

Detecting Fiscal-Monetary Causes of Inflation

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Introduction

Latin American countries have experimented with a wide variety of macroeconomic policies and have experienced diverse and sometimes adverse consequent outcomes. The Monetary and Fiscal History of Latin America (MFH) project has collected and organized systematic evidence consisting of comparable data sets from these varied historical experiences to construct a knowledge base for studying the origins and effects of alternative monetary and fiscal policies. Instances of these diverse policies were themselves caused by various political and economic events, so they can't easily be viewed as "experiments" purposefully conducted to learn the general equilibrium effects of alternative policies. Indeed, the study of macroeconomic policies explores not only their direct effects on individuals' behaviors and their indirect effects on altered market prices but also the responses of future policies to changes created by the policies that preceded them. Such interactions are central focuses of policy analysis.

While many economists emphasize the importance of evidence-based policy analysis, the evidence won't speak for itself; we require a conceptual framework to organize and interpret evidence. Decades ago, Koopmans (1947), while at the Cowles Commission at the University of Chicago, wrote "Measurement without Theory," a critical review of extensive research by Burns and Mitchell (1946) that measured business cycles from macroeconomic data. Koopman's review sparked a debate (for instance, see Vining 1949) that continues to this day as we struggle to put data science and machine learning methods to scientific use. Marschak (1953), Hurwicz (1966), and Lucas (1976) are classic expositions of the case for using structural econometric models to do policy analysis.

The architects of the MFH project, Tim Kehoe and Juan Pablo Nicolini, are keenly aware of the interplay between evidence and theory. They aimed to design the project

to facilitate the use of multicountry data to compare and contrast alternative models of fiscal and monetary interactions.

As macroeconomists, we find this study to be particularly promising because of the varied institutional structures, policy experiences, and macroeconomic outcomes presented. The countries have different degrees of separation between responsibilities for designing and executing monetary and fiscal policies. These separation conventions influence how these policies are ultimately coordinated and the extent to which one policy authority dominates the other. Such institutional conventions matter for alternative models of macroeconomic impacts. Whether fiscal or monetary policies are dominant or the extent to which they act in unison with common ambitions can have important consequences for macroeconomic performance. Studies like the MFH project promote understanding of the impacts of monetary-fiscal policy interactions.

Intellectual History

As background, we recall how Milton Friedman encouraged his students Eugene Lerner (1956) and Phillip Cagan (1956) to study big inflations that accompanied the Civil War in the United States and that followed both World War I and World War II.¹ Friedman recognized that these episodes contained sources of data variations that would let Lerner and Cagan isolate fundamental monetary-fiscal causes of inflation and private behavioral responses to it that can be confounded by many other forces that also affect the price level. Thus Friedman and his students aimed to sidestep the complex interactions of monetary and fiscal policy and avoid taking account of various general equilibrium effects by focusing on data for which monetary policy would dominate macroeconomic effects.

Specifically, Friedman's students sought

1. a single behavioral relationship—an aggregate demand function for money linking real balances inversely to an expected rate of inflation,
2. measures of the supply of nominal money balances, and
3. links between time series of measured inflation and an estimate of the public's expected rate of inflation suitable for plugging into the demand function for real balances.

Friedman's hunch was that the episodes studied by Lerner and Cagan could be treated as though they were "natural experiments." Specifically, explosive money supply series were "uncaused events," the sources of which need not be analyzed in order to understand the main force driving the price level and real balances. During the episodes studied by Lerner and Cagan, the three items on Friedman's list would overwhelm a long list of confounding forces that in tranquil times also affect the price level and make the quantity-theoretic sources of inflation more difficult to detect.

The MFH project led by Kehoe and Nicolini aims to extend the quantity-theoretic tradition pursued by Friedman and his students in ways that can help us understand

the histories of inflation in a set of Latin American countries. All the countries studied experienced a variety of inflationary episodes, though usually at rates substantially below those in the short European hyperinflation episodes studied by Cagan.² And while the three identification pillars of Friedman's students' analyses play roles in these new studies, variations in the rates of money creation and inflation are sufficiently lower that other forces confound their influences. The studies in the MFH project thus also pay attention to other data that the researchers hope will allow them to detect those other causes of inflation.

Explicitly dynamic equilibrium analyses of economies are vital for understanding how macroeconomic policies operate. The analyses avoid the "measurement without theory" criticism stated by Koopmans. While this approach makes macroeconomic policy analysis challenging, the results can be enlightening. We should not expect the data and analyses from this project to settle all modeling and measurement challenges, although the authors and architects of the study have taken important steps forward.

The main hypothesis explored by Kehoe and Nicolini is that sustained inflation rates, as opposed to short bursts of hyperinflation, are outcomes of particular monetary and fiscal regimes and the associated (perhaps rational) expectations about future policy actions that they cause. This is what led Kehoe and Nicolini to stress a common measurement of the consolidated budget constraint faced by monetary and fiscal authorities, together with the institutional backgrounds in which they are managed. Importantly, interrelated monetary and fiscal policies sometimes lead to indeterminate outcomes in the form of multiple equilibria that offer potential sources of variations in macroeconomic outcomes. One example is that economies can be pulled in different directions at different points in time. For example, Sargent (1999) and Sargent, Williams, and Zha (2009) illustrated how a multiplicity of self-confirming equilibria in conjunction with an adaptive learning mechanism present a dynamic pull toward and escape from these equilibria. Finally, a point that is usually deemphasized or ignored in models in the rational expectations tradition is that people inside economic models (e.g., consumers, entrepreneurs, and even policy makers) are exposed to macroeconomic ambiguity as they wrestle with uncertain policies. (For example, see the discussion in Hansen 2014.) Sometimes adaptive learning is motivated by agents' awareness of potential model misspecifications. It is worth noting that "control theory" counterparts can also be used to understand how people inside our models perceive the complex uncertainty that they confront and that affects both markets and policy making. We will elaborate on some existing work that features adaptive learning as a way to model potentially shifting environments.

This introduction presents and explores a list of theories about forces that help us understand equilibrium responses to alternative macroeconomic policy configurations. To interpret evidence, we find it compelling to push beyond the identification approach used in the empirical monetarist approach of Friedman and his former students Cagan and Lerner. This approach is needed to refine inferences about those basic forces to be drawn from the types of episodes studied by the team of researchers contributing to the MFH project. In so doing, model builders and econometricians are compelled to

1. refine models of expectations,
2. make components endogenous that Friedman and his colleagues took to be exogenous, and
3. add more “realistic” components of government budget constraints, such as risk-free real debt, risk-free nominal debt, and defaultable debt.

Challenges to “Exogenous” Money Supply

In this section, we review three empirical-econometric paths that refined and extended the money demand model used in the classic studies by Friedman and his former students.

BROADENING THE MEASUREMENT OF MONEY

Encouraged by Friedman and others, an extensive empirical literature refined theoretical specifications and estimates of the demand for money. An empirical challenge in such studies is how to construct the most appropriate counterpart to “money.” The aim has been to produce a measure of money that discovers the most “stable” demand for money function. Advances in transactions technologies have created close substitutes for cash in its transactional role. There were two research responses to these developments. One sought to broaden the definition of money, while the other substantially reduced the role of money in many macroeconomic models applied to developed economies.

Very recently, Lucas and Nicolini (2015) and Benati et al. (2016) embraced the first perspective and argued for a long-run stable demand for money by adjusting the measure of money based in part on regulatory considerations. For the United States, Lucas and Nicolini modified the M1 measure to include money market accounts, while Benati et al. found that the standard definition sufficed for a stable long-run demand for money function for many other countries. Inventing a monetary aggregate leading to a stable long-run demand for money function potentially inserts interesting additional linkages between money demand and monetary policy. While Lucas and Nicolini (2015) dismiss this as a serious concern for M1 or their modified version of it, we remain open to this notion and see endogenous responses as interesting in their own right and potentially important quantitatively. Moreover, Lucas and Nicolini’s use of low-frequency characterizations would seem to put aside the notion of using such broader definitions of money for high-frequency fine-tuning of monetary policy.³

DETECTING DYNAMIC FEEDBACKS

A second refinement has its origins in the applied time series to empirical macroeconomics that traces back to Yule (1927), Slutsky (1927), and, importantly, Frisch (1933) in his research on “impulse and propagation.” Subsequently, Sims (1980) and others saw the importance of extending time series methods to multivariate settings through what are referred to as vector autoregression (VAR) methods. Early research in the VAR tradition

discovered that the notion of an exogenous money supply specification was untenable in postwar data. Sims (1972) had previously linked the exogeneity of money to Granger's notion of causality in a dynamic setting. But by extending a bivariate analysis of money and income to a larger collection of variables represented as a VAR, the endogeneity of money became expressed in the VAR system as feedback effects from other variables, such as short-term interest rates, that had been omitted in the bivariate analysis. These analyses used post-World War II data and were outside the realm of hyperinflations. By emphasizing the importance of dynamic feedbacks among variables, this empirical finding undermined the practice of estimating money demand via a simple single equation time series regression. This evidence was from post-World War II economies in which inflationary episodes were very modest in comparison to the hyperinflation episodes studied by Cagan (1956) and Lerner (1956).

EMBRACING RATIONAL EXPECTATIONS

A third refinement emerged from reassessing the econometric specification of Cagan's original model (Cagan 1956). His model featured (1) a demand function for real balances, linking real balances to expected inflation, and (2) an equation linking the expected rate of inflation to a geometric average of current and past inflation (adaptive expectations). Cagan took the money supply as exogenous. This ruled out feedback effects that the previously mentioned VAR literature subsequently sought to characterize. In extending Cagan's analysis, Sargent and Wallace (1973) and Sargent (1977) found an alternative rationale for refining the exogeneity restriction by asking under what circumstances Cagan's specification of private-sector beliefs would be rational. By solving the implied inverse optimal prediction problem, Sargent and Wallace were led to a money supply process in which the process for money depended on past inflation, violating the Granger-Sims time series notion of exogeneity. In their specification, the only variable needed to forecast future inflation is current and past inflation, not money supply. This prediction-theoretic endogeneity of money could be only loosely motivated by saying that "maybe the feedback from inflation to money creation" somehow reflected the workings of a government budget constraint that made money creation endogenous. This thought can be viewed as leading to theoretical advances that involved adding economic forces to make money creation endogenous.

By looking at the relationships between monetary and fiscal policy from three different vantage points, these studies represent a central theme of the MFH project.

Inflation Theories under Cagan Demand

We now explore some initial extensions of the Friedman-Cagan money demand approach with explicit fiscal-monetary interactions. To begin, suppose that the government budget constraint is financed entirely by printing money. This happened to be one of Friedman's recommendations for coordinating monetary and fiscal policy (see Friedman 1948).

Interestingly, Friedman wrote that proposal a few years before the accord between the Treasury and the Federal Reserve that granted the Federal Reserve independence from the Treasury. Friedman's proposal recommends complete fiscal dominance over monetary policy. Within such a monetary-fiscal setup, we explore alternative ways of modeling private-sector beliefs.

SENSITIVITY TO EXPECTATIONS

Sargent and Wallace (1987) and Imrohorglu (1993) explored the implications of rational expectations for a fiscal version of a Cagan-type model. The models have a continuum of equilibria, including many with sunspots. Nevertheless, data on money creation and inflation strongly overidentify free parameters, including one that indexes which, if any, sunspot equilibrium prevails. Imrohorglu (1993) extracted estimates from the German hyperinflation data by using the method of maximum likelihood. Looking across the multiplicity of equilibria, we see that two types have attracted special interest—namely, “stationary” ones on each side of the Laffer curve in the inflation tax rate. Of particular interest is that rational expectations dynamics can drive the economic system toward a steady state on the bad side of a Laffer curve—that is, toward the stationary perfect foresight equilibrium that has the higher steady-state inflation rate. This outcome is disturbing because the comparative dynamics at that steady state imply that a *higher* sustained deficit financed by money creation is associated with lower steady-state inflation. That finding belies the “old-time religion” that asserts that bigger deficits financed by money creation lead to higher inflation. This is a rather dramatic illustration of how interactions between monetary-fiscal policy and private-sector expectations formation play a prominent, and in this case surprising, role in determining inflation.

Bruno and Fischer (1990) studied inflation dynamics in a similar model but under Cagan-style adaptive expectations. By altering the assumption about how the private sector forms beliefs, they found that the dynamic economic system, absent uncertainty, always converged to a perfect foresight steady state in which inflation is on the *good* side of the Laffer curve. Thus their findings resurrected the old-time religion by departing from rational expectations along transition paths. This line of research illustrates how private-sector expectations play a critical role in determining the manner in which monetary and fiscal policies, as intermediated through private-sector expectations, jointly affect inflation. These contributions also opened the door to studies that investigate how more flexible models of learning affect inflation as well as real variables, the topic we turn to next.

ADAPTIVE LEARNING

Researchers probed the stability of rational expectations under least squares learning. The resulting approach is an example of what Bray and Kreps (1987) call learning *about* an equilibrium in contrast to learning *within* an equilibrium. Adaptive versions of least squares learning allow discounting past observations as a flexible way to cope with

possible changes over time in an economic environment. The resulting equation systems are examples of so-called self-referential systems in which behavior today depends on beliefs about where the system will be in the future. This structure provided a framework for studying the stability of a rational expectations equilibrium. Within this framework, Marcet and Sargent (1989a) showed that under some regularity conditions, forces push the dynamical economic system toward the rational expectations equilibria, where convergence is punctuated with infrequent expectations-driven escapes toward other belief-outcome combinations. Marcet and Sargent (1989b) applied this approach to the study of hyperinflations in Cagan-type models with 100 percent deficit monetization. Like Bruno and Fischer (1990), Marcet and Sargent (1989b) found environments in which outcomes converged to a rational expectations equilibrium on the good side of the Laffer curve in the inflation tax rate. Technically, the system's "mean dynamics" (the dynamics averaged over the contributions from shocks) drive it toward this good outcome. But they also found positive probability "escape routes" in which there occur expectations-driven explosions in inflation not driven by money-creation-financed deficits.

Marcet and Sargent (1989b) noted that what they call a "projection facility" is needed to push the system back into the region of the good Laffer equilibrium. To Marcet and Sargent, the explosive inflation escape dynamics are a technical annoyance that they wanted to sidestep. But for Marcet and Nicolini (2003), those explosive escape paths provided a tool that could help in understanding the puzzling episodes in Latin American inflation histories in which inflation paths seemed to come unhinged from money-growth causes. Specifically, Marcet and Nicolini added an economic interpretation to Marcet and Sargent's "projection facility." In particular, Marcet and Nicolini interpreted this facility as a form of direct policy actions that reset expected inflation via exchange-rate interventions or price controls. These interventions are all cosmetic in the sense that they leave unchanged the government deficit to be financed by money creation.

Marcet and Nicolini (2003) used a calibration strategy to partition stabilizations in several Latin American episodes into ones that resulted from fundamental corrections—associated with reductions in the government deficit to be financed by money creation—and others resulting from cosmetic measures that left the government deficit unchanged. Sargent, Williams, and Zha (2009) extended this approach by using a maximum likelihood strategy to estimate a hidden Markov version of the Marcet and Nicolini model and to infer Markov movements in the government deficit, treated as a hidden state. In this way, they inferred whether various inflation explosions and stabilizations were driven by movements in fundamentals or by escape dynamics and subsequent cosmetic (and necessarily temporary) stabilizations.

Overall, this literature exposes the sensitivity of inflation dynamics to seemingly minor but sensible relaxations of pure rational expectations. The least squares dynamics involve expectations that are typically "wrong" only in subtle and hard-to-detect ways. This approach does not, however, allow for investors (or policy makers) to express aversion to potential misspecifications. Amplifying agents' reactions to concerns about those misspecifications could have an important impact on market and social valuation, an important topic that future research should explore.

Models without Full Debt Monetization

In the preceding models, government deficits are financed entirely by money creation. This structure serves as a pedagogically revealing example of the interplay between monetary and fiscal policy, but it is too special a case for understanding macroeconomic policies and their outcomes in many countries at many times. The unpleasant monetarist arithmetic of Sargent and Wallace (1981) adds one-period government debt to a model with perfect foresight and a demand for real balances like Cagan's. This simple setting frames the need to coordinate a monetary policy that determines a rate of money creation process with a fiscal policy that determines a net-of-interest government deficit process. Because seigniorage is a source of real government revenues and hence affects the equilibrium present value of these revenues, the "independence" of monetary authorities is a fiction (or said more politely, a "convention"). Sargent and Wallace stated conditions on fiscal policy and equilibrium real rates of interest under which a monetary authority could fight inflation in the short run only by making it worse in the long run.

Sargent and Wallace's unpleasant arithmetic also opened the door to a "fiscal theory of the price level" developed subsequently by Sims (1994), Woodford (1995), Leeper (1991), and others. (See Leeper and Leith [2016] for a comprehensive survey and Loyo [1999] for application to Brazilian inflationary episodes.) In a simple instance, imagine an environment in which real discount factors (potentially stochastic) are determined by an external economy and in which a real net-of-interest government surplus series is specified exogenously. The real value of debt is pinned down by a present-value relation. Since nominal debt is predetermined, the nominal price follows from a formula for the equilibrium present-value relation. This gives a rather stark example of the impact of fiscal policy on price determination. Of course, this is a (typically too) simple specification of the dynamic economic system. More generally, we expect more endogeneity, and this present-value relation is one among a system of equations that must hold in equilibrium.⁴

As in the example economies with full monetization, there is a multiplicity of equilibria, and the details of the monetary and fiscal rules matter and can appear as alternative types of regimes in which either monetary policy or fiscal policy dominates. By allowing for more than one-period debt, Cochrane (2001) explored policy ramifications for the full term structure. Recently, Chen, Leeper, and Leith (2015) and Bianchi and Ilut (2017) contributed an econometric exploration of regime-shift models between so-called fiscal dominance and monetary dominance. As an alternative, employing the Marcet and Sargent (1989a) type approach, in which the private sector embraces adaptive learning, opens the door to expectations-based escape dynamics with different forces pushing toward alternative equilibria.

Overall, these models point out the potential importance of the rules of engagement between fiscal and monetary authorities, as well as the crucial role of expectations formation in determining macroeconomic outcomes. They further demonstrate the need to study monetary and fiscal history together, as well as the value of a common measurement framework for the interpretation of the varied economic experiences in Latin America.

Models with Risky Nominal Government Debt

Pushing fiscal policy to the forefront puts a focus on the tools and consequences of debt management. To frame this discussion, we start with the classic benchmark model of Lucas and Stokey (1983) describing an optimal policy analysis under commitment when there exists a rich (complete) set of financial markets. Lucas and Stokey explored monetary-fiscal interactions in several revealing ways. Parts of the paper are tied to the Ramsey enterprise of constructing an optimal monetary-fiscal policy mix under well-posed rules of the game. The model has become a standard reference point for analyzing the consequences of risky government debt and for demonstrating how inflation can make nominal government debt mimic risky real government debt when managed appropriately. But because they recover a version of a Friedman rule of a zero nominal interest rate as a Ramsey policy, Lucas and Stokey's normative analysis requires modification in developing the positive description needed to understand various Latin American high-inflation episodes.

Extensions of potential value for interpreting evidence include

1. introducing explicit forms of market incompleteness,
2. allowing for default, and
3. adding tractable forms of heterogeneity across sectors, external investors, and individuals within the countries under investigation.

Such extensions put inflation and deflation into the arsenal that a Ramsey planner could use to redistribute among nominal debtors and creditors in response to macro-shocks. Moreover, the planner could denominate debt in either local or foreign currency as part of the policy design.⁵

SOVEREIGN DEFAULTS

Models of sovereign debt retreat from a complete markets specification and build on the insight that partial defaults provide possibly useful state contingency as part of the government's debt. Models in the Eaton and Gersovitz (1981) and Arellano (2008) tradition solve Ramsey plans in which a benevolent government chooses if and when to default. In these models, governments honor their debts only when they want to. To make governments want to honor their debts, the model builder adds adverse consequences in the form of punishments that creditors impose on the government in the event of a default.⁶ Specifications of punishments are important determinants of the quantitative implications of these models. Attempts have been made to directly measure costs that creditors impose on governments for defaulting, as surveyed by Tomz and Wright (2013) and more recently by Hébert and Schreger (2017). These models typically deliver unique processes of endogenous sovereign default premia that can be informative in calibration.

MULTIPLE EQUILIBRIA WITH SOVEREIGN DEFAULT

In models of multiple equilibria with distinct default premia, high default premia worsen a government's fiscal prospects by augmenting its interest burden (via a sophisticated kind of unpleasant arithmetic), thereby increasing the probabilities of default. Low default premia, on the other hand, ease a government's fiscal situation and make default less likely. An early example with such forces is Calvo (1988), who analyzes both outright defaults and implicit defaults induced by large inflationary episodes. Ayres et al. (2018) further explore the role of expectations in sovereign defaults. Cole and Kehoe (2000), who presented a fully dynamic version of a related problem, emphasize coordination problems associated with rolling over short-term debts. Chang and Velasco (2001) analyze a default model with a different sort of coordination problem, one driven by the potential illiquidity of banks, as in a classic Diamond and Dybvig (1983) setup. A growing literature explores alternative justifications for default, an understanding of which seems of vital importance in interpreting the varied experiences in Latin America.

DEFAULTS AND TERM STRUCTURE

While the contributions of Calvo (1988), Cole and Kehoe (2000), and Chang and Velasco (2001) all emphasize the perils of rolling over short-term debt, in practice there is typically a nontrivial term structure of outstanding government debts. Governments face trade-offs between issuing long- or short-term debts that interact with potential consequences of default. Quantitative analyses that have investigated these trade-offs include Hatchondo and Martinez (2009) and Arellano and Ramanarayanan (2012), who study hedging benefits brought by short- versus long-term debt. Aguiar et al. (2019) provide a theoretical framework for characterizing these trade-offs and their impact on nominal prices.

Besides being realistic, long-term debt introduces other possibilities. Multiple equilibria can emerge, including ones in which debt crises unfold gradually (see Lorenzoni and Werning 2013). Also, there is a term structure of default premia for bonds that is affected by variability in the underlying nominal interest rates, as featured in Tourre (2017). The term structure of default premia for fixed-rate bonds became particularly relevant for sovereign debt issued under the Brady Plan and had important implications for decisions to default on short-term obligations. For several chapters of the MFH, a salient instance was the rise in U.S. interest rates in the early 1980s, which arguably contributed to the wave of defaults in Latin American countries.

Much of the literature on defaults was motivated by events that occurred in Latin American countries during the time span of the MFH project. With better and more comparable data, we now have a better opportunity to assess the quantitative impacts of default through the lenses of competing and complementary models. The forward-looking nature of sovereign default and the potential for multiplicity in equilibria open the door to more in-depth probes into the impact of expectations and the social and private consequences of model uncertainty.

SUDDEN STOPS AND BALANCE OF PAYMENT CRISES

Guillermo Calvo (1998) made popular the term “sudden stops” to refer to rapid changes in capital flows to developing countries that are associated with large contractions in economic activity. Sudden stops are different from, but related to, traditional balance of payments crises. During both types of events, there are nominal depreciations of currencies and reversals of current accounts; however, the two events are set off by different triggers. Sudden stops have spawned an array of models that emphasize diverse mechanisms, all of which are relevant for understanding several episodes studied in the MFH.⁷ Mendoza (2010) is an early example of a model of sudden stops induced by exogenous changes in borrowing limits. The observed countercyclicality of the current account motivated Aguiar and Gopinath (2007) to use a version of the Eaton and Gersovitz (1981)–Arellano (2008) models in which the volatility of trend growth is a critical cause of the extreme fluctuations found in emerging economies. The observed sudden stops also inform studies of macroprudential policy options, as in Bianchi and Mendoza (2018). Atkeson (1991) authored a notable model of sudden stops and repudiation risk by deploying tools from the theory of optimal recursive contracts. His model offers a sense in which sudden stops are part of an optimal arrangement for disciplining the allocation of resources in the face of information and enforcement problems that affect public borrowing.

Bailouts, either contemporaneous or anticipated, provide a link between fiscal and monetary policy distinct from the ones that occur during balance of payments crises. This topic arises naturally when interpreting some of the MFH evidence. Burnside, Eichenbaum, and Rebelo (2001) studied bailouts in the context of the Asian currency crises that occurred in 1998, and Schneider and Tornell (2004) investigated how sectoral differences and bailout policies contribute to sudden-stop crises.

Phillips Curve Dynamics

The classic Friedman-Lerner-Cagan studies shut down Phillips curve dynamics by taking aggregate supplies of goods and aggregate employment as exogenous. A number of the subsequent contributions mentioned previously followed in this tradition by shutting down exploitable or permanent trade-offs between inflation and real outputs (e.g., the unpleasant monetarist arithmetic of Sargent and Wallace [1981] and the Lucas and Stokey [1983] investigation of state-contingent debt and taxation). Macroeconomic analyses of developed economies often embrace “sticky prices” to activate exploitable Phillips curve dynamics that at low or moderate inflation rates disguise the inflationary forces isolated by Cagan and Lerner.

Most current research modeling of Phillips curve dynamics in developed economies relies on Calvo’s (1983) exogenously specified price-setting mechanism. Imposing this structure dramatically simplifies calculations, often with little sacrifice of insights that would come from a deeper theory of price stickiness. Nevertheless, in the case of persistent high inflation or large nominal shocks, Calvo’s modeling device can have quantitatively

counterfactual implications. Moreover, the Calvo price-setting Poisson coefficients cannot plausibly be transported across economies with very different monetary-fiscal policies. Embracing a more primitive starting point to model price setting opens the door to a better understanding of economies that experience higher levels of inflation. An attractive alternative is to use a model price setting with menu costs, as in Sheshinski and Weiss (1977), or its general equilibrium version with idiosyncratic shocks, as in Golosov and Lucas (2007). Alvarez et al. (2019) obtain theoretical predictions for this class of models and showed that they are in line with data for large inflation rates, including findings from earlier research by Gagnon (2009) based on evidence from Mexico. Exploring the conceptual underpinnings of price sluggishness promises to provide a unified framework for better understanding the evidence and its implications across the varied inflationary experiences in Latin America as studied in the MFH.

Putting Things Together

Cagan (1956) was able to do a good job of explaining a set of spectacular hyperinflations by using a simple model. Relative to Cagan's model, we have added complications that seem vital for understanding Latin American macroeconomic histories. Because the monetary-fiscal events studied by the Kehoe-Nicolini team are less extreme than those studied by Cagan, the Kehoe-Nicolini team cannot neglect the confounding forces that Cagan could ignore. Prime among these are government debts. For example, by the time the German hyperinflation got rolling, the German government had defaulted on virtually all its domestic debt, so for better or worse, Cagan could ignore government debt.

For many of the episodes studied by the Kehoe-Nicolini team, government debts and how and whether they were paid, rescheduled, or defaulted on are big parts of the story. But limitations on how governments and central banks account for government debts present substantial measurement difficulties. The budget constraints of macroeconomic theory are about government debts that are priced to market, while government accounts typically report par values and do a poor job of accounting for coupon payments, let alone default premia. Even the best government accounting systems, such as those of the United States and the United Kingdom, report measures of government debt that can deviate markedly from the objects in a macroeconomist's government budget constraint (for example, see Hall and Sargent 2011).

Institutions delimiting the conduct of monetary and fiscal policy are vital to understanding the origins of inflation and its macroeconomic consequences. Societies are prone to revisit arrangements that set the scope of central bank independence, so these arrangements are naturally subject to controversy and stress. Former President Trump's 2019 public comments about the conduct of monetary policy in the United States are only one example among many instances. Arrangements, rules, and their evolution have contributed to successes in the control of inflation in countries such as Brazil, Chile, Colombia, and Paraguay as well as to the failures in Argentina and Venezuela.

The aim of our project has been to compare arrangements and outcomes across countries, to recognize patterns, and to generalize; in doing so we have necessarily ignored some important country-specific details and episodes. We strive to describe different regimes using a framework within which policy was conducted. On the other hand, there is scope for future research to probe deeper into the determinants of the different policy regimes. We see ours as a deliberate and defensible choice, but we acknowledge that it leaves many gaps. Indeed, we see this project as opening the door to investigations that will widen our appreciation of a broader set of long- and short-term economic and political forces that account for and explain experiences of the countries we have studied and, we hope, of other countries too.

While the MFH project offers valuable new data, it does not justify a “just let the data speak for themselves” approach. It is important to use formal models to interpret evidence and reason about the consequences of alternative government policies. While the modeling advances surveyed here are promising, their quantitative and empirical importance remains to be investigated fully. Thus the chapters in this volume provide information and ideas that promise not only to enhance our understanding of past Latin American experiences but, going forward, to evaluate more generally the relevance of alternative models and to suggest improvements in those models.

Notes

We wish to thank Juan Pablo Nicolini for helpful feedback on this essay.

- 1 These essays are two of the chapters in *Studies in the Quantity Theory of Money* (Friedman 1956).
- 2 Sargent (1982) subsequently used these same episodes to investigate how commitment to fiscal balance without seigniorage could end hyperinflations.
- 3 Lucas and Nicolini’s focus on long-run relations is reminiscent of Friedman’s characterization of the “long and variable” lags in the monetary transmission mechanisms about which he was cautious to theorize or estimate (see Friedman 1960).
- 4 This “in equilibrium qualification” skirts some important considerations. A more primitive analysis begins by thinking formally about a game between monetary and fiscal authorities and with rules of the game spelled out that limit the strategic interactions. See Bassetto (2002) for such a formulation and its implications.
- 5 Interestingly, a substantial part of Lucas and Stokey (1983) investigates how to implement the Ramsey policy without commitment to a tax policy, provided that there is no default and that a debt management authority appropriately chooses maturities of both nominal and real debts. Their analysis also has interesting implications for the choice of debt maturities denominated in different currencies.
- 6 In these models, the government is a principal acting as an agent for its citizens.
- 7 Models range from the first-generation currency attack models of Salant and Henderson (1978) and Krugman (1979) that emphasize the inconsistency of fiscal and monetary policy (e.g., pegging a nominal exchange rate while expanding central bank financing of the Treasury) to the purely belief-driven balance of payments crises described by Obstfeld (1986).

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