

Bubble, weak and strong hyperinflation: Theory and empirical evidence

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Abstract

This paper presents a theoretical framework that allows a taxonomy of hyperinflation, namely: (i) bubble, (ii) weak and (iii) strong hyperinflation. The inflation tax revenue curve is used to characterize each type of hyperinflation and we use this curve to test them. The bubble and strong hyperinflation hypotheses are rejected using Brazilian data. The weak hyperinflation hypothesis is not rejected and the economy could have been on the ‘wrong’ side of the Laffer curve during hyperinflation. This outcome, contrary to conventional wisdom, is predicted by this hypothesis, which presents a solution to an old puzzle of the hyperinflation literature. © 2015 National Association of Postgraduate Centers in Economics, ANPEC. Production and hosting by Elsevier B.V. All rights reserved.

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Resumo

Este trabalho apresenta um arcabouço teórico que permite uma taxonomia da hiperinflação. Ela é classificada em três tipos: (i) bolha; (ii) fraca; e (iii) forte. A curva do imposto inflacionário é usada para identificar cada tipo e para testá-las. As hipóteses de hiperinflação forte e de bolha são rejeitadas com dados da economia brasileira. A hipótese de hiperinflação fraca não é rejeitada e a economia poderia estar no “lado errado” da curva de Laffer. Esta ocorrência, uma possibilidade da hipótese de hiperinflação fraca, soluciona um quebra-cabeça antigo da literatura de hiperinflação.

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Palavras-chave: Hiperinflação; Crise fiscal; Restrição orçamentária intertemporal; Curva do imposto inflacionário

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1. Introduction

The monthly (continuous) inflation rate that maximizes the inflation tax revenue varies widely (from 18.3% to 143%), according to semi-elasticity estimates for the German hyperinflation made by several authors (Cagan, 1956; Barro, 1970; Frenkel, 1977; Sargent, 1977; Goodfriend, 1982; Burmeister and Wall, 1987; Christiano, 1987; Casella, 1989; Taylor, 1991; Engsted, 1993; Imrohoroglu, 1993; Michael et al., 1994). Those estimates lead one to conclude that during hyperinflation the German government could have obtained more tax revenue with lower inflation rates. This is an old puzzle of the hyperinflation literature raised by Cagan's (1956) seminal paper, namely: that only an economy with an irrational Government could operate on the 'wrong' side of the Laffer curve, since the Government could collect more tax with lower inflation rates. The weak hyperinflation hypothesis presented in this paper is consistent with the economy being on the 'wrong' side of the Laffer curve, for some time, during hyperinflation, even when agents are rational. Indeed, this "puzzling" outcome is predicted by the weak hyperinflation hypothesis.

In contrast to the traditional theories of hyperinflation, e.g. Sargent and Wallace (1987) and Bruno and Fischer (1990) – which assume a constant fiscal deficit – the driving force to cause hyperinflation in our framework is an increasing fiscal deficit being financed by money (see Barbosa et al., 2006). We understand that this assumption is crucial from an empirical viewpoint since, to our best knowledge, non-constant, increasing fiscal deficits have been ubiquitous in actual hyperinflation episodes.¹ The increasing deficit reaches a point where the intertemporal government budget constraint is not sustainable anymore. This point characterizes the start of the hyperinflation.² The process lasts at most a time span before the fiscal policy collapses.

In this intertemporal framework the particular hyperinflation path depends on the functional form of the inflation tax revenue curve, which is a key tool to discriminate among different hypotheses. There are three possibilities. If inflation tax revenue increases when the rate of inflation increases, the real quantity of money tends to zero as time approaches the end of hyperinflation. We call this a strong hyperinflation. When the inflation tax revenue ends up decreasing as the rate of inflation increases, the real quantity of money is still positive at the end of the hyperinflation. We name this a weak hyperinflation. Finally, hyperinflation can also be caused by a bubble, a possibility that can only occur if the inflation tax revenue increases as the rate of inflation increases.

Besides the theoretical framework, this paper departs from other papers in the literature in several ways. First, it follows a different empirical strategy and tests hyperinflation hypotheses estimating the inflation tax revenue curve (inflation tax curve, for short) directly, which can be used to discriminate among different hypotheses. Second, the inflation tax curve functional form used encompasses several specifications as particular cases, making inference more reliable. Thus, this approach allows one to test whether or not the demand for money specification used by Cagan is appropriate. Third, the inflation tax revenue data refer to the 1947–2003 period.³ This period includes the Brazilian hyperinflation that lasted a very long period, starting in the first half of the 1980s and ended in 1994, with the Real Plan. Therefore, in contrast to other empirical studies, which use very small samples covering only hyperinflation periods, the sample here covers almost half a century, in which both inflation and the inflation tax revenue showed great variability.⁴

The empirical evidence shows that the hypothesis that inflation tax revenue is an increasing function of the inflation rate is rejected for Brazil. Thus, both the bubble and the strong hyperinflation hypotheses are rejected, while the weak hyperinflation hypothesis is not. This result supports the claim that hyperinflation was caused by fundamentals – via increasing deficits – in Brazil, as well as in many other countries, rather than by a spontaneous combustion as in a bubble, the workhorse hypothesis widely used in the literature. Moreover, the empirical evidence for a weak-type

¹ See, for example, Cukierman (1988, pp. 20 and 47) and Morales (1988, p. 313) for the German and Bolivian experiences, respectively. Morales states that "The public sector deficits were increasingly financed by the central bank by the building up of arrears on the public external and internal debt." For Argentina, Machinea and Fanelli (1988, p. 111) state that "... the fiscal deficit never fell below 5% of GDP, and in some cases it even exceeded 15% of GDP...".

² In our framework the constant deficit enters as a particular case. This framework has also the advantage of providing a technical and precise definition of hyperinflation (see Barbosa et al., 2006), in contrast to the usual *ad hoc* definition, due to Cagan, which considers hyperinflation monthly inflation rates above 50%.

³ The annual inflation tax revenue data comes from Cysne and Lisboa (2004).

⁴ This could matter empirically, since low degrees of freedom might be one important factor behind the wide range of empirical estimates shown above, given that German hyperinflation lasted only a few months.

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