

# Calvo, Currencies, and Commitment

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

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February 24th 2023

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.

# ECONOMETRICA

JOURNAL OF THE ECONOMETRIC SOCIETY

*An International Society for the Advancement of Economic  
Theory in its Relation to Statistics and Mathematics*

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VOL. 46, NO. 6—November, 1978

Figure 1: Hole left by the nail

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. A. 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 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.

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 fair bit of swagger. Expressing doubts and admitting knowledge gaps was not a big part of the *modus operandi* — and still often isn’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 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, Karnit Flug and

Miguel Kiguel, who are here in the room, both 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. A. 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. A. Calvo (1983), but perhaps we will need another conference for that one.<sup>1</sup>

Let me return to the 1978 paper in *Econometrica*, G. A. Calvo (1978a). As I told you, I first encountered this paper nailed to a door, which puts me in mind of Martin Luther’s 95 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

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<sup>1</sup>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).

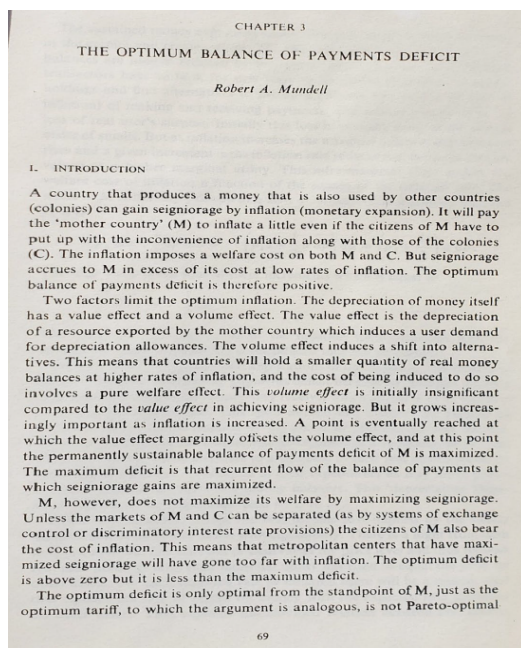


Figure 2: Robert Mundell and his paper on seigniorage

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 Economy* 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. A. 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 an “honest” government that reduced the nominal money supply so as to hold  $P$  initially fixed.<sup>2</sup>

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. A. 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

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<sup>2</sup>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.

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 U.S. Treasury obligations. However, the U.S. is indeed a monopoly issuer of those safe assets, as it is of U.S. currency. And U.S. 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 & Stein, 2021). Accordingly, recent literature stresses a convenience yield of U.S. government bonds for global investors, above and beyond the interest yield. Furthermore, the monopoly issuer, the U.S. 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.<sup>3</sup>

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

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<sup>3</sup>There were important precursors of this approach in the 1960s. 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 business school, interacting regularly with Mundell, when he published his Princeton Essay.



(Krishnamurthy & Vissing-Jorgensen, 2012), which was motivated (in part) by the question of how much Chinese intervention purchases of U.S. 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 (G. A. Calvo & Végh, 1996). Guillermo continues to explore these issues in a recent paper with Andrés Velasco (G. A. Calvo & Velasco, 2022).

The new literature on the alleged United States "exorbitant privilege" expands the discussion beyond the original narrative of the Bretton Woods days. A nice survey is Gourinchas et al. (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 U.S. fiscal policy (Sims, 2022). Effectively, the U.S. government is producing and marketing the liquidity services of its bonds, which makes 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 et al. (2011) a few years ago, and I have 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. A. Calvo (1988), which

Giancarlo Corsetti cited in his talk yesterday (Corsetti & Mackowiak, 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 U.S. safe assets may be inadequate when the U.S. determines the supply in a way that maximizes some policymaker objective. Two very nice recent papers are by Coppola, Krishnamurthy, and Xu (Coppola et al., 2023) and Choi, Kirpalani, and Perez (Choi et al., 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 et al. (2022) model is particularly focused on the U.S. 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 interpretations 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 U.S. 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 U.S. Treasury, who may not always be coordinating in a way that produces a monopoly-level seigniorage flow. 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 U.S. 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 G. A. Calvo et al. (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.

All that being said, there is an important sense in which the demand for U.S. 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 U.S. policymakers would see advantage in measures that enhance Treasury market liquidity, especially during crises, such as those proposed by Duffie (2020) and others.

In thinking about models of the IMS, I wonder further if it really makes sense to imagine the U.S. 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 U.S. financial markets. That is a large part of what gives the dollar its global role and supports the network externalities that make the U.S. dollar the global currency. That is why the Chinese yuan cannot displace the U.S. dollar under current conditions. If you recognize that reality, it becomes clear that the determinants of U.S. debt supply bring into play a host of other factors beside seigniorage, some of which were discussed by Marina Halac yesterday, for example, in her very nice paper with Pierre Yared (Halac & Yared, 2022).

Real-world U.S. 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 U.S. 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 U.S. 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 political document, it is obviously tempting 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.

Coming back to 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. Looking *way* further back, the United States froze Japan's foreign reserves in 1940 to deter its military penetration into Southeast Asia; that U.S. 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.



**Figure 3:** Carlos Eulalio Calvo Díaz

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 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 Aznar (Pérez Aznar, 2021) 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 "Why do 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, and not 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.



# Appendix A Early handwritten notes for G. A. 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

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

Hence

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

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

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

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

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

## References

- Aguiar, M., & Amador, M. (2022). *The economics of sovereign debt and default*. Princeton University Press.
- Auernheimer, L. (1974). The honest government's guide to the revenue from the creation of money. *Journal of Political Economy*, 82(3), 598–606.
- Cagan, P. D. (1956). The monetary dynamics of hypeinflation. In M. Friedman (Ed.), *Studies in the quantity theory of money* (pp. 25–117). University of Chicago Press.
- Calvo, C. (1868). *Derecho internacional teórico y práctico de Europa y América*. D'Amyot Librairie Diplomatique (Paris).
- Calvo, G. A. (1978a). On the time consistency of optimal policy in a monetary economy. *Econometrica*, 46(6), 1411–1428.
- Calvo, G. A. (1978b). Optimal seigniorage from money creation: An analysis in terms of the optimum balance of payments deficit problem. *Journal of Monetary Economics*, 4(3), 503–517.
- Calvo, G. A. (1983). Staggered prices in a utility-maximizing framework. *Journal of monetary Economics*, 12(3), 383–398.
- Calvo, G. A. (1988). Servicing the public debt: The role of expectations. *American Economic Review*, 647–661.
- Calvo, G. A. (2011). Leonardo “Pepe” Auernheimer. *Journal of Applied Economics*, 14(1), I–III.
- Calvo, G. A., Leiderman, L., & Reinhart, C. M. (1993). Capital inflows and real exchange rate appreciation in Latin America: The role of external factors. *IMF Staff Papers*, 40(1), 108–151.
- Calvo, G. A., Leiderman, L., & Reinhart, C. M. (1996). Inflows of capital to developing countries in the 1990s. *Journal of Economic Perspectives*, 10(2), 123–139.
- Calvo, G. A., & Végh, C. A. (1996). Disinflation and interest-bearing money. *The Economic Journal*, 106(439), 1546–1563.
- Calvo, G. A., & Velasco, A. (2022). *Joined at the hip: Monetary and fiscal policy in a liquidity-dependent world* (tech. rep.). National Bureau of Economic Research.

- Choi, J., Kirpalani, R., & Perez, D. J. (2022). *The macroeconomic implications of US market power in safe assets* (tech. rep.). National Bureau of Economic Research.
- Cochrane, J. H. (2023). *The fiscal theory of the price level*. Princeton University Press.
- Coppola, A., Krishnamurthy, A., & Xu, C. (2023). *Liquidity, debt denomination, and currency dominance* (tech. rep.). National Bureau of Economic Research.
- Corsetti, G., & Mackowiak, B. (2022). *Gambling to preserve price (and fiscal) stability* (tech. rep.). European University Institute.
- Duffie, D. (2020). *Still the world's safe haven? Redesigning the U.S. Treasury market after the COVID-19 crisis*. Hutchins Center, Brookings Institution.
- Farhi, E., Gourinchas, P.-O., & Rey, H. (2011). *Reforming the international monetary system*. CEPR.
- Farhi, E., & Maggiori, M. (2018). A model of the international monetary system. *Quarterly Journal of Economics*, 133(1), 295–355.
- Gelpern, A., & Panizza, U. (2022). Enough potential repudiation: Economic and legal aspects of sovereign debt in the pandemic era. *Annual Review of Economics*, 14(1), 545–570.
- Gopinath, G., & Stein, J. C. (2021). Banking, trade, and the making of a dominant currency. *Quarterly Journal of Economics*, 136(2), 783–830.
- Gourinchas, P.-O., Rey, H., & Sauzet, M. (2019). The international monetary and financial system. *Annual Review of Economics*, 11(1), 859–893.
- Halac, M., & Yared, P. (2022). *A theory of fiscal responsibility and irresponsibility* (tech. rep.). National Bureau of Economic Research.
- Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica*, 46(6), 1251–1271.
- Krishnamurthy, A., & Vissing-Jorgensen, A. (2012). The aggregate demand for Treasury debt. *Journal of Political Economy*, 120(2), 233–267.
- Lucas, R. E. (1978). Asset prices in an exchange economy. *Econometrica*, 46(6), 1429–1445.
- Mundell, R. A. (1972). The optimum balance of payments deficit. In E. M. Claassen & P. Salin (Eds.), *Stabilization policies in interdependent economies* (pp. 69–86). North-Holland Elsevier.

- Obstfeld, M. (1982). Relative prices, employment, and the exchange rate in an economy with foresight. *Econometrica*, 50(5), 1219–1242.
- Obstfeld, M. (1995). International currency experience: New lessons and lessons relearned. *Brookings Papers on Economic Activity*, 26(1), 119–220.
- Obstfeld, M. (2013). The international monetary system: Living with asymmetry. In R. C. Feenstra & A. M. Taylor (Eds.), *Globalization in an age of crisis: Multilateral economic cooperation in the twenty-first century* (pp. 301–336). University of Chicago Press.
- Pérez Aznar, F. (2021). *Revisiting Carlos Calvo on the 200th anniversary of his birth*. Retrieved March 24, 2023, from <https://www.ejiltalk.org/revisiting-carlos-calvo-on-the-200th-anniversary-of-his-birth/>
- Sims, C. A. (2022). *Optimal fiscal and monetary policy with distorting taxes* (tech. rep.). Griswold Center for Economic Policy Studies, Princeton University.
- Swoboda, A. (1968). *The euro-dollar market: An interpretation*. Princeton Essays in International Finance no. 64, February.
- Taylor, J. B. (1979). Estimation and control of a macroeconomic model with rational expectations. *Econometrica*, 47(5), 1267–1286.