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Speculative hyperinflations and currency substitution

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ABSTRACT

We propose a rational expectations framework for understanding speculative hyperinflations that end in response to 'orthodox' stabilization programs. Motivated by a strong degree of hysteresis in the stock of real balances after the end of hyperinflations, we provide a cash-and-credit model in which the money demand exhibits persistence because individuals can establish long-lasting credit relationships. We use the model to show that if hysteresis in real balances is possible then a fiscal–monetary reform that successfully stops a speculative hyperinflation may fail to prevent it. We argue that speculative hyperinflationary equilibria are consistent with some key stylized facts observed in extreme hyperinflations.

1. Introduction

The goal of this paper is to provide a unified rational expectations framework for understanding speculative hyperinflations that end in response to restrictive fiscal and monetary plans. On the practical side, the paper shows that speculative hyperinflationary equilibria in the model developed here are consistent with some well-documented features of real hyperinflations.

The facts: While there are many differences in details among hyperinflationary episodes as those experienced by some European and Latin-American countries in the 1920s and 1980s, respectively, there are some important common facts too. Besides explosive inflation dynamics, these include the following:

1. Hyperinflations occur during periods of sizeable fiscal imbalances. In particular, average seigniorage is high in hyperinflationary economies.[1]
2. During hyperinflations there is a lack of strong contemporaneous correlation between seigniorage and inflation. Sometimes seigniorage falls while inflation still grows at increasing rates.

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[1] Fischer et al. (2002) report a strong positive relationship between seigniorage, deficits and inflation using annual observations corresponding to a sample of 24 high-inflation countries over the period 1960–1995. Catão and Terrones (2005) find a similar result. Also, a number of country studies stress the role of seigniorage as a potential cause of hyperinflationary bursts, e.g. (in italics the country under analysis) Sargent (1986, *Hungary, Austria, Poland, and Germany*), Sachs (1987, *Bolivia*), Eckstein and Leiderman (1992, *Israel*), Kiguel and Neumeyer (1995, *Argentina*), and Petrovic et al. (1999, *Yugoslavia*).

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3. Stopping a hyperinflation in a sustainable manner usually involves a mix of fiscal and monetary 'orthodox' reforms aimed at reducing monetization of government deficits.[2] In most cases, a successful stabilization plan reduces inflation drastically in a short time (a few months, at most).
4. The stock of real balances falls as inflation rises over the course of a hyperinflation and remains below the pre-hyperinflation level for sometime after the stabilization, thus recovering only gradually.[3]

Fig. 1 contains some evidence from hyperinflationary episodes in Germany, Hungary, Poland, Argentina, Bolivia, and Peru. These data generally confirm the facts above. In all cases, the rise in inflation goes parallel to the fall in real balances. The peak in the inflation rate coincides with the lowest value of the stock of real money recorded for the entire period. At that point the stock of real balances falls bellow 40% the level prevailing two years before. Although seigniorage is, on average, higher in the pre-reform period than after the collapse of the hyperinflationary path, in some cases inflation reaches its peak value while seigniorage is decreasing (as in Germany 10:1923 and Bolivia 12:1984-2:1985) while in others seigniorage remains high and increasing (as in Argentina) or fairly constant (Poland and Peru). In all cases, after the stabilization seigniorage was cut down, inflation remained at low and stable values and the stock of real balances exhibited a slow recovery.

The argument: To account for the facts listed above, we provide a model whose cornerstone is a mechanism that produces a sluggish adjustment in the demand for real balances. Consistent with fact 4, such mechanism gives rise to hysteresis in the demand for money in the aftermath of a hyperinflation. Referring to this phenomenon, Calvo and Végh (1992, p. 11) argue that "high inflation forces a gradual development of new financial instruments [...] Creating new financial products is costly and requires a learning process. Once this investment has taken place, the public will continue using these new financial instruments even if inflation falls". Along this line of reasoning, our model allows for a *gradual development* of a non-monetary financial instrument whose initial adoption is *costly* but can be used *even if inflation falls*, thus displacing local money for sometime after the end of the hyperinflation.

In particular, as in Ireland (1995), in our economy households may acquire their consumption basket using either cash or credit. Trade on credit requires an initial costly investment to build up long-lasting seller–buyer relationships which can be exploited for some time to avoid the inflation cost of holding money. On the side of monetary supply, we assume that the government sets a target for seigniorage over a *fiscal-dominance* regime which is possibly reversed at some future date by the implementation of a monetary–fiscal reform conducive to a low-inflation *monetary-dominance* regime. Households have full information regarding the change of policy regime.

The model provides a natural interpretation of the links among the fiscal roots of hyperinflations, their dynamics and end, and the relative role of expectations and fundamentals. In particular, the model exhibits up to three different equilibrium regimes. First, a unique low-inflation equilibrium that arises when the public expects a restrictive government policy in the form of a reduced level of seigniorage over the fiscal-dominance regime and an early and/or sufficiently aggressive reform that leads to a low-inflation environment. Second, a unique high- and increasing-inflation equilibrium path which prevails in a policy scenario opposite to the latter, i.e. when seigniorage is high, the fiscal-dominance regime extends over a long horizon and the post-reform inflation rate is not sufficiently low. Third, for some structural parameters and government policy choices lying in between the two previous cases, the model displays multiple equilibria, some of them hyperinflationary, whose realization hinges crucially on private expectations coordination. Hence, we refer to this last class of equilibrium paths as *speculative hyperinflations*.

Within the logic of the model, speculative hyperinflationary equilibria generate dynamics that are consistent with facts 1 and 2. On the one hand, seigniorage need not rise along a hyperinflationary path (fact 2). On the other, a speculative hyperinflation will not be possible unless the *level* of seigniorage over the fiscal-dominance regime is sufficiently high (fact 1). Thus, despite equilibrium multiplicity, the model provides elements for policy guidance.

The possibility of hysteresis in the demand for money after the stabilization (fact 4) is a critical condition for the existence of speculative hyperinflations in this set up. When such possibility is removed, the model displays a unique equilibrium, regardless of the policy parameters. In this latter case, the expectation of a future policy reform is sufficient to rule out equilibrium multiplicity and, thus, speculative hyperinflations. This is an intuitive result. By switching off the hysteresis mechanism, the households demand for real balances depends only on next-period expected inflation, exactly as in the classical model of Cagan (1956). Then, as shown by Obstfeld and Rogoff (1983) and Nicolini (1996), the prospect of a future monetary stabilization ensures equilibrium uniqueness through a familiar backward induction argument.

The previous reasoning, however, does not apply if a fall in the stock of real balances has persistent effects that extend over the stabilization period. In this case, the aggregate demand for money does not only depend on expected inflation but may also be influenced by *past* inflation rates. This last form of history-dependence, in turn, implies that the backward induction argument that underlies the equilibrium selection mechanism studied by Obstfeld and Rogoff (1983) and Nicolini (1996), in general, does not suffice for pinning down a unique equilibrium path. In this latter case, a policy reform that is effective in bringing inflation down *ex post* (i.e. after the reform is implemented, consistently with fact 3) may not be

[2] See, e.g. Bruno et al. (1991) for a comprehensive review of several inflation stabilization processes.

[3] In recent times, this last fact is closely related to the phenomenon of dollarization, i.e. the quasi-permanent substitution of a foreign currency for the local one. Kamin and Ericsson (2003) and Reinhart et al. (2003) provide empirical evidence on this fact.