}$$

The interest rate r is the federal funds rate, the inflation rate p is over four quarters, where I had it originally, and y is a percentage deviation of real GDP from some target - potential GDP, or whatever it happens to be at the time. The rule really says that the short-term federal funds rate should equal the inflation rate plus half the GDP gap plus half the difference in the inflation rate and two, plus two. What I’m going to stress today is we should get back to some rules; we’re not there, so that’s the question for us all to be addressing.

Anyway, I just put in some numbers: if the equilibrium rate is 2 percent - as it is in the picture - the inflation rate is 2 percent, which is the target, and the GDP gap is 0 percent, then you’d say the interest rate is 4 percent. There is a lot of work, including by John Williams when he was in San Francisco, saying that that rate over on the right should not be 2; it should be 1. This is a sort of consensus that maybe 2 was too high. There are debates about that, but 1 seems to be what the Fed uses. If you make that a 1, rather than a 2, and still plug in the inflation rate of 2, and the GDP gap is still 0, you get 3. It’s slightly lower, but then you move into the area where we are, or have been recently. For example, if you still have 1 on the right and the inflation rate is 3, you get 4.5 - about where we are now. If you plug in 4, which may be where we are - it maybe higher; we don’t know - you get 6. That’s above where we are now. It’s probably a little higher than that; we’ll have to see. The inflation target is 2 percent, the equilibrium interest rate is 1 percent - not 2, but 1 - and the gap is 0. I think that’s probably right. So, that says we get a federal funds rate of 6 percent, which is probably a percentage point and a half above where we are now. In that sense, we still have

more to go.

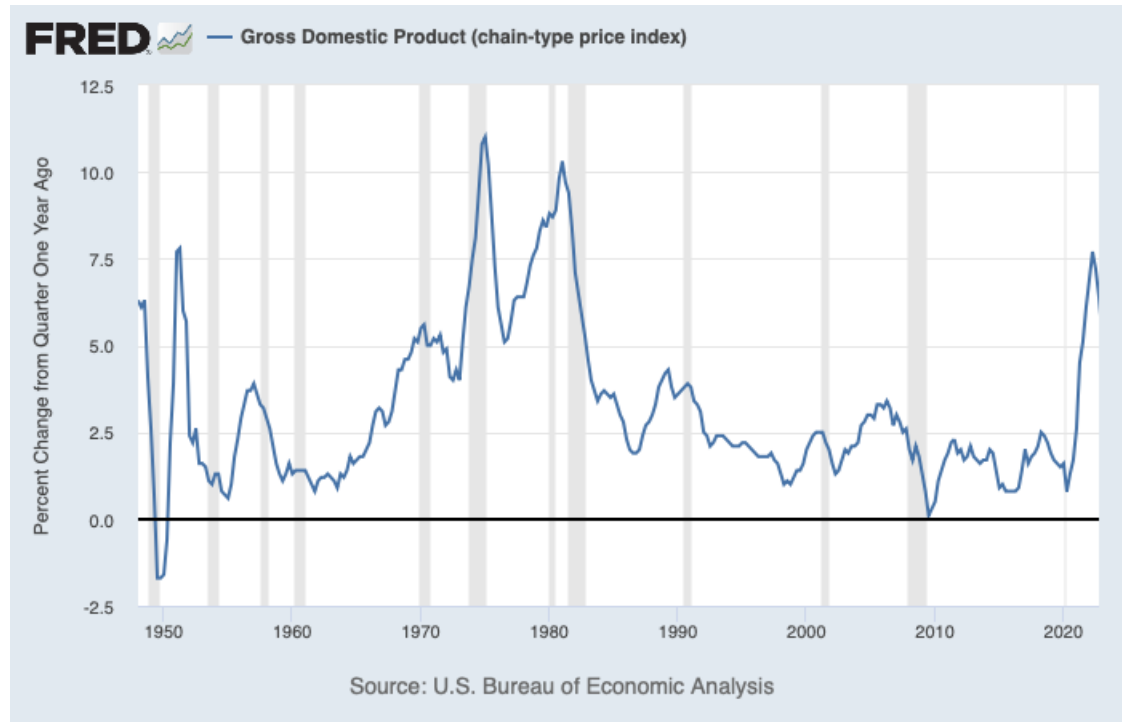


Figure 5
Gross Domestic Product (Chain-Type Price Index)

There are lots of debates about this; let me try to review a little bit about that. First of all, Figure 5 is a picture of the inflation rate in the US. This is a particular inflation rate - this is GDP measured from a year earlier, and I'm going back to the late 40s into the most recent observation. You can see we've had quite a bit of a jump, and this didn't occur magically; it occurred because they were off, and it's still not back to normal. This is one particular measure, but you see it rivals the great inflation period in the late 70s and early 80s. The graph really makes you wonder if we could ever get back to the 2 percent goal, which is where we were for quite a while until it got off. There is a question of why this happened, but I'm not really addressing that so much now. We will do that in the future.

If I were in charge or even involved, I would be worried about this, and that's why I say, "Why not go to 6 percent? Why not go a little bit higher?" You do not have to go right away, but you should be doing it pretty soon. That's the thing to look at; it's pretty striking.

Let me also mention a little bit about the rest of the world. Figure 6 shows the most recent data I have for the euro area. CPI plugs around 2 to 2 and a half percent for a while, but then it goes very high. I don't think this is an accident. It's similar thinking. In fact, one thing that I've stressed a lot in my research is that central banks tend to follow each other. We don't know exactly the reasons; maybe they talk to each other too much already. I don't know, but they do tend to follow each other. And if you look at the Taylor rule - whatever measure you use - the ECB seems to be too low now. They're starting to react, and they're

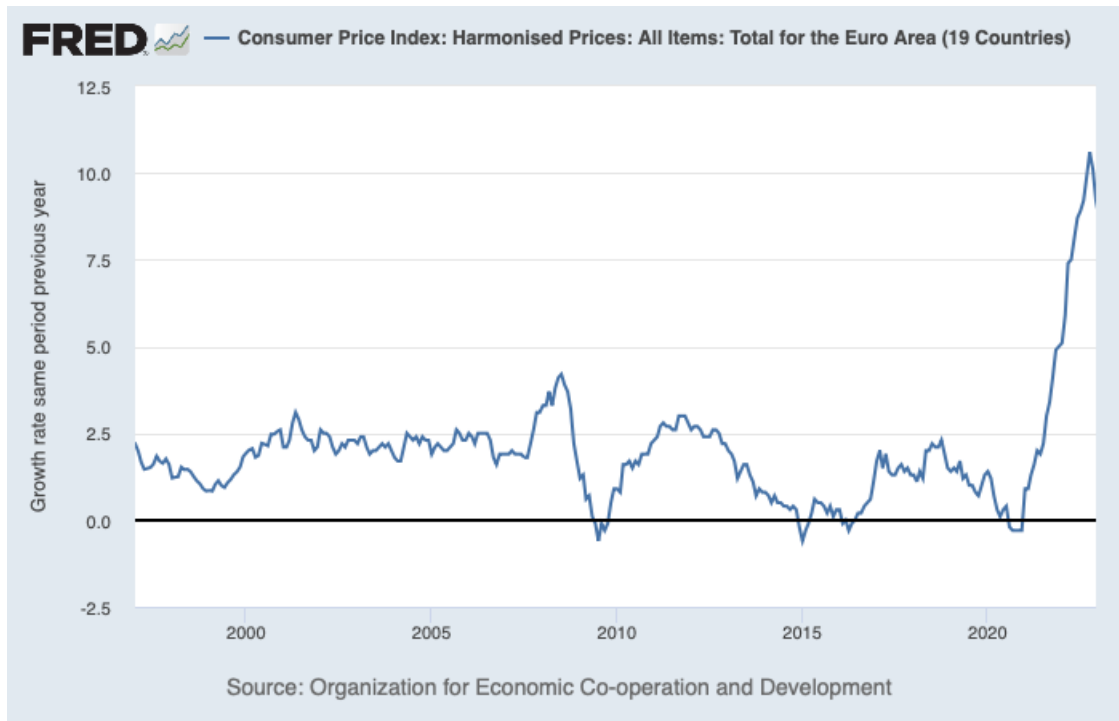


Figure 6

Consumer Price Index: Harmonised Prices: All Item: Total for the Euro Area (19 Countries)

changing their policy, so it's not just the United States. It's part of a global phenomenon, and that worries me quite a bit.

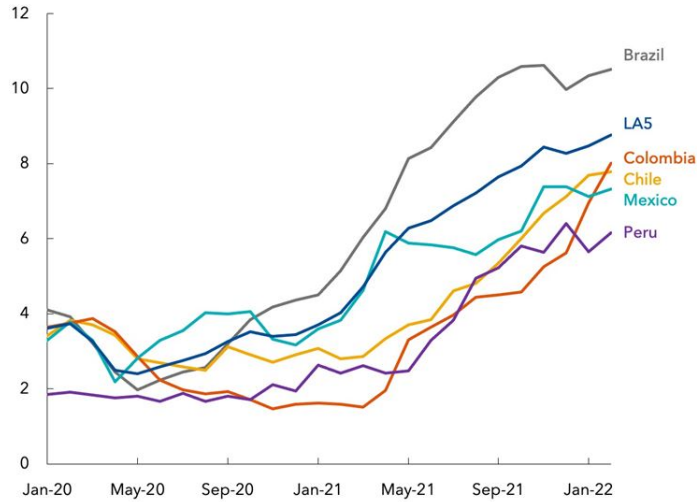
Figure 7 shows inflation in countries in Latin America - sorry I don't have Argentina on there. The data is from people who watch these countries, and IMF staff calculations. This is through the early part of last year, and they're all high, much higher than 2 percent. It's really a change for the better now; maybe it's getting better, I don't know. Inflation always looks different if you look at it up close. It's not just Europe; it's not just the United States; it's also much of Latin America; it's not every country in the world, but it's there, and it's a concern.

Again, maybe this is the Latin American countries saying, "Well if the US does it, we'll do it." I don't know the reasons; you know about it more than I do, but that's one of the questions that we should be addressing here. My sense from looking at Figure 7 is that we should get back to normal. Figure 8 is a picture from Jim Grant's Interest Rate Observer. He's got the federal funds rate implied by the Taylor rule - which is at 6 or 7 percent, much higher than the other measures - the federal funds rate implied by non-monetary variables, and the current federal funds rate as of a while ago. So, they were all pretty close, but they're way off at the end. This is not just me; there are a lot of people seeing this, and it'd be better if there were more discussion about this. I cannot emphasize enough that the adjustments of the Fed from 0.25 to 4.5 are not trivial.

Broader based

Inflation in Latin America has become broader based since the second half of 2021.

(year-over-year percent change)



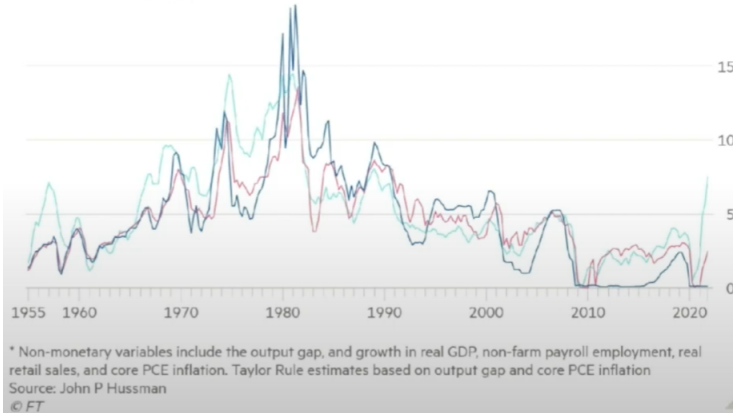
Sources: Haver Analytics; national authorities; and IMF staff calculations.
Note: Peru refers to Lima.



Figure 7
Inflation in Latin America January 2020 - January 2022

Too low for too long

— Federal funds rate (%) — FF rate implied by non-monetary variables*
— FF rate implied by Taylor Rule*



* Non-monetary variables include the output gap, and growth in real GDP, non-farm payroll employment, real retail sales, and core PCE inflation. Taylor Rule estimates based on output gap and core PCE inflation
Source: John P Hussman
© FT

Figure 8
Too Low for Too Long

Now, people say, "Oh, big deal. They've done this." Well, they haven't done it enough, and so I think that's the question: Should they do more? We should discuss this. That's

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really my main point, and I think it's important to look at a little history here. These are six papers that I looked at, the top two of which we've discussed a lot today:

- Calvo, Guillermo. 1978. "On the Time Consistency of Optimal Policy in a Monetary Economy." *Econometrica* 46 (6): 1411-1428.
- Calvo, Guillermo. 1983. "Staggered Prices in a Utility-Maximizing Framework." *Journal of Monetary Economics* 12 (3): 383-398.
- Mendoza, Enrique. 2005. "Toward an Economic Theory of Reality: An Interview with Guillermo A. Calvo." *Macroeconomic Dynamics* 9 (1): 123-145.
- Taylor, John. 1979. "Estimation and Control of a Macroeconomic Model with Rational Expectations." *Econometrica* 47 (5): 1267-1286.
- Taylor, John B. 1980. "Aggregate Dynamics and Staggered Contracts." *Journal of Political Economy* 88 (1): 1-23.
- Taylor, John B. 2004. "Policy Regime Change and the International Financial Institutions." Keynote speech presented at the IMF Conference in Honor of Guillermo Calvo, April 2004.

One is Guillermo's famous 1978 paper "On the Time Consistency of Optimal Policy in a Monetary Economy", published in *Econometrica* and reprinted in the book *Rational Expectations and Econometric Practice* edited by Bob Lucas and Tom Sargent. The first selection by me in the list above appears in the same book. Mine starts on page 659, and Guillermo's ends on 658, so they're back-to-back. I always thought that was kind of nice: Guillermo and Taylor right next to each other. And my paper in 1979 was about policy rules. It was really trying to emphasize that we need to do more on policy rules, and it was one way to think about that issue at the time.

The second paper on the list is also by Guillermo. We've already talked about that and introducing different ways to think about price setting in macroeconomics. My paper Taylor(1980) was written around the same time and has the same kind of title. The idea here was to try to explain a little bit more about what was going on. It was actually a long time ago, so I was really thinking carefully about what these price-wage dynamics are all about. The paper had a lot of the features that Ivan Werning and Chris Sims already mentioned today.

The third paper is an interview Enrique did - I just asked him about this a few minutes ago - with Guillermo back in 2003. It was around the same time when they had a conference in honor of Guillermo, where I presented. The last paper is my speech from that same conference in 2004, which I dug up: "Policy Regime Change and the International Financial Institutions." The idea behind this speech - and even today I want to say it even more emphatically - is "get back to a rule. Get back to a strategy." We don't need to change things that much if it works pretty well; it's not going to be perfect. Whether it's a Taylor rule or some variant on that, getting back to rules is really what I think the goal should be. As I look through the papers and think about what I heard today already and what different central banks are doing, I come to the same conclusion. It's not revolutionary; it's been around for a while. We've been talking about this for a while, so why can't we do this? Why do we need to have new theories if it seems it is getting off the old theories that led us astray?

That's what I'd really like to leave you with. I could do it in different ways, I could show the models in more detail. In fact, one of the things that's very important about the research is that the Taylor rule or similar ones, work pretty well in a wide variety of models,

so they're somewhat robust. The exchange rate wasn't there, and maybe exchange rates are important in certain countries, but it doesn't really matter in a lot of countries as well. Let me just stop there and see if there are any thoughts, questions, or criticisms. That's the main argument. I wanted to just emphasize that this is the work of a long time ago, but the message is really this: It's still time to get back. We haven't lost it. It's not that hard. It's a simple little formula. Why can't we do that? You practitioners know a lot about it.

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Final Remarks

Lecture in *The Credibility of Government Policies: Conference in Honor of Guillermo Calvo*¹

Guillermo Calvo
Columbia University

Thank you. Thank you very much for all the praise I received during the conference. And a very special thanks to Andy (Neumeyer) and Martín (Uribe), the head organizers. They have done a tremendous job, and so did all the people that worked alongside them. This conference has been fantastic because I sense that some public good has been created as a result of different generations joining the podium and actively participating from the floor. A good number of ideas involved fundamental macro theory and gave rise to a conversation over basic principles by members of the young and the old generations. I am hopeful that this will help to expand a common language in terms of economic principles, thus creating a public good. How can you build institutions and solid macro theory if we do not come to some agreement about economic principles across generations?

Leaving aside this general comment, and before commenting on some of the topics raised at the conference, I will start my remarks by focusing on the state of macro theory from the mid-1950s to the early 1970s. This period helps to illustrate traps that macro theory can fall into if fundamentals are treated in a cavalier manner. As I will argue, nowadays we run the risk of falling into a similar trap if we do not seriously consider the emergence of multiple global transactional means of payments (TMP) after the global financial crisis, GFC.

Macroeconomics from the mid-1950s to the early 1970s is far from the macroeconomics we know today. For instance, we did not have a widely agreed framework to model expectations about the future. Dynamic macroeconomics started to grow when the profession tried to liberate itself from the IS/LM static model. This sounds like a straightforward project, but it took a long time to devise a workable framework. For instance, it was soon found out that perfect foresight with an infinite time horizon—a natural framework for dynamic macroeconomics—could lead to highly unrealistic conclusions—for example, that small departures from steady-state cause a hyperinflation or deflation. This conclusion was quickly dismissed as unrealistic, but the theory leading to such a conclusion was not dismissed until the start of the rational expectations revolution (see, e.g., Sargent and Wallace (1973))!

The problem of instability with perfect foresight was something that started to be taken seriously in mathematical macro theory after the seminal paper of Phillip Cagan on hyperinflation, Cagan (1956). Under the assumption of adaptive expectations, he showed that

if money supply is constant over time and expected inflation is revised in a backward-looking fashion according to the very recent inflation, the equilibrium inflation rate could be highly unstable. There is a steady state in which inflation is zero, but a slight departure from the steady state gives rise to hyperinflation or deflation! From this finding *conventional wisdom* (at the time) concluded that perfect foresight would imply the same sort of instability. Of course, there was a basic conceptual error, because under perfect foresight, inflation expectations are not mechanically linked to *past* inflation. But this was the state of the art when Phil Cagan wrote his deservedly famous paper.

I do not know if that issue is being discussed in classrooms these days, but at that time those theoretical results were highly disconcerting. I was particularly concerned about these results because I was obsessed with *credibility* issues (largely thanks to Argentina), in which the future takes center stage and cannot be easily extrapolated from past observations. To make the situation even more confusing, and the since sticky prices assumption was taken for granted in most macro models, it was common for papers to assume that the initial price level is a *predetermined* variable, in which case most perfect foresight solutions converge to hyperinflation or deflation.

Therefore, under those conditions, issues involving credibility and time consistency could not be examined sensibly. Fortunately, the discussion in Sargent and Wallace (1973) helped to reach a consensus about rational expectations equilibrium in which a now familiar concept like *Saddle Path* took center stage, showing, among other things, how unsophisticated macro theory was for about twenty years—a *twenty year hiatus*!!

To summarize, in my opinion, one important contribution of rational expectations that is alive and well these days, independently of many other things, is that it helped to develop a framework in which it makes sense to assume model-consistent expectations without implying glaringly unrealistic results. This does not imply, of course, accepting rational expectations without further discussion. After all, models are objects to be improved, not just to be admired! Moreover, models are also cages. Golden cages at that, which prevent us from clearly seeing beyond their bars. That is why thinking out of the box is advisable, and could be highly rewarding for young generations that are at the peak of their creativity.

Let me illustrate this with an anecdote involving the time inconsistency paper that the conference is celebrating today. I presented a draft of the paper in a highly prestigious workshop at the University of Chicago. The ideas were not familiar at the time, to the point that a few minutes after I started my talk, somebody said something like “this does not work, because it contradicts Bellman’s principle,” which was quickly agreed upon by the rest of the audience and led the chairman to stop the session. As usual, I was invited to share a drink at the faculty club. There was no real aggression, everybody was very friendly—Bob Lucas in particular.

Before catching a plane back to New York, I called my wife from the airport. She asked, “How did it go?”; I said, “It was a disaster, but I am still very confident!” Two or three days later, back at Columbia University where I was teaching, I got a handwritten letter from Bob Lucas with my model in discrete time, claiming that I was right. This was lucky because the paper also got a lot of flak when I presented it elsewhere, proof that there was something novel about it. So, the lesson for the young generation is to never give up. It could even be a blessing if for a while, the paper is heavily criticized or even (momentarily) rejected.

This interplay between new ideas and conventional wisdom is also illustrated by the

current discussion around inflation. In my opinion, conventional macroeconomic theory—hailing back to before the Global Financial Crisis (more precisely, the 2008 Lehman crisis) — still dominates, despite the unusual eye-popping shocks observed since Lehman (an example of *cognitive dissonance*?). It is always very tempting to go back to conventional models for an explanation, but one must be especially cautious if macro shocks are very different from those in the past. After 2008 the world moved into a situation that we had not seen since at least WWI. For instance, the Lehman crisis initiated a long period in which believers in the simple-minded version of the quantity theory of money, QTM, as a first approximation, had a hard time rationalizing the observed “low” inflation. Some assets that were highly liquid before the Lehman 2008 crisis, called *toxic* assets, stopped being so, while, in turn, other assets, like US T-bonds, went the other way. We have not yet developed a widely accepted theory about the mechanisms behind those shocks, except for agreeing, I believe, that extensions of the QTM (including a new definition of the relevant monetary aggregate, M) need urgently to be addressed.

Let me now turn to the New Keynesian model (NKM). There is a puzzle that I want to share with you. In the NKM there is *money*, the only TMP, and the *real economy* is subject to sticky prices/wages. As is well known, under conventional assumptions, this combination leads to a unique dynamically stable equilibrium with unemployment.

Now, suppose we introduce an additional TMP. The two TMPs are not necessarily perfect substitutes, but they can be used as TMP (i.e., *currency substitution* prevails). Carlos Végh and I (Calvo and Végh (1994)) have explored such a model (where the TMPs are the *peso* and the *dollar*). Despite the existence of a second TMP, we focused on Keynesian unemployment equilibrium. We never thought that currency substitution could eliminate unemployment. The procedure we followed turns out to be equivalent to combining the two TMPs into an aggregate TMP. And, thus, it should not surprise anybody that Keynesian unemployment cannot be dismissed.

However, the procedure highlighted above ignores the possibility that there may be a stable solution in which full employment prevails, and disequilibrium moves from the labor market (as in the NKM) to the TMP markets. If you allow for that to hold, Calvo (2023) shows that there is a full employment equilibrium depending on whether one puts the TMPs in the utility function or, as in Clower (1967), in a cash-in-advance constraint. If one puts the two TMPs in the utility function, it is unlikely that one focuses—or that it is plausible to focus—on *price haggling*. But, on the other hand, if one puts the two TMPs in a cash-in-advance constraint, haggling arises as a natural possibility. My paper shows that haggling leads naturally to full employment, despite disequilibrium in the TMP markets. This is so because, in a nutshell, full employment is a Pareto optimal equilibrium, unlike Keynesian unemployment.

This is a work in progress, but I mention it here because ignoring this type of equilibrium may lead to ignoring the relevance of multiple TMPs, and missing factors that may turn out to be highly relevant in the multiple-TMP world in which the world economy is increasingly immersed. Moreover, ignoring these factors may lead us to a replay of the *twenty years hiatus* episode discussed above.

At a global level, multiple currency issues arose as US Treasury bonds emerged as another form of currency in the heat of the GFC, and with the creation of the euro, which has become a competitor of the USD since its inception. For instance, there has been a

lot of movement in the ratio of M2 in dollars and euros. If one thinks of these aggregates as “monies or, more precisely, as TMPS”, one could conclude that we are in a currency substitution scenario, with a significant twist: these instruments are global-level TMPs! This fact forces us to take these phenomena more seriously. If some monetary policy action is called for, it may require close collaboration between the Fed and the ECB, for instance—and a new Bretton-Woods-type agreement may be necessary. These possibilities deserve close attention since the USD M2/euro M2 ratio is anything but stable: it has changed significantly since the beginning of the pandemic, and it appears to be heading back to pre-pandemic values.

Let me now turn to dollar dominance (DD). There is a lot of discussion about this issue in the newspapers but little in terms of the theory and mechanics behind DD. I have been thinking about DD for some time and started to develop a theory, according to which DD is partly caused by price-setting mechanics—which led me to label it the *price theory of money*, PTM. Frustrated by not finding anything like that in modern literature, I turned to Keynes’s *General Theory* (Keynes (1936))—and *voilà*, there it was! To wit:

The fact that contracts are fixed, and wages are usually *somewhat stable*, in terms of money, unquestionably plays a large part in attracting to money so high a liquidity premium. (Chapter 17, page 236, italics added).

The issue/puzzle addressed by the PTM is why even though a ten-dollar bill is essentially worthless, you can buy a sandwich with it. The PTM suggests that money’s backup may be generated *from the ground up* - namely, by price setters willing to hold price quotations somewhat rigid in nominal terms for a significant period.

In conventional macroeconomics, fixed prices are typically cataloged as a problem for the smooth working of the macroeconomy. Absent proactive monetary policy, unemployment/excess capacity may prevail, something that has led to the view that *price/wage flexibility* should be promoted. Interestingly, though, this implication does not necessarily hold, because under those conditions, the PTM is ruled out; hence, perfect price/wage flexibility may seriously jeopardize money’s liquidity and, in the limit, lead to barter and a large output loss (think about recent Bitcoin fluctuations). When I discussed these issues with Alan Taylor, now at Columbia University, he suggested—and I think he is right—that the PTM is a *macro*-foundation of money, given that it would not fit the conventional *micro* theory that tends to abstract from economy-wide price stickiness. So, you see, a conjecture as straightforward as the PTM falls flatly outside microeconomics, and it’s hard for conventional wisdom to swallow. No wonder, then, that the PTM, a fundamental insight ensconced in the *General Theory*, has been ignored by the profession until recently (and according to my count, it is still having a hard time raising its head from oblivion).

Keynes suggested the PTM for a one-currency economy (which could be the whole world). Still missing is a well-structured theory that applies to a world with multiple reserve currencies – that is, global TMPs. Such an extension would come in handy to rationalize the recent swings in dollar dominance, the increasing prominence of the euro, and China’s attempt to turn the renminbi into a new global TMP. Moreover, extensions of the PTM could be directed to analyzing whether policies that are becoming popular these days – for example, *weaponization of the dollar* - may weaken the USD as a transactional liquid asset and harm global trade. These are all promising research issues.

QR

These are my reflections for today. I want again to thank very much the organizers and all of you for participating in this wonderful conference. The public good that it helped to generate is especially valuable for the young who are actively churning out new papers. I hope that the depth and variety of topics covered inspire them. My advice to them is “do not let this richness overwhelm you.” Occasionally, let a good piece of music invade your room, think about attractive ideas that may even sound crazy at first, and let your mind fly without the rigor of standard models. Get a group of like-minded colleagues and enjoy. Life is much better that way. And sometimes a very good paper jumps out of the hat!

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