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Central banks' inflation forecasts under asymmetric loss: Evidence from four Latin-American countries

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HIGHLIGHTS

- We study the rationality of central banks' inflation forecasts under asymmetric loss.
- We study data for four countries: Argentina, Brazil, Chile, and Mexico.
- Evidence against rationality weakens when we assume an asymmetric loss function.
- Central banks seem to incur a larger loss when they overpredict the inflation rate.
- We analyze alternative rationality tests, growth forecasts, and private-sector forecasts.

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ABSTRACT

We study the rationality of the inflation forecasts of the central banks of Argentina, Brazil, Chile, and Mexico. We reject rationality under a symmetric (Chile is an exception) but not under an asymmetric loss function. An overprediction implies a larger loss than an underprediction. We also analyze alternative rationality tests, growth forecasts, and private-sector forecasts.

1. Introduction

In recent years, researchers have been increasingly interested in studying the potentially asymmetric shape of the loss function of central banks (Ruge-Murcia, 2002, 2003; Nobay and Peel, 2003; Aguiar and Martins, 2008; Surico, 2008; Ikeda, 2010; Caunedo et al., 2013; to name just a few). To this end, researchers have studied forecasts (or projections) of important macroeconomic variables like the inflation rate published by central banks. Most researchers, however, have focused on the central banks of industrialized countries: Boero et al. (2008) focus on the Bank of England's Survey of External Forecasters, Capistrán (2008) and Sinclair et al. (2010) analyze the loss function of the US Federal Reserve, Pierdzioch et al. (2012a) study projections published by the Bank of Canada, and Pierdzioch et al. (forthcoming) study FOMC forecasts.

We report empirical results that shed light, based on published inflation forecasts, on the shape of the loss function of four Latin-American central banks. Specifically, we follow earlier researchers (Sinclair et al., 2010; Baghestani, 2012; Pierdzioch et al., 2012a) and use the approach recently developed by Elliott et al. (2005) to study the central banks' loss functions. This approach has also been widely studied in other contexts: Baghestani and Marchon (2012) study forecasts of the Brazilian real exchange rate collected

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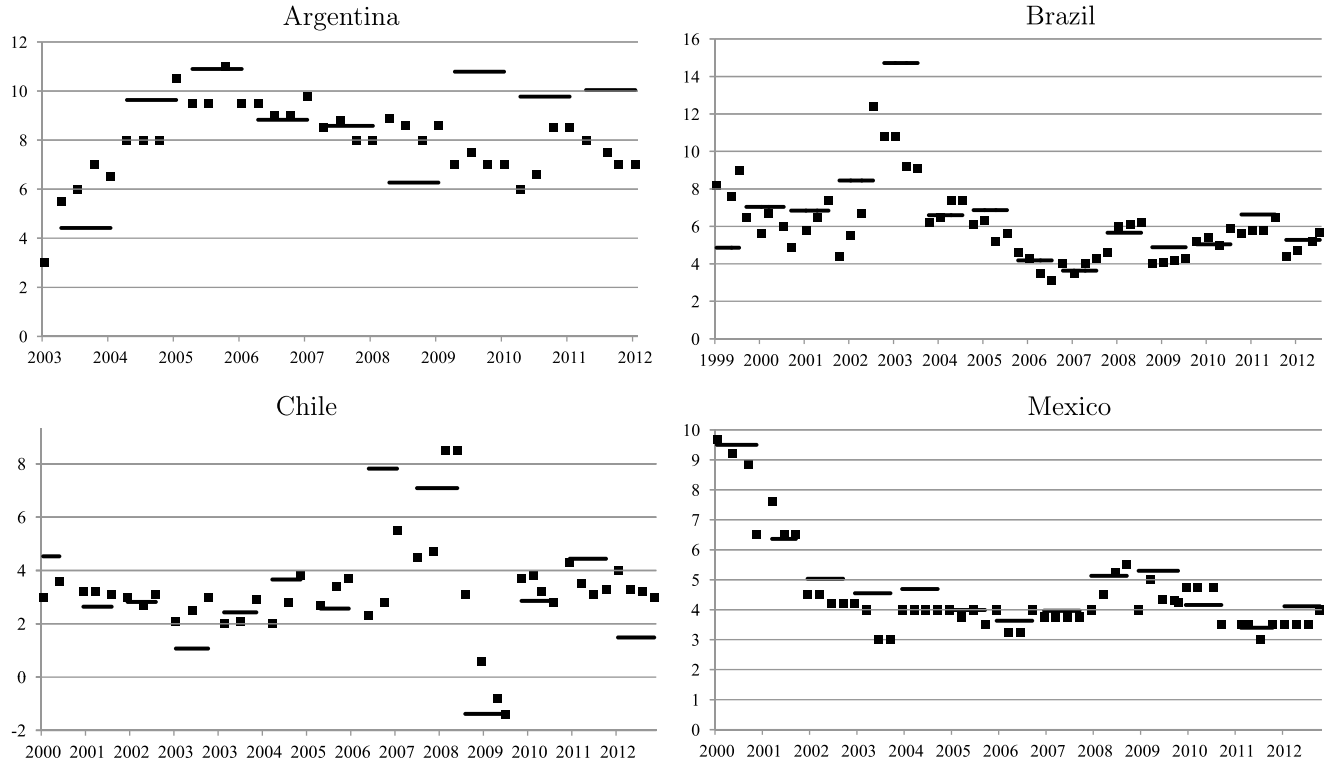

Fig. 1. Realizations and central banks' forecasts of the inflation rate. Note: This figure shows as squares the current-year inflation forecasts. The solid line represents the actual value obtained from the IMF World Economic Outlook database. The forecast error is defined as $s_{t+1} - f_{t+1}$. The average forecast error and its standard error are for Argentina: 0.98* (0.42); Brazil: 0.51* (0.25); Chile: −0.03 (0.28); Mexico: 0.39* (0.09); * = significant on a five percent level.

from a survey conducted by the Brazilian Central Bank. Pierdzioch et al. (2012b) and Fritsche et al. (2014) use the approach to study exchange-rate forecasts of individual exchange-rate forecasters, and Döpke et al. (2010) examine business-cycle forecasts.

2. Data and preliminary results

We study projections as published in the quarterly inflation reports of the central banks of Argentina, Brazil, Chile, and Mexico. The central banks usually publish four reports per year, mostly at the end of a quarter, to inform and explain to the general public recent and expected inflation trends and the ensuing consequences for the conduct of monetary policy. Each report contains an inflation outlook, including the central bank's projections of the inflation rate and the GDP growth rate for the current and the next year. The sample period ends for all countries in 2012, but its start differs across countries. The central bank of Argentina has published inflation forecasts since 2003, while the central bank of Brazil has published forecasts since 1999.[1]

Fig. 1 shows the current-year forecasts of the inflation rate as well as the realized inflation rate. While the inflation forecast errors in Chile do not show a systematic pattern, the central banks of Argentina, Brazil, and Mexico have systematically underestimated the inflation rate for most of the time. This underestimation can be a signal of biased inflation forecasts, but it can also signal that the loss functions of the central bank have an asymmetric shape.

Besides the unbiasedness of forecasts, it is interesting to study the orthogonality of the forecast errors, that is, whether the forecast errors are correlated with information known to a central bank at the time a forecast was formed. We use the lagged inflation rate to approximate the information set of a central bank and estimate the following regression model:

$$s_{t+1} - f_{t+1} = \alpha + \beta s_t + \epsilon_{t+1}, \tag{1}$$

where s_{t+1} = realization of the future inflation rate, f_{t+1} = forecast of the inflation rate formed in period t, ϵ_{t+1} = disturbance term. The estimation results reported in Table 1 (based on the Newey–West estimator) show that, except for Chile, the orthogonality condition (H_0: $\alpha = \beta = 0$) can be rejected at a ten percent level of significance, implying that forecast errors are not orthogonal to the information set of a central bank.

It is tempting to interpret the violation of forecast-error orthogonality as evidence against forecast rationality. However, the regression model given in Eq. (1) rests on the implicit assumption that the loss function of a central bank is symmetric. Empirical evidence available for other central banks suggests that it may be hard to justify this assumption.

3. Modeling an asymmetric loss function

Like Elliott et al. (2005), we assume that a central bank's loss function, $\mathcal{L}$, is given by

$$\mathcal{L} = [\alpha + (1 - 2\alpha)I(s_{t+1} - f_{t+1} < 0)]|s_{t+1} - f_{t+1}|^p, \tag{2}$$

where I = the indicator function, $p = 1$ for a lin–lin and $p = 2$ for a quad–quad loss function, and α = asymmetry parameter (with $0 < \alpha < 1$). The idea is to search for the shape of the loss function that would be most consistent with a central bank's forecast errors. For $\alpha = 0.5$, we have a symmetric loss function. If we assume, in addition, that $p = 2$, then we get a symmetric quadratic loss function underlying a traditional Mincer–Zarnowitz regression of forecast unbiasedness. Eq. (2) is based on the assumption that the loss only depends on forecast errors and not, in addition, on

[1] Three countries have adopted an inflation targeting regime: Brazil (June 1999), Chile (September 1999), and Mexico (January 2001).