

Processes of Evolutionary Self-Organization in High Inflation Experiences

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Summary. We study some features of the processes that have generated high inflation in Latin- American countries. The statistical evidence shows that these inflationary experiences are *fractional brownian* noises. Several authors showed that self-organized criticality (SOC) processes may constitute the best explanation of the origin of such noises. But this hypothesis requires that the underlying structure remains timeinvariant. We conjecture, instead, that the economic structures evolve in time being, at each stage of their evolution, self-organized structures. We find that such ESO (evolutionary self-organized) processes still generate fractional brownian noises. Thus, they seem to provide a better explanation for the economic phenomenon of high inflation.

21.1 Introduction

The Latin-American inflation episodes of the last decades showed a remarkable persistence, peaked by periods of extremely high inflation. This makes them interesting objects of study. Despite the fact that those levels of inflation seem byproducts of a past era, they still deserve a careful analysis. We presented elsewhere a hypothesis about the behavior of the notorious Argentinean inflation: that it was the result of a critically self-organized (SOC) process (Tohmé et al., 1995). The main phenomenological property of such a system is that it generates time series behaving like $\frac{1}{f}$ noises. The hypothesis is that the underlying economic structure that determines the price levels in the economy is in a permanent critical state, such that any shock can generate a non-correlated and rather unbounded inflationary response. We showed data that made this contention plausible. This is also intuitively plausible, since SOC processes exhibit “avalanche-like” behavior, and this is consistent with the evidence of hyperinflationary burst. From November 1988 to July 1989 the inflation rate in Argentina jumped from 5.7% to 196%.

Nevertheless, there are two main problems with this line of analysis. On one hand, it lacks a solid econometric support. On the other, to accept the SOC

hypothesis involves to assume some properties which have a very low likelihood when interpreted in the context of real economies: SOC processes can generate fluctuations of all sizes in response to uniformly distributed exogenous shocks. If this were true, it would imply that an economy like Argentina's is prone, at any moment, to generate wild and unexpected bursts of inflation, contrary to the fact that prices remained stable for almost the entire decade of 1990. This is because of another feature of a SOC process, namely that a single process generates the entire series of its outcomes. Again, this seems counterintuitive in the case of a real world economy for a period of more than thirty years since it would mean, if true, that the institutional, political, social and economic rules that determine the behavior of inflation remain invariant during such a long period of time. Therefore, to accept the SOC hypothesis for inflation means to assume that the economy has a strong tendency to generate inflation. Moreover, if this is so, any level of inflation, no matter how high, should be expected.

In order to widen the domain of evidence we analyze two other Latin-American high inflation experiences, Chile and Colombia. The first issue to address is whether the inflation rates behave like $\frac{1}{f}$ noises, the key signature of SOC processes. We find that this kind of behavior is indeed a common trait of these economies. The common characteristic of being $\frac{1}{f}$ noises makes the different inflationary experiences very similar in a crucial aspect: the statistical features of their respective time series of observations. However, this seems odd, especially when we consider the remarkable historical, political and economic differences among the countries in this small sample. Hence, even if our database has been slightly expanded, we have to face a hard-to-believe set of conclusions. Moreover, we still lack a strong econometric tool to make sure that this is not just a statistical artifact. In other words, we face the necessity of justifying our methodology of analysis. In this sense, we follow a method of making conjectures and looking for refutations similar to Lakatos (1976). That is, we just make a claim without being "ontologically" committed to it and then we confront that conjecture with data and theoretical arguments.

The alternative hypothesis we will confront to the SOC hypothesis is based on a simple insight: it may be possible that the underlying economic structure that generates inflation consists of a sequence of SOC processes, instead of a single one. We call such a process an Evolutionary Self-Organized (ESO) system. In fact, $\frac{1}{f}$ noises are generated also in this case. Therefore, the ESO hypothesis is able to explain the same statistical information that can be concluded from the SOC hypothesis. Nonetheless, instead of obeying a single set of behavioral rules, an ESO process goes through an evolutionary process, characterized by sudden (but sporadic) changes of structure. This seems to be a better explanation of the behavior of the economies under study, since these have exhibited a history of erratic and unstable political and economic conditions. In other words, the ESO hypothesis supersedes the SOC conjecture since it explains equally well the same set of data, being at the same time