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Inflation Targeting Near 40 across Space and Time: Bayesian Model Comparison of Central Bank Deeds

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Inflation Targeting Near 40 across Space and Time: Bayesian Model Comparison of Central Bank Deeds

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Abstract

This paper contributes to the literature by providing a comparative analysis of inflation targeting (IT) across groups of countries and time periods. We estimate via Bayesian techniques the central bank policy preferences of African inflation targeters (AfITs), employing the medium-scale New Keynesian small open economy model under complete asset markets (CAM) proposed by Kam et al. (2009), with application to advanced-country inflation targeters (ACITs), as extended also to incomplete asset markets (IAM) by McKnight et al. (2020), with application to Latin American inflation targeters (LAITs), and including or not real exchange-rate concerns in the social loss function of IT central banks. Our study convincingly selects CAM over IAM in a Bayesian model comparison of 4 model versions and compares the estimated weights of 4 typical IT central bank policy choices for 2 AfITs, 5 LAITs, and 3 ACITs in a common recent sample period, 2009:Q1-2021:Q4, as well as referring back to the sample periods in the cited original studies, starting in the early 1990s or early 2000s and with no or minimal overlap. Our findings confirm that all 10 IT central banks are firmly committed to their price stability mandate in the sense of prioritizing inflation stabilization, with an estimated almost unchanged 40-60% share across space and time. Adapting to real-world global developments as the millennium was unfolding, IT approaching the age of 40 seems to have evolved toward more 'flexible' regimes with increased 'fear of floating', but we also point to nuances or specificities across the 3 groups or 10 countries compared.

Keywords: Bayesian model comparison, complete vs incomplete asset markets, inflation targeting mandates and actions, fear of floating, small open economies, medium-scale New Keynesian SOE DSGE models
JEL: C51, E52, F41

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1. Introduction

The number of central banks that have adopted inflation targeting (IT) as the main monetary policy framework has grown since 1990, when the first IT framework was launched in New Zealand: see, e.g., Archer (1997), Buckle (2019), Cobham (2021) and Kiley and Mishkin (2025) as well as the map in Figure 1. In a recent assessment of whether 'actions speak louder than words' across monetary policy frameworks, Zhang and Wang (2022) used panel data from 69 countries over 1990-2021, noting that, in 2019, 32 of them were (explicit) inflation targeters, making 47% of their sample.[1]

It is clear that, by institutional design and legal mandate, the primary goal of monetary policy for IT central banks should be price stability, and usually they state it openly. For IT countries, therefore, the policy preferences of central banks *de jure* as well as *de facto* should be exclusively dominated by inflation stabilization as the most important (under 'flexible IT' mandate) if not the only (under 'strict IT' mandate) goal of monetary policy. Other typical macroeconomic policy objectives such as employment (e.g., in the dual mandate of the US Federal Reserve Board), economic growth, exchange-rate stability, and interest-rate smoothing should *de jure* not be considered with priority or at all under strict IT, but could be *de facto* intended as secondary goals even under strict IT in central bank actions and even if this is not stated in words.

Along such lines of analysis, the policy preferences of 3 advanced-country inflation targeters (ACITs) and 5 Latin American inflation targeters (LAITs) have already been estimated in medium-scale dynamic stochastic general equilibrium (DSGE) New Keynesian (NK) small open economy (SOE) setups – see, notably, Kam et al. (2009), Palma and Portugal (2014) and

[1]The IT countries in Zhang and Wang (2022) include 11 advanced economies, Australia, Canada, Czechia, Iceland, Israel, Japan, New Zealand, Norway, South Korea, Sweden and United Kingdom, as well as 21 emerging market economies (EMEs), Brazil, Chile, Colombia, Costa Rica, Hungary, India, Indonesia, Jamaica, Kazakhstan, Mexico, Paraguay, Peru, Philippines, Poland, Romania, Russia, Serbia, South Africa, Thailand, Turkey and Uruguay. Citing as source Cobham (2021), Kiley and Mishkin (2025) include among the IT countries, as of 2023, also the United States (US), which is in the Zhang and Wang (2022) sample but not identified as an IT country, and the European Monetary Union (EMU) as a single unit, not in Zhang and Wang (2022). Ghana and Uganda are also not included in Zhang and Wang (2022). Thus, the total number of IT countries currently may be considered as 36 (including the US and the EMU).

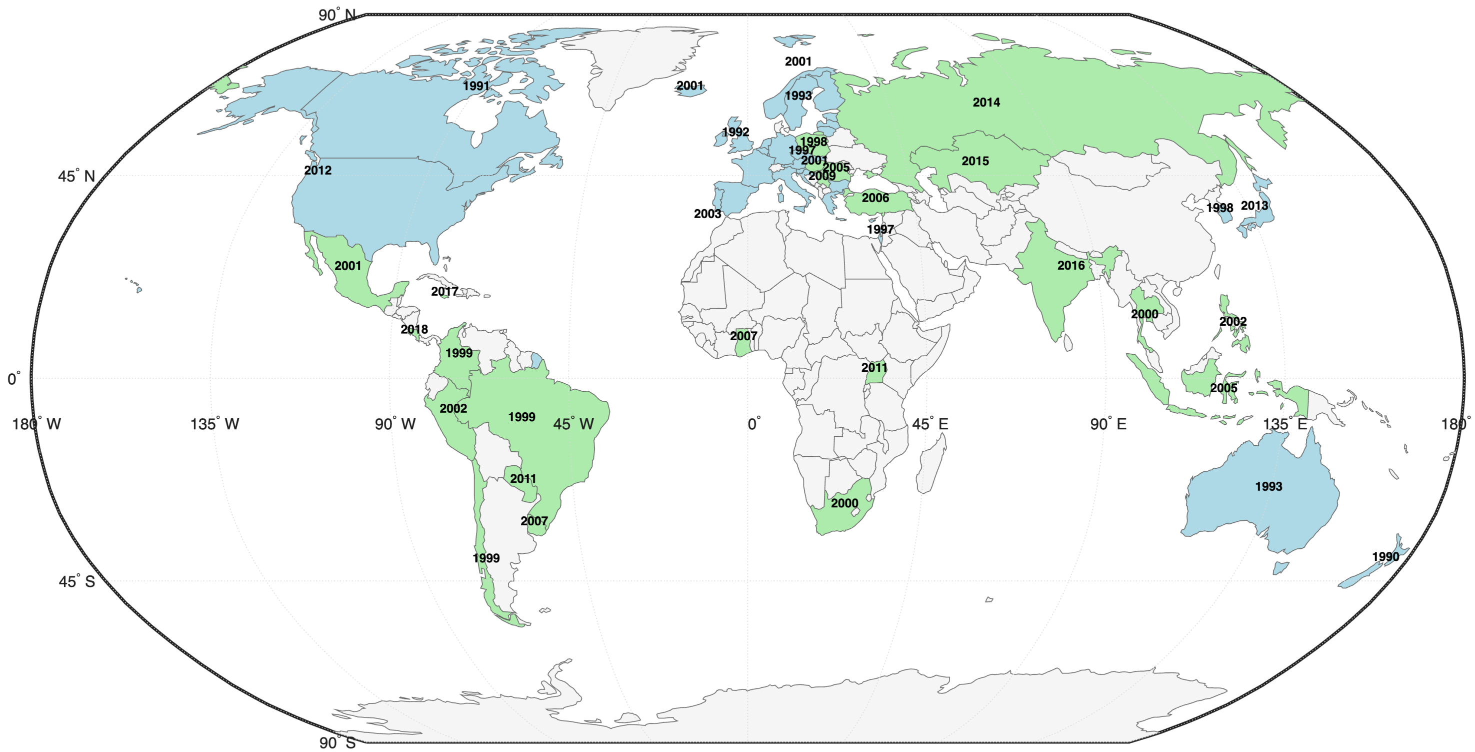

Figure 1: Inflation Targeting across Space (by Country) and Time (Year of Adoption); advanced economies in light blue, emerging market economies in light green. The IT adoption year for the EU, 2003, appearing on the map just south of Portugal, is based on https://www.ecb.europa.eu/press/pr/date/2003/html/pr030508_2.en.html and for the US, 2012, on https://www.federalreserve.gov/monetarypolicy/files/FOMC_LongerRunGoals_201201.pdf

McKnight et al. (2020), but those of African inflation targeters (AfITs) have not yet been studied. Our paper fills in this gap by focusing on the 2 first AfITs, namely South Africa and Ghana, and goes on to further provide a fair comparison of the estimated results obtained via the same model and method as in McKnight et al. (2020) but also in a common more recent sample period, 2009:Q1–2021:Q4 – hence, highly comparable and useful for academics and policymakers alike – with regard to the actual behavior of these 10 SOE IT central banks. Our analysis, therefore, accounts for 10 out of the current 36 explicit IT central banks, including the same 3 ACITs (Australia, Canada and New Zealand) as in Kam et al. (2009) and 7 EMEs, of which the same 5 LAITs (Brazil, Chile, Columbia, Mexico and Peru) as in McKnight et al. (2020) and now – for a first time – 2 AfITs.

To introduce key terminology and situate our study in a broader context, we begin here by recalling some concepts and findings from the literature on IT. Many IT central banks can be described as 'flexible' rather than 'strict' inflation targeters, in the sense that their objectives go beyond the primacy of inflation stabilization. No matter the level of transparency about the macroeconomic variables these IT central banks are most concerned about, the tradeoffs across the latter are less clear. Flexible inflation targeting central banks, such as the Reserve Bank of New Zealand, are more explicit that achieving their price stability objective is also dependent on more stable financial system, output, interest rates and exchange rate. In this context, transparency and accountability could be improved by providing more clarity on the weight these central banks place on alternative stabilization objectives in words and actions – see, e.g., Svensson (2007) – which is what our present paper also seeks to accomplish.

As already suggested, a flexible IT central bank is typically concerned about a few macroeconomic objectives, which can be uncovered empirically, even when they are not stated, by estimated positive weights of respective 'target' variables in its loss functions other than inflation – see, again, Kam et al. (2009), Palma and Portugal (2014) and McKnight et al. (2020) as well as, e.g., Caputo and Pedersen (2020). Therefore, changes in central bank preferences are usually interpreted as changes in the monetary policy regime. The goals and objectives of monetary policy are not necessarily constant over time. Previous research, such as Clarida et al. (2000), Arestis et al. (2016) and Caputo and Pedersen (2020), has shown that central bank preferences have changed as monetary authorities have migrated to full-fledged IT regimes. For example, since the introduction of the IT regimes in the UK and

Chile, these countries have increased their focus on price stability and placed less emphasis on real exchange-rate stability and output-gap stability. In this sense, estimated weights of targets in central bank loss functions provide a framework for central bank boards to assess central bank performance.

One research question that we engage with here is whether our 2 AfITs, Ghana and South Africa, are indeed committed to price stability as mandated. A second, but related, research question is whether other policy targets distract them from their commitment to price stability. Finally and most importantly, using an identical DSGE model-based Bayesian re-estimation in a more recent data sample period as well as looking back at the original studies of Kam et al. (2009) and McKnight et al. (2020), our main contribution is to provide a broad comparison of the evolution of IT policy preferences across space and time – that is, among AfITs, LAITs and ACITs and from 1990 through 2021. We, thus, assess which the main similarities and differences are in their level of commitment to inflation stabilization as well as uncover the relative share of any additional policy targets. A particular advantage of our quantitative approach disciplined by theory is that purely empirical work such as panel data analysis cannot properly account for endogenous determination of several dozens of important macroeconomic variables, which Bayesian estimation of the same underlying medium-scale NK SOE DSGE model we employ for all countries handles in a superior, theoretically-informed way. Moreover, Bayesian model comparison allows us to select a preferred model across 4 versions for each IT country, as we summarize next.

Following Kam et al. (2009), who assume complete asset markets (CAM), and McKnight et al. (2020), who consider both CAM and incomplete asset markets (IAM),[2] we employ Bayesian methods and select the estimated version of the NK SOE DSGE model with the highest (log) marginal likelihood per country. We also estimate the posteriors of the central bank target weights, the private sector's structural parameters, and the parameters for the exogenous processes and compare them across our 10 IT countries and 3

[2]As in the literature, we define a complete international asset market as one involving complete international risk-sharing as opposed to an incomplete international asset market where only a single bond is available for trading, which breaks down the full insurance against idiosyncratic risk: see, e.g., Chari et al. (2002), Benigno (2009), Rabanal and Tuesta (2010) and Alonso-Carrera and Kam (2016). We also allow for incomplete exchange-rate pass-through and a gap in the law of one price, as in Monacelli (2005).

country groupings as well as across time samples.

In a country-wise sense, we focus on assessing the monetary policy preferences of the Bank of Ghana (BoG) and the South African Reserve Bank (SARB), which is novel. However, we also update the estimates for the 5 LAITs in McKnight et al. (2020) and the 3 ACITs in Kam et al. (2009). These countries have adopted IT as their monetary policy framework and operate flexible (i.e., floating) nominal exchange-rate regimes. In the model, they are assumed to select the appropriate interest rate (i.e., policy rate) that minimizes their assigned (by legal mandate) quadratic social loss function including 4 typical policy targets: inflation stabilization, output-gap stabilization, interest-rate smoothing and real exchange-rate stabilization. The importance, or the weight, placed on these policy targets is then dependent on the central bank's monetary policy priorities, *de jure* and/or *de facto*, and we estimate and compare these weights transparently, as relative shares (out of 100%) across countries, groups of countries and time periods. This approach provides an innovative and quantitative comparative analysis of the spatial and temporal dimensions in the evolution of IT policies as inflation targeting gets nearer to its 'mature' age of 40 years in implementation.

Our key findings are summarized next. First, the Bayesian estimation results confirm that Ghana and South Africa are committed to their price stability mandates. Ghana's estimated weight to inflation stabilization is 46% (out of 100%), while the respective target weight for South Africa is even higher, 60%. In a broader and updated comparison across all 10 IT countries in this paper, these weights for the inflation stabilization target are in the range between 39% for Canada and New Zealand as minimum in the common recent sample of our re-estimation, 2009:Q1–2021:Q4, and 63% for Australia as maximum.

The paper also concludes that other policy goals matter for AfITs, in addition to the main goal of inflation stabilization. Interest rate smoothing is the second priority after inflation for Ghana and South Africa with policy weights of 33% and 31% respectively. In fact, Ghana's policy weight on interest rate smoothing is the highest among the 10 IT central banks we compare in the common recent sample. The stabilisation of the output gap with policy weights of 14% and 9% for Ghana and South Africa, respectively, is the third policy preference. As expected of IT central banks, but in contrast to some LAITs and ACITs in our more recent sample re-estimation, Australia, Brazil, Colombia and South Africa place no weight on real exchange-rate stabilization and, thus, are not characterized by 'fear of floating' in this sense –

see, e.g., Palma and Portugal (2014) – while all other 6 inflation targeters in our sample are, yet, in various degrees.

The results show that AfITs' average weight for the inflation stabilization parameter, 53%, is above the average of 51% for all ten countries, higher than the 51% average for the LAITs and 48% for the ACITs in the common recent sample. The ACITs recorded the lowest policy weight for inflation stabilization of 48% among the three groupings. The ACITs are revealed as equally concerned about interest-rate smoothing and output-gap stabilization, with both shares at 19% on average in our updated re-estimation.

The second preferred policy target of the AfITs is interest-rate smoothing, 32% on average, followed by output-gap stabilization, 12% on average. The least policy concern for the AfITs is real exchange-rate stabilization, 4% on average, as is the case for the ACITs and the LAITs too, even though their average policy weight of 14% and 16%, respectively in the common recent sample is 3 times higher than that of the AfITs.

Another contribution of this paper is that, while it employs an already established methodology from similar previous literature, it compares the same set of studied IT countries, 10 in number, but with an updated and common sample, namely 2009:Q1–2021:Q4. This is particularly relevant, as it helps inform about IT evolution over time, relative to the original samples in Kam et al. (2009), 1990:Q1-2005:Q3, and McKnight et al. (2020), early 2000s–2014:Q4. In the concluding remarks of McKnight et al. (2020), a future research avenue is suggested along the lines that policy preferences can vary over time, depending on institutional mandates and central bank governors. Against such lines, we arrive at important conclusions in the present study about similarities, differences, and evolution over time of IT central bank policy preferences in advanced SOEs as well as EMEs in Latin America and Africa. Furthermore, our paper is of immediate policy relevance for a comparative evaluation of IT monetary policies, as it enables a quantitative and evidence-based assessment of the level of commitment of inflation targeting central banks towards their price stability mandates and also their additional target macro-variables. In short, and concluding here our preview of main results, overall IT has kept the primacy of inflation stabilization strongly dominant in all 10 countries, with a relative share of the order of 51% in the updated common sample. Interest-rate smoothing has declined over time, often losing 43% of its share on the average, at the cost of both output-gap stabilization and real exchange-rate (RER) stabilization having increased their shares.

The remainder of the paper is organized as follows. Section 2 summarizes the mandates of the IT central banks of South Africa and Ghana compared to the LAITs and the ACITs. Section 3 outlines the log-linearized DSGE model economy utilized in Bayesian estimation. Section 4 describes the data and the empirical strategy. Section 5 discusses the novel Bayesian estimation results for the AfITs and, more importantly, provides a broader comparison across the other IT countries of interest here and across time periods, which adds to the existing literature in an original way too. Section 6 presents the conclusions of the paper.

2. Central Bank Mandates and Inflation Target Ranges

We now present some necessary institutional background derived from legal documents and the websites of the 10 IT central banks compared in our study. Our focus is on the South African Reserve Bank (SARB) and the Bank of Ghana (BoG), which were historically the first two central banks in Africa to adopt inflation targeting, and still remain among the very few AfITs,[3] enjoying a leading role and reputation in the implementation of inflation targeting on this continent. We also briefly provide a similar context for the 5 LAITs and the 3 ACITs of interest here.

2.1. South Africa

According to Section 224 of the Constitution of South Africa, the mandate of the SARB is legally defined as follows:[4]

> "The primary object of the South African Reserve Bank is to protect the value of the currency in the interest of balanced and sustainable economic growth in the Republic. The South African Reserve Bank, in pursuit of its primary object, must perform its functions independently and without fear, favour or prejudice, but there must be regular consultation between the Bank and the Cabinet member responsible for national financial matters."

[3] The third IT country in Africa is Uganda, which adopted inflation targeting in 2011, but we exclude it from our analysis due to a too short experience with IT.

[4] https://www.resbank.co.za/en/home/about-us, accessed on January 19, 2025.

The interpretation of price stability[5] "implies maintaining inflation within the target range of 3-6%, as set by government. The achievement of this target is underpinned by the stability of the financial system and financial markets. For this reason, the Bank is obliged to actively promote financial stability as one of the important determinants of financial system stability."

SARB's independence and autonomy are also entrenched in the Constitution of South Africa:[6] "The SARB has the independence to use any of the monetary policy instruments at its disposal to achieve its monetary policy goal. However, the selection of a monetary policy goal is the responsibility of government."

2.2. Ghana

The BoG Act of 2002, Act 612 as amended, Section 27, established a Monetary Policy Committee (MPC) responsible for the formulation of monetary policy[7] In 2007, the BoG officially adopted an IT framework under a flexible exchange-rate regime, designed to ensure price stability over the medium term. The mandate of the Bank of Ghana is characterized as follows:[8]

> "The primary objective of the Bank of Ghana is to maintain stability in the general level of prices, as stated under section 3 of the Bank of Ghana Act 2002, (Act 612), as amended. In addition to price stability, the Bank is enjoined to support the general economic policy of Government, promote economic growth and development, and ensure effective and efficient operation of the banking and credit system; and contribute to the promotion and maintenance of financial stability."

Unlike the dependence of SARB's objective, "the Government and the Central Bank jointly set the medium-term inflation target, and the Bank of Ghana is required to deploy its policy tools to attain the target. Currently, the Bank's inflation target is 8% with a symmetric band of 2%."[9]

[5] https://www.resbank.co.za/en/home/about-us, accessed on January 19, 2025.

[6] https://www.resbank.co.za/en/home/about-us, accessed on January 19, 2025.

[7] https://www.bog.gov.gh/monetary-policy/our-monetary-policy-framework/, accessed on January 19, 2025.

[8] https://www.bog.gov.gh/monetary-policy/our-monetary-policy-framework/, accessed on January 19, 2025.

[9] https://www.bog.gov.gh/monetary-policy/our-monetary-policy-framework/, accessed on January 19, 2025.

Furthermore, the BoG "promotes transparency and accountability to anchor inflation expectations effectively within the target band. The Bank is also accountable to the legislature and required to submit a monetary and financial stability report that provides extensive details on the monetary policy course of action to parliament twice a year."[10]

2.3. Brief Comparison with Previous Studies

To sum up the SARB mandate, it legally aligns with what is known as 'operational independence', or 'instrument independence with goal dependence' and is similar in this sense to a 'classical IT regime' as in the early IT adopters such as New Zealand, Canada, Australia and the UK – see, e.g., Mihailov (2006), Mihailov (2007), Arestis and Mihailov (2009). This mandate is constitutionally enshrined, as in Colombia, Mexico and Peru – see, e.g., McKnight et al. (2020) – to enhance IT implementation and protect it from political influences.

Price stability implies an IT range of 3-6% in South Africa, while in Ghana there is a point target of 8% but within a symmetric band of +/–2 percentage points. For the IT ranges of the LAITs, see McKnight et al. (2020). In New Zealand and Canada, the IT target has a range from 1% to 3%, with a focus on the midpoint of 2%,[11] and is defined in terms of the consumer price index (CPI) for reasons that capture households' spending on both domestically produced and imported goods and services, as well as its compilation by the respective national statistical office, and hence external to the central bank. In Australia, the range in terms again of the CPI is narrower, 2%–3%, and the midpoint appears less emphasized.[12]

In summary of the cited literature we follow here and with view to the outlined mandates above, we could possibly group South Africa together with Colombia, Mexico and Peru as constitutionally-bounded strict inflation targeters, whereas the remaining countries do not have enshrined IT in their constitution and are interpreted by their legal statutes as flexible inflation

[10] https://www.bog.gov.gh/monetary-policy/our-monetary-policy-framework/, accessed on January 19, 2025.

[11] https://www.rbnz.govt.nz/monetary-policy/about-monetary-policy/inflation and https://www.bankofcanada.ca/rates/indicators/key-variables/inflation-control-target/ accessed on January 19, 2025.

[12] https://www.rba.gov.au/education/resources/explainers/australias-inflation-target.html

targeters. Most of these IT central banks operate under the 'classical' regime of instrument independence with goal dependence, except the BoG, which sets the inflation target jointly with the government. All these IT central banks assign a high importance of transparency and accountability – in most cases, to the government or sometimes to parliament.

What we outlined in the present section was the institutional mandates and operational implementation of the 10 IT central banks compared in our study, as these are stated in legal documents in words, and in that sense without quantitatively measured priorities or rankings. What our strategy will complement this descriptive analysis based on words and intentions in legal texts in the following section is exactly the numerical expression, e.g., in percentage weights, of the policy preferences as 'crystallized' and recovered (or reverse engineered) from the macroeconomic data obtained historically in interaction with the deeds or actions of the policymakers in each of these countries over the same more recent period of 2009:Q1–2021:Q4, looking also back at analogous earlier estimates. In this ambitious theory-based quantitative comparison of IT regimes across space and time lies the key contribution of our present work.

3. Log-Linear Approximation of the Model

The log-linearized equilibrium conditions are summarized in this section.[13] We log-linearized around a deterministic steady-state inflation rate with zero bond holdings and a steady-state terms of trade of one. Variables in the lower case denote the logarithmic changes of the respective variables from their steady-state levels.

Log-linearizing the consumption Euler equation (A.15) and taking expectations conditional on time, yields:

$$c_t - hc_{t-1} = \mathbb{E}_t(c_{t+1} - hc_t) - \frac{1-h}{\sigma}(r_t - \mathbb{E}_t\pi_{t+1}) \tag{1}$$

The log-linear approximation of the optimal pricing decision rule can be expressed as a New Keynesian Phillips Curve (NKPC) for domestic goods inflation:

[13]The nonlinear model, as it is the same as in McKnight et al. (2020), is relegated to Appendix A.

$$\pi_{H,t} - \delta_H \pi_{H,t-1} = \beta(\mathbb{E}_t \pi_{H,t+1} - \delta_H \pi_{H,t}) + \lambda_H(mc_{H,t} + \epsilon_{H,t}), \tag{2}$$

where $\lambda_H = \frac{(1-\beta\theta_H)(1-\theta_H)}{\theta_H}$, $\pi_{H,t} = ln(\frac{P_{H,t}}{P_{H,t-1}})$, $y_t = ln(\frac{Y_t}{Y_{ss}})$ is the percentage deviation of home output from steady state and $mc_t = \varphi y_t - (1+\varphi)\epsilon_{a,t} + \alpha s_t + \frac{\sigma}{1-h}(c_t - hc_{t-1})$.

Log-linearizing the equations for the first order condition for import retail firms in (A.29) and the aggregate price index for imports (A.26) results in the aggregate supply condition for imported retail goods:

$$\pi_{F,t} - \delta_F \pi_{F,t-1} = \beta(\mathbb{E}_t \pi_{F,t+1} - \delta_F \pi_{F,t}) + \lambda_F(\psi_{F,t} + \epsilon_{F,t}), \tag{3}$$

where $\psi_{F,t}$ is the law of one price (LOP) gap and is defined as: $\psi_{F,t} = e_t + p_t^* - p_t$. Log-linearizing the real exchange rate equation (A.9) and the home terms of trade equation (A.10) and using the definition of the LOP gap yields the relationship between the real exchange rate and the terms of trade:

$$q_t = e_t + p_t^* - p_t = \psi_t + (1-\alpha)S_t. \tag{4}$$

If we first-difference the log-linearized version of the terms of trade equation (A.10) we obtain:

$$s_t - s_{t-1} = \pi_{F,t} - \pi_{H,t} + \epsilon_{s,t}, \tag{5}$$

where $\epsilon_{s,t}$ is an exogenous *terms of trade shock*. Now if we first difference the log-linearized version of the CPI index equation (A.8) we get:

$$\pi_t = (1-\alpha)\pi_{H,t} + \alpha\pi_{F,t}, \tag{6}$$

The real interest-rate parity condition under IAM is obtained by first differencing equation (4) and applying the log-linearized version of the interest rate parity condition in equation (A.16):

$$(r_t - \mathbb{E}_t \pi_{t+1}) - (r_t^* - \mathbb{E}_t \pi_{t+1}^*) = \mathbb{E}_t(q_{t+1} - q_t) - \chi(d_t + \epsilon_{q,t}), \tag{7}$$

where $\epsilon_{q,t}$ measures the time varying deviations from real interest parity and $d_t = log(D_t) = log(\frac{\tilde{e}_t B^*}{Y_{ss} P_t})$ is real foreign bond holdings in domestic currency.

Under CAM the real interest parity condition is characterized as follows:

$$(r_t - \mathbb{E}_t\pi_{t+1}) - (r_t^* - \mathbb{E}_t\pi_{t+1}^*) + \epsilon_{q,t} = \mathbb{E}_t(q_{t+1} - q_t), \tag{8}$$

The goods-market clearing condition in equation (A.31) implies:

$$y_t = (1-\alpha)c_t + \alpha\eta q_t + \alpha\eta s_t + \alpha y_t^*. \tag{9}$$

Assuming the exogenous stochastic shocks follow independent AR(1) processes for the terms of trade, technology and real-interest-parity shocks, we have:

$$\epsilon_{k,t} = \rho_k \epsilon_{k,t-1} + \nu_{k,t}; \quad \rho_k \in (0,1), \quad \nu_k \sim i.i.d(0, \sigma_k^2) \tag{10}$$

for $k = s, a, q$ and noting that the cost-push shocks in the domestic and retail sectors follow an i.i.d process, in particular, the marginal cost shocks in the home goods and import retail firms profit functions are $\epsilon_H \sim i.i.d(0, \sigma_H)$ and $\epsilon_F \sim i.i.d(0, \sigma_F)$, respectively. For simplicity, we assume that the foreign country variables $\{\pi^*, y^*, r^*\}$ follow uncorrelated AR(1) processes:

$$\begin{bmatrix} \pi_t^* \\ y_t^* \\ r_t^* \end{bmatrix} = \begin{bmatrix} a_1 & 0 & 0 \\ 0 & b_2 & 0 \\ 0 & 0 & c_3 \end{bmatrix} \times \begin{bmatrix} \pi_{t-1}^* \\ y_{t-1}^* \\ r_{t-1}^* \end{bmatrix} + \begin{bmatrix} \sigma_{\pi^*} & 0 & 0 \\ 0 & \sigma_{y^*} & 0 \\ 0 & 0 & \sigma_{r^*} \end{bmatrix} \times \begin{bmatrix} \nu_{\pi^*,t} \\ \nu_{y^*,t} \\ \nu_{r^*,t} \end{bmatrix} \tag{11}$$

where $\nu_{\pi^*,t}, \quad \nu_{y^*,t} \quad \nu_{r^*,t} \sim N(0, I_3)$.

Within IAM and a given monetary policy context, if we set up the domestic technology, interest parity and terms of trade shocks denoted by $\{\epsilon_{a,t}, \epsilon_{q,t}, \epsilon_{s,t}\}$, the foreign processes $\{\pi^*, y^*, r^*\}$, and the cost-push shocks $\{\epsilon_{H,t}, \epsilon_{F,t}\}$, we can determine ten endogenous variables as $\{c_t, y_t, d_t, q_t, s_t, r_t, \psi_t, \pi_t, \pi_{H,t}, \pi_{F,t}\}$. Similarly, we can determine nine endogenous variable in a CAM that excludes, d_t, real foreign bond holdings in domestic currency.

Each central bank is assumed to optimally set the nominal interest rate by minimizing a quadratic loss function that includes four specific policy objectives: inflation stabilization, output-gap stabilization, ensuring nominal interest-rate smoothing and – possibly – also reducing real exchange-rate variability.

Accordingly, the one-period central bank quadratic loss function, L is defined as:

$$L(\widehat{\pi}_t, y_t, q_t, r_t - r_{t-1}) = \frac{1}{2}[\widehat{\pi}_t^{\,2} + \mu_y y_t^2 + \mu_q q_t^2 + \mu_r (r_t - r_{t-1})^2] \tag{12}$$

where $\widehat{\pi}_t$, y_t and q_t are the log-linear deviations of the average annual inflation rate, real GDP and real exchange rate from their respective steady state levels. $\mu_y, \mu_q, \mu_r \in [0, \infty)$ represent the weights placed on output-gap stabilization, real exchange rate stabilization and targeted interest rate smoothing respectively, and the weight attached to inflation stabilization, $\widehat{\pi}_t$ is normalized to one.

The loss function specified here relates to a flexible IT regime as described in Svensson (1999). The weight on the change in the interest rate is to reflect monetary policy inertia. Obstfeld and Rogoff (1998) and Svensson (2000) also point out the importance of the real exchange rate in the monetary policy transmission mechanism, especially in small open economies.

Following the literature, we further assume that the central bank minimizes its loss subject to the structural equations under discretion and employ the algorithm of Dennis (2007) to compute solutions to a linear-quadratic Markov perfect equilibrium (LQ-MPE) problem. As in Kam et al. (2009) and McKnight et al. (2020), we also add a noise term to the resulting optimal interest-rate rule to capture imperfections in the setting of interest rates (i.e., an exogenous monetary policy shock).

4. Empirical Strategy

4.1. Data

To make the international comparison of our (re-)estimation results more meaningful and up-to-date, our quarterly data are constrained within the range of the same more recent time period for all 10 IT countries, namely from 2009:Q1 to 2021:Q4. We opted to do so (i) even if Ghana, South Africa, the LAITs and the ACITs began the implementation of inflation targeting at different dates and (ii) even if we also look back at the earlier results in the cited original studies to judge about the time evolution of IT regimes. To further enhance the comparisons with the earlier literature, we used in our Bayesian (re-)estimation the same nine observable variables and exogenous shocks as in McKnight et al. (2020) and Kam et al. (2009). The sources of these nine observables for our analysis of the African inflation targeters are summarized in Table 1.

As common in the DSGE literature, all variables were first expressed in natural logarithms and then transformed into deviations from trend after detrending with the Hodrick-Prescot (HP) filter. Exceptions are interest rates and inflation rates, which are measured as quarterly percentage changes. Further, all variables are demeaned to correspond to their theoretical deviations from steady state.

4.2. Methodology and Estimation

Following McKnight et al. (2020) and Kam et al. (2009), the log-linearized model, denoted henceforth as M, was estimated using Bayesian methods.[14] Let Y be a matrix of data and θ a vector of parameters for the model, M, which seeks to explain Y. In Bayesian analysis, we are interested in knowing more about the parameters of the model θ given the data set, Y.

We assess the importance that the central bank attaches to RER stability by estimating two versions of the model, one in which the weight attached to RER stabilization is positive ($\mu_q > 0$) and the other in which this weight is zero ($\mu_q = 0$), under each of of the alternative assumptions regarding international asset markets: CAM vs IAM. The judgment as to which of these four model is more probable for each country, given the data at hand, is made using Bayesian model comparison, as described later on.

The weight attributed to each policy objective will depend on the institutional preferences of each central bank, which we can make inferences about using estimates of the respective Bayesian posterior distributions. Three sets of parameters were estimated: central bank target weights, $\{\mu_y, \mu_q, \mu_r\}$, private sector deep parameters, $\{h, \sigma, \phi, \eta, \delta_H, \delta_F, \theta_H, \theta_F\}$, and parameters for the exogenous processes $\{a_1, b_2, c_3, \rho_a, \rho_q, \rho_s, \sigma_H, \sigma_F, \sigma_a, \sigma_q, \sigma_s, \sigma_{\pi^*}, \sigma_{y^*}, \sigma_{r^*}, \sigma_r\}$.

To recall – see, e.g., Koop (2003 / reprinted with corrections 2006) – Bayesian econometrics makes use of Bayes rule, in our notation here:

$$p(\theta/Y, M) = \frac{p(Y/\theta, M)p(\theta/M)}{p(Y/M)} \tag{13}$$

Our main interest is in calculating $p(\theta/Y, M)$, referred to as *posterior density*, which combines data and prior information. The probability density function for the data given the parameters for the model, M, $p(Y/\theta, M)$ is often referred to as the *likelihood function* or the data generating process. Finally, $p(\theta/M)$ is referred to as the *prior density*, which is independent of the data set and may contain non-data information or our beliefs about the parameter value ranges before examining the data set.

[14]See, e.g., Herbst and Schorfheide (2016).

Table 1: Observable Data Description and Sources

Observed variable	**Unit**	**Notation**	**Source**
Imported goods inflation	(%) Local currency	$\pi_{F,t}$	Bank of Ghana/South Africa Reserve Bank/International Financial Statistics, IMF
Terms of trade	Price of imports to exports	s_t	World Bank/International Financial Statistics, IMF
Real exchange rate	Local currency per 1 US Dollars adjusted for relative price levels	q_t	Bank of Ghana/South Africa Reserve Bank/International Financial Statistics, IMF
Domestic real GDP	Millions of constant Ghana Cedis / South African Rands	y_t	Ghana Statistical Service/International Financial Statistics, IMF
Domestic CPI inflation	Percent	π_t	Ghana Statistical Service/International Financial Statistics, IMF
Nominal interest rate	Percent	r_t	Bank of Ghana/South Africa Reserve Bank/International Financial Statistics, IMF
US CPI inflation	Percent	π_t^*	International Financial Statistics, IMF
US real GDP	Millions of constant US Dollars	y_t^*	International Financial Statistics, IMF
US federal funds rate	Percent	r_t^*	International Financial Statistics, IMF

If both sides of equation (13) are integrated with respect to θ, and noting that $\int p(\theta/Y, M)d\theta$=1, then

$$p(Y/M) = \int p(Y/\theta, M)p(\theta/M)d\theta$$

and the posterior density in (13) becomes – see, e.g., Herbst and Schorfheide (2016):

$$p(\theta/Y, M) = \frac{p(Y/\theta, M)p(\theta/M)}{\int p(Y/\theta, M)p(\theta/M)d\theta} \tag{14}$$

The denominator on the right-hand side of equation (14) is referred to as the *marginal likelihood* of the data associated with model M, and it depends on only the prior and likelihood function.

A characterization of the properties of the posterior distribution is required in order to make Bayesian inferences. A posterior simulator is used to obtain the probability density of the posterior since analytical results are usually not available. We follow what is widely employed in the literature by using the Metropolis-Hastings (MH) algorithm. Since the mid-1990s, statisticians have been increasingly drawn to Markov chain Monte Carlo (MCMC) methods to simulate complex, non-standard multivariate distributions. The MH algorithm belongs to the class of MCMC algorithms used to simulate multivariate distributions. The M-H algorithm constructs a Markov chain such that the stationary distribution associated with this Markov chain is unique and equal to the posterior distribution of interest.[15] A type of MH algorithm, known as the Random Walk MH (RWMH) MCMC algorithm, has commonly been used when it is difficult to find a good approximation for the posterior density. We apply it too, and simulate for each of our 10 IT countries 2,000,000 RWMH-MCMC draws (and up to 2,500 Kalman-filter iterations), discarding the first half to reduce any initial condition biases.

5. Results

We add to, replicate, and extend in time, notably including the COVID-19 pandemic, the analysis of prior research on inflation targeters in Latin America and advanced small open economies. More precisely, we estimate

[15]For a good introduction to this algorithm, see Chib and Greenberg (1995).

the macroeconomic policy objectives of the central banks of Ghana and South Africa, indeed the first two African IT economies for which such measurement is now attempted using Bayesian methods, and compare them with analogous *updated* estimates for the remaining IT countries reported in similar earlier studies that are of interest here, too. Yet, we now zoom in over the *same*, more recent sample period, 2009:Q1–2021:Q4 as for the AfITs, and within the context of the *same* medium-scale NK SOE DSGE model in four versions, as discussed. The updated and compared estimates of the target weights of the IT central banks by region and stage of development across the world, which we provide in a rich summary, are useful and policy-informing. They uncover from the data, but within an explicit medium-scale SOE DSGE theoretical framework allowing for endogeneity in a way that is impossible to capture in pure empirical specifications, the *actual* objectives (*de facto*) of these 10 SOE inflation targeters and relate them to their mandated objectives (*de jure*). Thus, we contribute here to the IT literature with a novel broad comparison in terms of percentage share quantification of IT central bank target weights. It has important implications for assessing the transparency and accountability of monetary policy in all of these countries as well as across time, with an intentional focus on the AfITs that have not been studied within such a uniform comparative Bayesian DSGE perspective previously.

5.1. Prior Densities

Our choice of prior densities complies with the related literature; see, e.g., McKnight et al. (2020) for LAITs and Kam et al. (2009) for ACITs, as well as Güngör and Güloğlu (2019) for Turkey and Sobieraj and Metelski (2021) for Poland. For each country, α, which represents the share of imports in domestic consumption, is calibrated to a value corresponding to the average share of imports of goods and services in consumption. We also follow common practice in the literature by fixing the discount factor, β, at 0.99 for all countries. The debt-elastic interest rate parameter, χ, which is applicable only in the two versions of the model assuming IAM, is also fixed at 0.05, consistent with the estimates of Selaive and Tuesta (2003). All other structural parameters, except the three mentioned ones, are estimated using a common Bayesian framework that enables direct comparisons. We follow Kam et al. (2009) and McKnight et al. (2020) in assuming that the prior distributions for the central bank preference parameters of interest μ_y, μ_q, and μ_r, as well as all other deep parameters in the underlying DSGE model, are the same. Therefore, any resulting differences in the posterior densities of the estimated structural parameters will be due to the data itself.

As in McKnight et al. (2020), the unrestricted ($\mu_q > 0$) and restricted ($\mu_q > 0$) CAM versus IAM model versions are ranked by Bayesian model comparison for each country, and the most supported by the available data, or 'preferred', model version for this more recent common sample period for all 10 IT countries is, finally, compared across and interpreted.[16]

5.2. Bayesian Model Comparison

We now turn to analyzing the performance of our four SOE NK DSGE model versions through the lens of Bayesian model comparison. In this way, we 'let the data speak', eventually selecting the most supported model version by the observed sample in a probabilistic sense, i.e., our 'preferred' model by country. The usual criterion, or 'sufficient statistic', in such Bayesian model comparison is simply the (log) marginal likelihood, for each model version by country – see, e.g., Geweke (1999). Accordingly, the model version with the highest (log) marginal likelihood is selected as the most probable given the data for each of all compared IT countries. The summary statistics of the Bayesian estimation for these 10 countries are presented in Table 2. In view that such a comparison is novel in the literature on inflation targeting, we next suggest several observations that constitute the core contribution of the present paper.

First, as an overall cross-check of the reliability of our estimates, among the key statistics reported in the table is the acceptance rate for each estimation run of the RWMH-MCMC algorithm. According to the literature, the average value of the acceptance rate should be between 20% and 40% (Herbst and Schorfheide, 2016), p. 69, or even up to 50% (Koop, 2003 / reprinted with corrections 2006), p. 98. More generally, because the acceptance rate should depend on the dimension of the problem, i.e., the number of estimated parameters, as discussed in Robert and Casella (2004), chapter 7, section 8.4, Adjemjan (22 July 2017, Dynare forum) usually targets 1/3 and considers as reasonable a wider range, provided that it is not very close to the extremes of about 1% or 99%.[17] With view to this particular dimension, our estima-

[16]As is typical in Bayesian fine-tuning, we attempted several estimation runs for each country in each model version but retained and report here results, where acceptance rates and convergence diagnostics look stronger overall.

[17]https://forum.dynare.org/t/acceptance-ratio-in-the-mh-algorithm/10402

tion results reported in Table 2 are generally credible: the acceptance rates are neither too low nor too high. In addition, the indeterminacy rates and the invalid likelihood rates are typically low. This is reassuring and provides a certain degree of confidence in the results and subsequent interpretations regarding the target weights uncovered in the same methodological manner for 10 inflation targeting central banks – and with a particular focus on the AfITs – that take a central stage in our comparative study.

Second, to begin with the results from the Bayesian model comparison, in 9 out of our 10 country cases – with the exception of South Africa – the highest log marginal likelihood (reported in bold fonts in the discussed table for each country) selects the complete asset market assumption over the alternative incomplete asset market assumption as more probable given the data. If we also apply the Kass and Raftery (1995) criterion to provide some sense of the statistical significance of this result, let us take the minimal difference in the log marginal likelihoods between the most supported and the second-best model by country: this points to Canada. Applying the Kass-Raftery criterion, i.e., multiplying the difference in these log marginal likelihoods by 2, we obtain $2[-1319.3 - (-1322.4)] = 2(3.1) = 6.2 > 2$. Canada had the smallest difference between the most preferred models followed by Australia, Colombia, and Brazil. In these four cases, the Kass-Raftery criterion was between 6 and 10, therefore offering 'strong evidence' in favour of the winning model. For all other 6 countries, the Kass-Raftery criterion is above 10, and hence there is 'very strong evidence' in favour of the model selected by our Bayesian comparison here. Although the overwhelming support by the data for CAM over IAM may sound somewhat counterintuitive to newcomers in the field, especially if they imagine the CAM assumption as a theoretical fiction, it is consistent with analogous findings in McKnight et al. (2020), where for all examined in the same way (but in earlier IT quarterly samples) 5 LAITs the CAM assumption wins over the IAM assumption in the Bayesian model comparison. Our suggested interpretation is that both these assumptions are indeed extreme, but one should not give priority to the IAM assumption as more realistic. By contrast, it consistently appears as less supported by the data. Therefore, assuming a single foreign bond to subsume the whole complexity of the financial system of modern economies is worse in theoretical modelling than to rely instead on the alternative clearly exaggerated richness of complete asset markets globally as an approximation to reality.

Table 2: Bayesian Model Comparison Using a Common Recent Sample Period (2009:Q1–2021:Q4): All 10 IT Countries

	CAM		**IAM**	
	$\mu_q > 0$	$\mu_q = 0$	$\mu_q > 0$	$\mu_q = 0$
Group 1: AfITs				
Ghana				
log marginal likelihood	**-1742.10**	-1764.60	-1837.80	-1815.20
acceptance rate (%)	39.11	40.05	4.33	26.38
indeterminacy rate (%)	0.10	0.09	35.44	2.90
invalid likelihood rate (%)	2.23	3.18	0.00	0.00
South Africa				
log marginal likelihood	-1978.10	-1970.80	-1957.90	**-1925.50**
acceptance rate (%)	66.39	66.90	36.56	50.77
indeterminacy rate (%)	0.47	0.08	9.16	3.73
invalid likelihood rate (%)	1.96	0.88	0.08	0.00
Group 2: LAITs				
Brazil				
log marginal likelihood	-1494.40	**-1489.40**	-1525.70	-1532.30
acceptance rate (%)	50.30	48.67	16.21	5.43
indeterminacy rate (%)	0.00	0.00	14.43	46.68
invalid likelihood rate (%)	1.59	2.30	0.00	0.05
Chile				
log marginal likelihood	**-1533.80**	-1539.70	-1599.60	-1597.3
acceptance rate (%)	61.39	63.88	7.22	8.55
indeterminacy rate (%)	0.01	0.42	1.16	11.65
invalid likelihood rate (%)	1.74	2.30	3.29	0.04
Colombia				
log marginal likelihood	-1435.30	**-1430.80**	-1500.40	-1501.60
acceptance rate (%)	44.25	49.02	4.79	5.56
indeterminacy rate (%)	2.52	0.41	4.87	21.60
invalid likelihood rate (%)	1.34	1.60	0.08	0.12
Mexico				
log marginal likelihood	**-1380.5**	-1433.1	-1529.5	-1529.7
acceptance rate (%)	72.90	22.91	28.00	25.32
indeterminacy rate (%)	0.01	26.71	0.11	0.97
invalid likelihood rate (%)	2.23	2.09	0.00	0.01
Peru				
log marginal likelihood	**-1460.7**	-1539.4	-1689.4	-1599.4
acceptance rate (%)	77.55	62.90	6.71	11.17
indeterminacy rate (%)	0.02	0.36	1.08	12.21
invalid likelihood rate (%)	2.86	2.56	4.02	0.66
Group 3: ACITs				
Australia				
log marginal likelihood	-1364.30	**-1359.90**	-1433.30	-1430.10
acceptance rate (%)	74.33	66.30	14.90	7.34
indeterminacy rate (%)	0.00	0.23	2.08	6.26
invalid likelihood rate (%)	2.87	2.79	1.46	0.07
Canada				
log marginal likelihood	**-1319.30**	-1322.40	-1409.20	-1404.90
acceptance rate (%)	58.88	58.51	30.73	15.33
indeterminacy rate (%)	0.00	0.00	0.00	5.35
invalid likelihood rate (%)	2.63	2.67	0.00	0.03
New Zealand				
log marginal likelihood	**-1359.00**	-1365.90	-1422.60	-1423.90
acceptance rate (%)	68.90	42.73	15.73	11.84
indeterminacy rate (%)	0.02	5.75	7.85	5.39
invalid likelihood rate (%)	1.86	2.56	0.04	0.00

Note: CAM stands for the model versions by country featuring complete asset markets, whereas IAM relates to those with the alternative assumption of incomplete asset markets. 'estimate' refers to the posterior mean of the estimated coefficients of the policy preferences in the central bank loss function. The log marginal likelihood for each model version by country in bold fonts highlights the highest value, that is, the model version most supported by the data, and hence our preferred model version by country.

Third, across all 10 countries, except Australia, Brazil and Colombia and South Africa, our Bayesian model comparison reported in Table 2 favors the unrestricted ($\mu_q > 0$) versus the restricted ($\mu_q = 0$) model version. In general, then, our estimation reveals what has been known in this literature as 'fear of floating' for all the remaining 6 IT central banks. This also means that no matter the priority of IT, be it 'strict' or 'flexible' in the mandate of the central banks in the examined countries, most of them are here revealed to have also been concerned in deeds, or *de facto*, about real exchange-rate fluctuations.

Fourth, and turning to the estimates of the policy preferences of interest in the common recent sample of 2009:Q1–2021:Q4 in Table 3, one can conclude from the two commonly used chain convergence diagnostics statistics we provide, the Geweke test p-value (which should be above 0.01 or even 0.05) and the univariate Brooks-Gelman shrink factor (which should be in the range of 1.00–1.10), that in some cases one or both of these statistics reveal convergence problems. However, when so many parameters are jointly estimated, this is sometimes the case, and has been true for the original sample estimates in both McKnight et al. (2020) and – less so – Kam et al. (2009): see Table 4. Bearing this in mind, the results across all our 10 IT countries in both the common recent time period (Table 3) and the country-specific earlier time periods in original studies (Table 4) appear plausible and satisfactory. In percentage terms, they reveal a dominant weight of inflation stabilization, an average across the 10 IT central banks of 51% in the common sample (see panel B in Table 3 and the right-hand side panels of figures 2 and 3) and of 48% in the original-studies samples (see panel B of Table 4 and the right-hand side panels of figures 2 and 3), followed by output gap stabilization and interest rate smoothing with a tied weight, 18% in the common sample and interest-rate smoothing with 35% in the original-studies sample.

Fifth, considering the time periods of these estimates – reported in tables 3 and 4 and illustrated in figures 2 and 3 – we can conclude that the priority of the inflation stabilization has been preserved moving from the 1990s into the 2000s and until 2022, while interest-rate smoothing, at 35% in the earlier sample, has declined by about half and tied in importance with output-gap stabilization, at 18% in the recent common sample. This reshuffling appears plausible given the impact of the GFC and the COVID-19 pandemic on the economies around the globe and their adaptation to the new uncertain and less predictable environment.

Table 3: Estimated Weights in IT Central Bank Loss Function: Common Recent Sample Period

		Panel A: Relative to Inflation Stabilization = 1											Panel B: Weights as % Shares				
Country	**Sample**	μ_π	μ_y	**p-value**	**B-GF**	μ_r	**p-value**	**B-GF**	μ_q	**p-value**	**B-GF**	$\Sigma\mu_i$	μ_π, %	μ_y, %	μ_r, %	μ_q, %	**check, %**
Ghana	2009:Q1–2021:Q4	1	0.30	0.01	1.10	0.71	0.00	1.84	0.16	0.01	1.09	2.17	46.08	13.82	32.72	7.37	100.00
South Africa	2009:Q1–2021:Q4	1	0.16	0.04	1.06	0.52	0.96	1.00	0.00	–	–	1.68	59.59	9.30	31.11	0.00	100.00
Brazil	2009:Q1–2021:Q4	1	0.66	0.29	1.02	0.18	0.07	1.05	0.00	–	–	1.84	54.35	35.87	9.78	0.00	100.00
Chile	2009:Q1–2021:Q4	1	0.33	0.44	1.01	0.39	0.59	1.00	0.37	0.00	1.24	2.09	47.85	15.79	18.66	17.70	100.00
Colombia	2009:Q1–2021:Q4	1	0.36	0.08	1.05	0.26	0.00	1.22	0.00	–	–	1.62	61.73	22.22	16.05	0.00	100.00
Mexico	2009:Q1–2021:Q4	1	0.26	0.33	1.01	0.18	0.03	1.05	0.85	0.01	1.11	2.29	43.67	11.35	7.86	37.12	100.00
Peru	2009:Q1–2021:Q4	1	0.35	0	1.11	0.23	0.45	1.01	0.5	0	1.26	2.08	48.08	16.83	11.06	24.04	100.0
Australia	2009:Q1–2021:Q4	1	0.30	0.04	1.06	0.30	0.62	1.00	0.00	–	–	1.60	62.50	18.75	18.75	0.00	100.00
Canada	2009:Q1–2021:Q4	1	0.37	0.00	1.15	0.53	0.02	1.10	0.65	0.00	1.14	2.55	39.22	14.51	20.78	25.49	100.00
New Zealand	2009:Q1–2021:Q4	1	0.57	0.03	1.06	0.40	0.20	1.03	0.41	0.02	1.08	2.38	42.02	23.95	16.81	17.23	100.00
average: AfIT2													52.84	11.56	31.91	3.69	100.00
average: LAIT5													51.13	20.41	12.66	15.77	100.00
average: ACIT3													47.91	19.07	18.78	14.24	100.00
average: all IT10													50.51	18.24	18.36	12.90	100.00

Note: 'p-value' reports the probability value for each estimated coefficient associated with the chi-square diagnostic convergence test proposed by Geweke (1999) for the RWMH-MCMC algorithm and 'B-GF' reports the Brooks-Gelman univariate shrink factor proposed by Gelman and Rubin (1992) and extended by Brooks and Gelman (1998). The listed estimates are for the 'preferred' model version by country corresponding to the highest (log) marginal likelihood per country, i.e., the bold entries in Table 2.

Table 4: Estimated Weights in IT Central Bank Loss Function: Various Original-Study Samples

		Panel A: Relative to Inflation Stabilization = 1											Panel B: Weights as % Shares				
Country	**Sample**	μ_π	μ_y	**p-value**	**B-GF**	μ_r	**p-value**	**B-GF**	μ_q	**p-value**	**B-GF**	**sum**	μ_π, %	μ_y, %	μ_r, %	μ_q, %	**check, %**
Ghana	2009:Q1–2021:Q4	1	0.30	0.01	1.10	0.71	0.00	1.84	0.16	0.01	1.09	2.17	46.08	13.82	32.72	7.37	100.00
South Africa	2009:Q1–2021:Q4	1	0.16	0.04	1.06	0.52	0.96	1.00	0.00	–	–	1.68	59.59	9.30	31.11	0.00	100.00
Brazil	2004:Q1–2014:Q4	1	0.73	0	1.05	0.53	0	1.1	0.31	0	1.08	2.57	38.91	28.40	20.62	12.06	100.00
Chile	2002:Q1–2014:Q4	1	0.17	0	1.03	1.14	0.68	1.69	0.31	0	1.07	2.62	38.17	6.49	43.51	11.83	100.00
Colombia	2003:Q1–2014:Q4	1	0.44	0.01	1.03	0.35	0	1.03	0.1	0.01	1	1.89	52.91	23.28	18.52	5.29	100.00
Mexico	2002:Q1–2014:Q4	1	0.1	0.04	1	0.43	0	1.7	0.06	0.33	1.05	1.59	62.89	6.29	27.04	3.77	100.00
Peru	2005:Q1–2014:Q4	1	0.03	0	1.01	1.78	0.29	1.04	0	–	–	2.81	35.59	1.07	63.35	0	100.0
Australia	1990:Q1–2005:Q3	1	0.412	0.759	1.003	0.611	0.198	1.062	0	–	–	2.03	49.31	20.32	30.13	0	100.00
Canada	1990:Q1–2005:Q3	1	0.157	0.891	1	0.855	0.014	1.266	0	–	–	2.019	49.53	7.78	42.35	0	100.00
New Zealand	1990:Q1–2005:Q3	1	0.273	0.574	1.01	0.85	0.007	1.287	0	–	–	2.129	46.97	12.82	39.92	0	100.00
average: AfIT2													52.84	11.56	31.91	3.69	100.00
average: LAIT5													45.69	13.11	34.61	6.59	100.00
average: ACIT3													48.75	13.68	37.58	0.00	100.00
average: all IT10													48.04	12.97	34.96	4.03	100.0

Note: CAM stands for the model versions by country featuring complete asset markets, whereas IAM relates to those with the alternative assumption of incomplete asset markets. 'estimate' refers to the posterior mean of the estimated coefficients of the policy preferences in the central bank loss function. The log marginal likelihood for each model version by country in bold fonts highlights the highest value, that is, the model version most supported by the data, and hence our preferred model version by country.

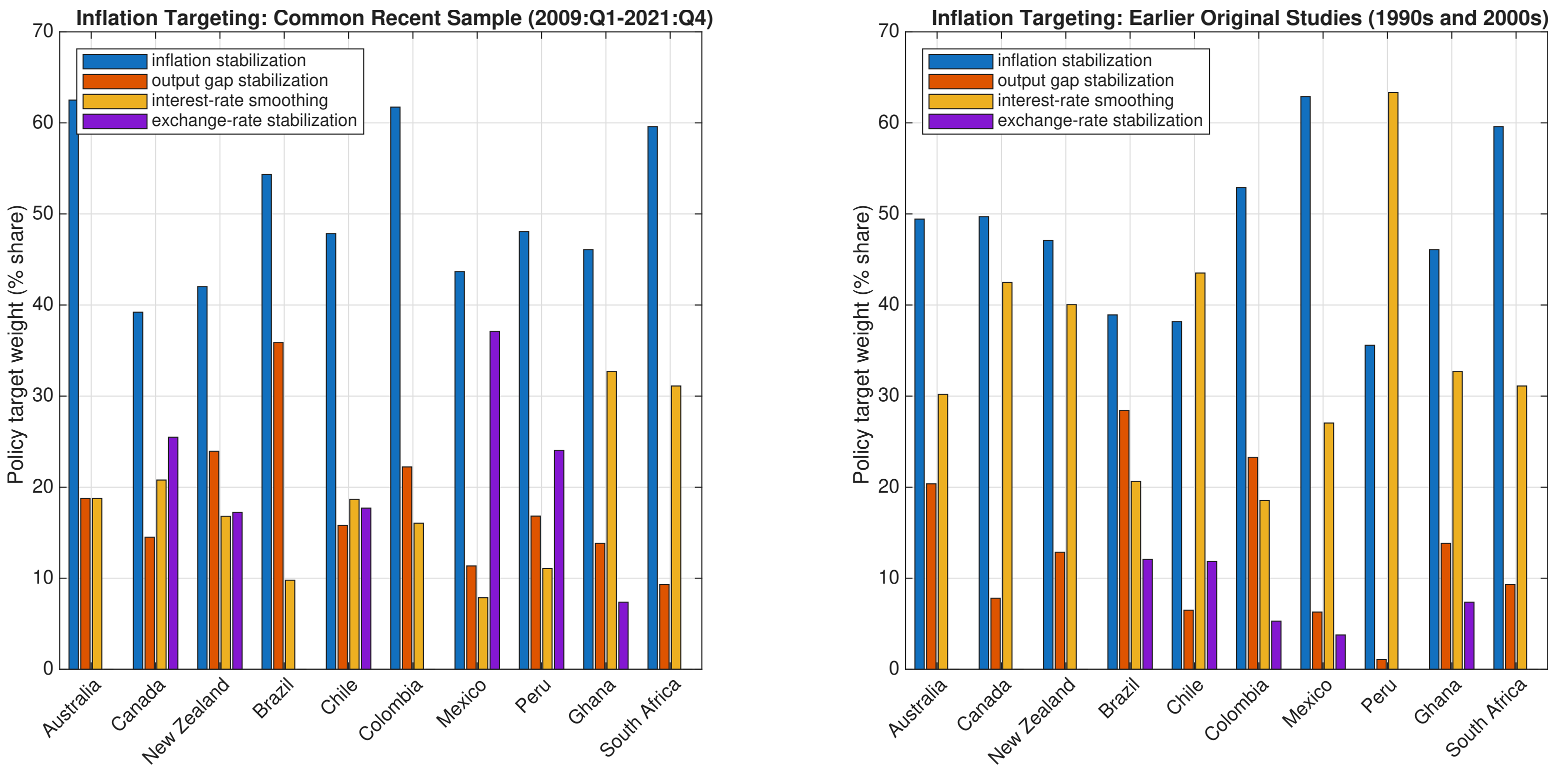

Figure 2: Estimated IT Policy Weights across Countries and Time

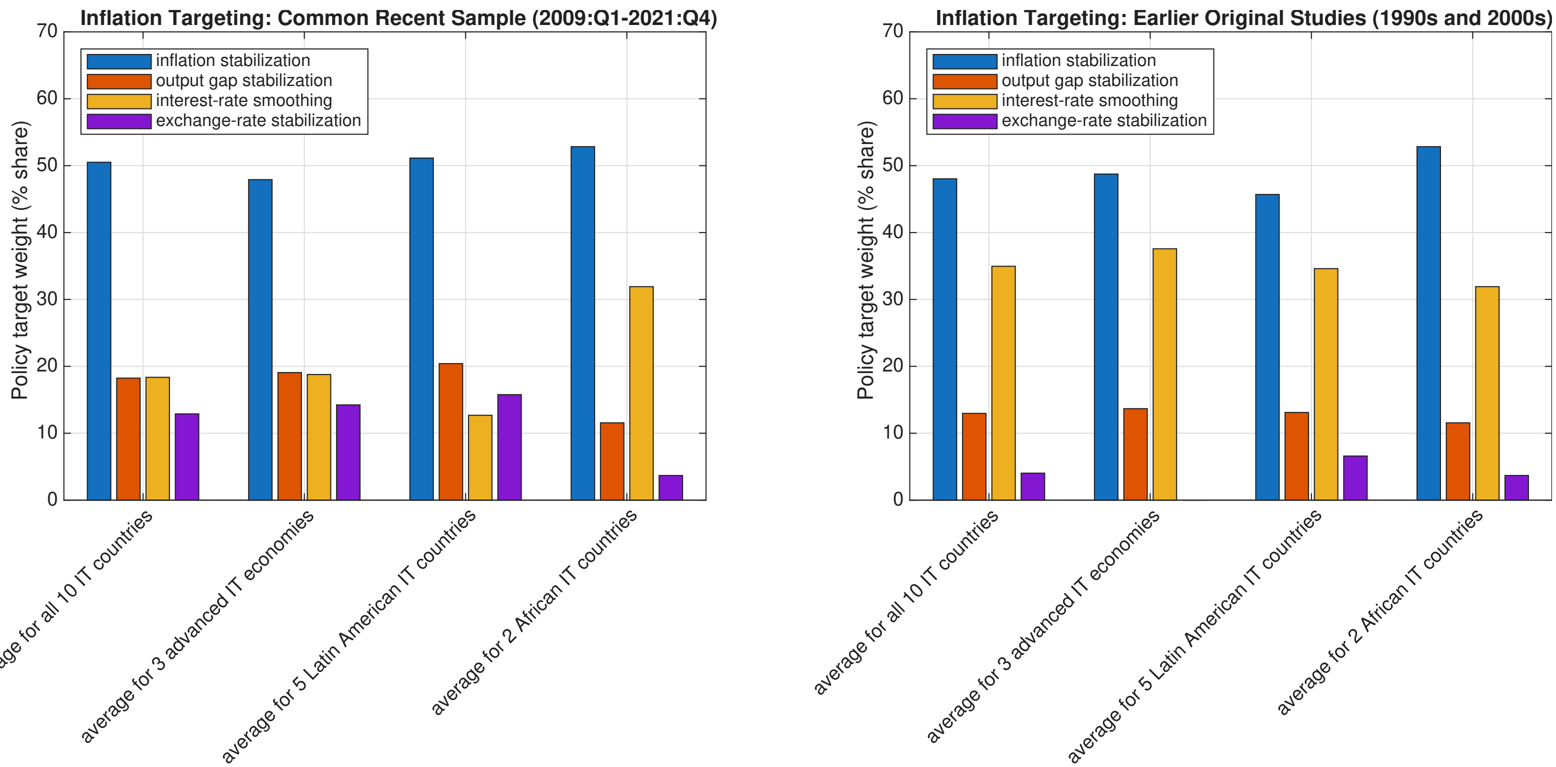

Figure 3: Estimated IT Policy Weights across Country Groups and Time

Sixth, disaggregating the percentage shares further, as reported in tables 3 and 4 and illustrated in the left-hand side panels of figures 2 and 3, one can see that the priority of inflation stabilisation has been strongest among the AfITs in the common sample, with a share of 53%, followed by the LAITs, 51%, and then the ACITs, 48%. Interest-rate smoothing and output stabilisation tie at 18%. The AfITs have the highest share of interest rate smoothing, 32%, followed by the ACITs, 19% and the LAITs, 13%. In terms output stabilization, LAITs have the highest share of 20% and are marginally followed by the ACITs, 19% and then the AfITs, 12%. The degree of 'fear from floating' comes out strongest in the common sample for the LAITs, at 16% on average, then for the ACITs, 14%, and – perhaps surprisingly – largely unimportant for the AfITs, 4%.

Seventh, looking across time and comparing the evolving estimates for the LAITs and the ACITs in the original and common samples – as reported in tables 3 and 4 and illustrated in figures 2 and 3 – one can conclude that for the LAITs output stabilization and exchange-rate stabilization have grown in share at the expense of the drop in interest-rate smoothing. For the ACITs, the same trend has shaped out, but the fall in the share of interest-rate smoothing is much smaller.

5.3. Estimated Policy Preferences

Next, focusing on our 2 AfITs, we compare the results for Ghana and South Africa, initially across each other and then with those of the 8 other IT countries studied here. However, our interpretations require a careful context.

Firstly, as discussed, many of the IT central banks in our sample consider themselves as 'flexible' inflation targeters in the sense that their objectives go beyond simply inflation. Although these central banks are often explicit about the importance of inflation, the tradeoffs across stabilizing inflation and other macroeconomic objectives have rarely been arranged in some order of at least roughly quantified priorities. The approach in the present paper is consistent with Svensson (2007), in which transparency and accountability can be enhanced by providing a clearer, and in our case quantified, view of the weights a central bank attaches to competing stabilization objectives.

Secondly, for central bank boards seeking to assess central bank performance, historical estimates of stabilization objectives, which are subject to an explicit structural and micro-founded model as presented here, can provide a framework to do so. If one simply observes the unconditional volatilities of the target variables, it may be inadequate for the assessment of monetary policy, as these volatilities also depend on non-policy structural features of the economy.

Finally, since the target weight parameters are jointly estimated based on the same DSGE model, inferences can be made about policy objectives conditional on the environment in which each central bank operates. The joint estimates result in different conclusions when compared to inferences based on the unconditional distributions of target variables such as the volatility of annual inflation, the output gap, interest rates, and the exchange rate.

We now compare the uncovered preferences of the 10 IT central banks in terms of the estimated target weights they attach to inflation stabilization (μ_π), output-gap stabilization (μ_y), interest-rate smoothing (μ_r) and exchange-rate stabilization (μ_q). These results for the common recent sample are shown in Table 3 and the left-hand side panels of figures 2 and 3.[18]

First, we note that for the AfITs, Ghana's preference for inflation stabilization, 46%, is lower than South Africa's, 60%. In contrast, Ghana places greater weight on the stabilization of the real exchange rate compared to South Africa (7% versus 0%) and on the stabilization of the output (14% versus 9%). Ghana also places slightly more weight on the smoothing of the interest rate relative to South Africa (33% versus 31%). All these quantitative findings support the conclusion that Ghana is indeed a flexible inflation targeter in its actual monetary policy as is implied by its mandate, and also displays the typical for emerging market economies (including most LAITs) 'fear from floating'. On the other hand, South Africa is much closer to a strict inflation targeter, even if our estimates did uncover empirically some concern about output-gap stabilization too, 9%, which was the lowest weight among the 10 IT countries, with a stronger emphasis on interest-rate inertia and no concern about exchange-rate variability.

In terms of the countries' preference for inflation stabilization, as reflected

[18]In the one-period central bank quadratic loss function, L, if the weight attached to the annual inflation rate, $\hat{\pi}_t$ is normalized to one and the estimated weights placed on output-gap stabilization (μ_y), real exchange-rate stabilization (μ_q) and interest-rate smoothing (μ_r) are used, then the weights placed on all the four policy preferences can be summed up to 100% to determine the relative importance of each policy choice. This 'summary statistics' were also used in Palma and Portugal (2014). Both ways of expressing the comparison of policy weights are reported explicitly for clarity in our tables 3, for the common recent sample, and 4, for the earlier samples of the original studies.

in panel A of Table 3 and Figure 2, Australia placed the highest weight (63%), followed by Colombia (62%). Canada (39%) revealed the lowest preference for inflation stabilization, followed closely by New Zealand (42%). Examining inflation stabilization preferences in terms of regional category averages, illustrated in panel B of Table 3 and Figure 3, the AfITs recorded the highest average weight of 53%, followed by the LAITs with an average weight of 51%, and then the ACITs with an average policy weight of 48%. However, it must be noted that the AfITs' average inflation stabilization weight is heavily influenced by South Africa's relatively higher weight. The average for the LAITs is driven much higher by the relatively higher weights of Colombia (62%) and Brazil (54%). Overall, inflation stabilization remains the most important target variable in the ten IT countries we compare here, none of these recording a policy weight less than 39%.

After inflation stabilisation, which emerges in our comparison with an average policy weight of 51%, the second policy preference for the 10 IT countries we survey is interest-rate smoothing and output-gap stabilisation which tied in importance, with an average policy weight of 18%, and finally exchange-rate stabilisation (13%). Interest-rate smoothing stabilization is second only to inflation stabilization in four out of the 10 countries, with its highest weight estimated for Ghana and South Africa, at 33% and 31% respectively with its lowest of 8% in Mexico. In terms of country groupings, the average policy weight of the AfITs of 32% is the highest, while the average weight of the LAITs is the lowest at 13%.

Output-gap stabilization, is second to inflation stablization in 3 of the 10 10 IT central banks studied here. The weights placed on this policy target ranged from the highest of 36% in Brazil to the lowest for South Africa, 9%. Among the three groupings, LAITs placed the highest average weight of 20%, influenced by the high weight of Brazil.

Finally, we compare the average preference of the IT central banks studied here for the use of real exchange-rate stabilization as a policy objective. This *de facto* 'fear of floating' is now most common in the LAITs, with an average policy weight of 16%, followed closely by the ACITs, 14%. Our finding, now using a (much) later sample, marks a significant shift from the results obtained in Kam et al. (2009), in which the Bayesian model comparison determined that this policy objective was not relevant for the 3 ACITs (see Table 4 and figures 2 and 3). Perhaps surprisingly and as we mentioned already, real exchange-rate stabilization comes out as the least popular policy objective among the AfITs, with an average policy weight of 4%. Such a comparison with other IT countries, therefore, enhances the credibility of the two African IT central banks we studied as maintaining the primary goal of an inflation targeting framework that shows almost no concern for RER developments.

5.4. Estimated Structural Parameters

Under CAM for Ghana and IAM for South Africa, Tables 5 and 6 report the mean, standard deviation, the corresponding 2.5-percentile to 97.5-percentile credible set and the numerical standard error (NSE) for the posterior estimates as well as two widely employed diagnostic tests we introduced earlier for MCMC convergence.[19] The mean of the posterior density is used as the point estimate for the key parameters of interest, the posterior standard deviation measures the extent of uncertainty associated with the point estimate, and the NSE provides the approximation error. The p-value relates to the Geweke (1999) chi-squared test,[20] and the Brooks-Gelman univariate shrink factor (B-GF) is reported too.[21] For both Ghana and South Africa, most of the shrink factors were less than 1.1 and most of the Geweke test p-values were positive, suggesting overall satisfactory convergence to a stationary distribution. But in several cases for Ghana and, less so, South Africa the parameters that had shrink factors greater than 1.1 also were those that scored a zero probability value in the Geweke test, thus indicating failure on counts of both these convergence statistics that the Markov chains had converged to stationary distributions. Nevertheless, such occasional problems have been similarly identified, though at a smaller scale, by the earlier analogous studies of Kam et al. (2009) and McKnight et al. (2020).

The shapes of the estimated posteriors for Ghana under CAM and South Africa under IAM are shown in figures 4 and 5, respectively. The distributions depicted are not always unimodal and well-shaped – but, again, such problems have similarly occurred in the earlier studies, even if at a lesser degree, once so many parameters in a DSGE model are ambitiously attempted

[19] For a detailed discussion of MCMC diagnostics, see, e.g., Gelman (1996) and Geweke (1999).

[20] It is expected the means from the two halves of the generated sample to be statistically indifferent if the Markov chains of draws has converged to a stable distribution. A low p-value may be evidence of problems of convergence.

[21] A shrink factor close to 1 is indicative of convergence to a stationary distribution. For a good exposition on MCMC convergence statistics, see Brooks and Gelman (1998).

to be estimated. Moreover, the shapes of the posteriors tend to be quite distinct from the corresponding ones of the priors and mostly not tightly overlapping with those of the priors.

Generally, we observe different posterior estimates of the means and standard deviations from those assumed by the priors for the behavioural parameters. On the whole, we also observe lower variances of the posterior distribution estimates relative to the prior distributions, thus the posterior estimates contained important information derived from the actual data. The prior means and standard deviations of the parameters for the policy weights are also quite different from the posterior means and standard deviations observed. Finally, the observed posterior means of the shock processes are generally higher than the assumed priors. A few exceptions to this pattern are the technology, risk premium, the terms of trade, and the foreign inflation shock processes. The observed standard deviations of the posterior estimates of the shock processes are generally lower than the priors.

5.4.1. Ghana

Table 5 shows the estimates for the unrestricted model ($\mu_q > 0$) under CAM for Ghana, selected by the comparison of the Bayesian models we discussed earlier. The posterior mean estimate for the degree of inflation persistence in the home goods sector is $\theta_H = 0.96$ and for the imported goods market is $\theta_F = 0.10$, indicating that prices remain unchanged for a much longer period for the home-goods sector relative to the imported-goods sector. The degree of indexation or 'backward lookingness' denoted by δ_H and δ_F is quite high compared to the prior and especially for the domestic-goods sector, 0.83, compared to the imported-goods sector, 0.72. Judging from the high value of σ, the coefficient of relative risk aversion, of 1.05, we conclude that consumption is very sensitive to real interest-rate changes. The habit parameter, h, is higher than the assumed prior mean of 0.60, 0.86, showing high persistence of Ghanaian households' consumption between periods. The elasticity of substitution between home-made and foreign goods, η, 0.44, is considered low compared to the prior of 1.00 and falls outside the 1-2 range that is generally found in the literature – see, e.g., Corsetti et al. (2008).[22] The inverse of the Frisch elasticity of labor supply is 1.44 versus a prior of

[22] Obstfeld and Rogoff (2000) proposed that fairly large elasticity of substitution in combination with transaction costs could help explain a number of important questions in international economics.

1.50.

5.4.2. South Africa

Table 6 reports the marginal posterior density estimates for the key parameters for South Africa under IAM and the unrestricted model, as selected by the Bayesian model comparison discussed earlier. The notable differences between Ghana and South Africa are in terms of the coefficient of relative risk aversion, σ, also referred to as the inverse elasticity of intertemporal substitution in consumption (EISC), the degree of habit persistence, h, the inverse of the Frisch elasticity of intertemporal labor supply, ϕ, the degree of indexation in imported-goods markets, δ_F, the degree of inflation persistence in imported-goods markets, θ_F and the degree of inflation persistence in domestic-output markets, θ_H.

South Africa has a lower degree of habit persistence (0.16 versus 0.86). The coefficient of relative risk aversion is higher in Ghana than in South Africa (1.05 vs 0.64). The inverse of the Frisch elasticity of labor supply is higher in South Africa (2.08 versus 1.44). The degree of indexation in the imported-goods markets is lower in South Africa (0.58 versus 0.72). The degree of persistence of inflation in imported-goods markets is also higher in South Africa (0.39 versus 0.10). These differences will, of course, imply some country-specific adaptations to the various shocks in the global economic environment across the two AfITs, in a narrower comparison, as well as across the 10 IT economies we compared extensively, of which more comes next.

5.4.3. Comparison with Previous Studies

The range of degree of the habit persistence parameter, combining results from previous research and estimates based on the recent common sample period, is between 0.21 and 0.93. Ghana and South Africa's parameter estimates are within this range, but South Africa's estimate is significantly lower, indicating that habit formation is less important for South African household consumer behavior. The average habit persistence parameter for the AfIT of 0.54 is lower than the averages of 0.89 and 0.69 for the ACIT and the LAIT countries, respectively, showing that habit formation is less important in the AfIT countries.

Table 5: **Priors and Posterior Parameter Estimates for Ghana under Complete Markets and Positive Target Weight on Real-Exchange stabilization, $\mu_q > 0$, $\alpha = 0.21$.**

Parameter	Description	Prior Distribution			Posterior Distribution						
		Type	Mean	S.D	Mean	S.D	2.50%	97.50%	NSE (8%)	p-value	B-GF
h	habit persistence	Beta	0.60	0.20	0.86	0.06	0.19	0.93	0.01	0.00	1.43
σ	inverse elasticity of intertemporal substitution in consumption	Gamma	1.00	0.50	1.05	0.43	0.27	2.19	0.11	0.00	1.68
ϕ	inverse of Frisch elasticity of labor supply	Gamma	1.50	0.25	1.44	0.24	1.05	2.03	0.01	0.06	1.00
η	elasticity of substitution between home made and foreign goods	Gamma	1.00	0.50	0.44	0.15	0.27	2.19	0.01	0.05	1.01
δ_H	degree of indexation in domestic-output markets	Beta	0.70	0.20	0.83	0.11	0.25	0.98	0.02	0.00	1.17
δ_F	degree of indexation in imported-goods markets	Beta	0.70	0.20	0.72	0.19	0.25	0.98	0.04	0.02	1.08
θ_H	degree of inflation persistence in domestic-output markets	Beta	0.50	0.20	0.96	0.01	0.13	0.87	0.00	0.00	1.04
θ_F	degree of inflation persistence in imported-goods markets	Beta	0.50	0.20	0.10	0.03	0.13	0.87	0.00	0.00	1.23
a_1	degree of persistence in foreign inflation	Beta	0.50	0.20	0.93	0.02	0.19	0.96	0.00	0.00	1.14
b_2	degree of persistence in foreign output	Beta	0.50	0.20	0.41	0.11	0.19	0.96	0.00	0.01	1.01
c_3	degree of persistence in foreign interest rate	Beta	0.50	0.20	0.68	0.09	0.19	0.96	0.00	0.64	1.00
ρ_a	degree of persistence in technology shock	Beta	0.50	0.20	0.89	0.05	0.13	0.87	0.01	0.11	1.02
ρ_q	degree of persistence in risk premium	Beta	0.90	0.20	0.81	0.25	0.23	1.00	0.06	0.00	1.16
ρ_s	degree of persistence in terms of trade	Beta	0.25	0.20	0.15	0.07	0.01	0.73	0.01	0.00	1.06
	Relative Policy Target Weights										
μ_q	real exchange-rate stabilisation	Gamma	0.50	0.30	0.16	0.07	0.09	1.24	0.01	0.01	1.09
μ_y	output gap stabilisation	Gamma	0.50	0.30	0.30	0.11	0.09	1.23	0.02	0.01	1.10
μ_r	interest-rate smoothing	Gamma	0.50	0.30	0.71	0.40	0.09	1.24	0.10	0.00	1.84
	Standard Deviation of Shock Innovations										
σ_H	domestic-output cost-push shock	Inverse Gamma	0.50	0.25	11.20	2.68	0.91	7.36	0.71	0.00	2.25
σ_F	imported-goods cost-push shock	Inverse Gamma	0.50	0.25	14.83	7.58	0.91	7.35	2.08	0.00	3.39
σ_a	technology shock	Inverse Gamma	1.00	0.40	8.15	1.96	0.52	2.66	0.51	0.00	2.53
σ_q	risk premium shock	Inverse Gamma	2.00	0.50	0.56	0.17	0.32	0.87	0.03	0.00	1.28
σ_s	terms of trade shock	Inverse Gamma	1.00	0.40	24.08	0.68	0.52	2.66	0.10	0.52	1.01
$\sigma_{\pi*}$	foreign inflation shock	Inverse Gamma	1.00	0.40	0.43	0.08	0.52	2.66	0.00	0.00	1.03
σ_{y*}	foreign output shock	Inverse Gamma	1.00	0.40	1.24	0.14	0.52	2.66	0.01	0.04	1.01
σ_{r*}	foreign interest rate shock	Inverse Gamma	1.00	0.40	0.42	0.07	0.52	2.66	0.00	0.93	1.00
σ_r	interest rate shock	Inverse Gamma	1.00	0.40	0.29	0.06	0.52	2.65	0.00	0.00	1.01

Note: The numerical standard error (NSE) as given in Geweke (1999). The p-value is computed using $L = 0.08$, i.e., an 8% autocovariance tapered estimate, as in Geweke (1999). The univariate Brooks-Gelman shrink factor (B-GF) as in Brooks and Gelman (1998).

Table 6: **Priors and Posterior Parameter Estimates for South Africa under incomplete Markets and Zero Weight on Real-Exchange Stabilisation, $\mu_q > 0$, $\alpha = 0.33$.**

Parameter	Description	Prior Distribution			Posterior Distribution						
		Type	Mean	S.D	Mean	S.D	2.50%	97.50%	NSE (8%)	p-value	B-GF
h	habit persistence	Beta	0.60	0.20	0.16	0.04	0.27	2.19	0.01	0.07	1.03
σ	inverse elasticity of intertemporal substitution in consumption	Gamma	1.00	0.50	0.64	0.10	0.27	2.19	0.02	0.74	1.00
ϕ	inverse of Frisch elasticity of labor supply	Gamma	1.50	0.25	2.08	0.28	1.05	2.03	0.03	0.00	1.05
η	elasticity of substitution between home made and foreign goods	Gamma	1.00	0.50	0.55	0.08	0.27	2.19	0.01	0.00	1.12
δ_H	degree of indexation in domestic-output markets	Beta	0.70	0.20	0.43	0.21	0.25	0.98	0.05	0.13	1.04
δ_F	degree of indexation in imported-goods markets	Beta	0.70	0.20	0.58	0.16	0.25	0.98	0.04	0.15	1.04
θ_H	degree of inflation persistence in domestic-output markets	Beta	0.50	0.20	0.25	0.05	0.13	0.87	0.01	0.63	1.00
θ_F	degree of inflation persistence in imported-goods markets	Beta	0.50	0.20	0.39	0.03	0.13	0.87	0.00	0.33	1.01
a_1	degree of persistence in foreign inflation	Beta	0.50	0.20	0.59	0.17	0.19	0.96	0.04	0.76	1.00
b_2	degree of persistence in foreign output	Beta	0.50	0.20	0.41	0.11	0.19	0.96	0.01	0.70	1.00
c_3	degree of persistence in foreign interest rate	Beta	0.50	0.20	0.68	0.13	0.19	0.96	0.01	0.66	1.00
ρ_a	degree of persistence in technology shock	Beta	0.50	0.20	0.84	0.05	0.13	0.87	0.01	0.20	1.02
ρ_q	degree of persistence in risk premium	Beta	0.90	0.20	0.98	0.03	0.23	1.00	0.00	0.00	1.08
ρ_s	degree of persistence in terms of trade	Beta	0.25	0.20	0.10	0.067	0.01	0.72	0.01	0.80	1.00
	Relative Policy Target Weights										
μ_y	output gap stabilisation	Gamma	0.50	0.30	0.16	0.07	0.10	1.24	0.02	0.04	1.06
μ_r	interest-rate smoothing	Gamma	0.50	0.30	0.52	0.19	0.10	1.24	0.05	0.10	1.00
	Standard Deviation of Shock Innovations										
σ_H	domestic-output cost-push shock	Inverse Gamma	0.50	0.25	0.90	0.19	0.91	7.35	0.023	0.00	1.09
σ_F	imported-goods cost-push shock	Inverse Gamma	0.50	0.25	1.16	0.60	0.91	7.33	0.11	0.81	1.00
σ_a	technology shock	Inverse Gamma	1.00	0.40	19.02	0.84	0.52	2.66	0.22	0.00	1.25
σ_q	risk premium shock	Inverse Gamma	2.00	0.50	17.10	2.35	0.32	0.87	0.64	0.00	2.15
σ_s	terms of trade shock	Inverse Gamma	1.00	0.40	20.54	0.69	0.52	2.66	0.16	0.28	1.02
$\sigma_{\pi*}$	foreign inflation shock	Inverse Gamma	1.00	0.40	0.28	0.04	0.52	2.66	0.00	0.41	1.00
σ_{y*}	foreign output shock	Inverse Gamma	1.00	0.40	1.22	0.13	0.52	2.66	0.01	0.49	1.00
σ_{r*}	foreign interest rate shock	Inverse Gamma	1.00	0.40	0.20	0.02	0.52	2.65	0.00	0.62	1.00
σ_r	interest rate shock	Inverse Gamma	1.00	0.40	0.27	0.04	0.52	2.66	0.00	0.90	1.000

Note: The numerical standard error (NSE) as given in Geweke (1999). The p-value is computed using $L = 0.08$, i.e., an 8% autocovariance tapered estimate, as in Geweke (1999). The univariate Brooks-Gelman shrink factor (B-GF) as in Brooks and Gelman (1998).

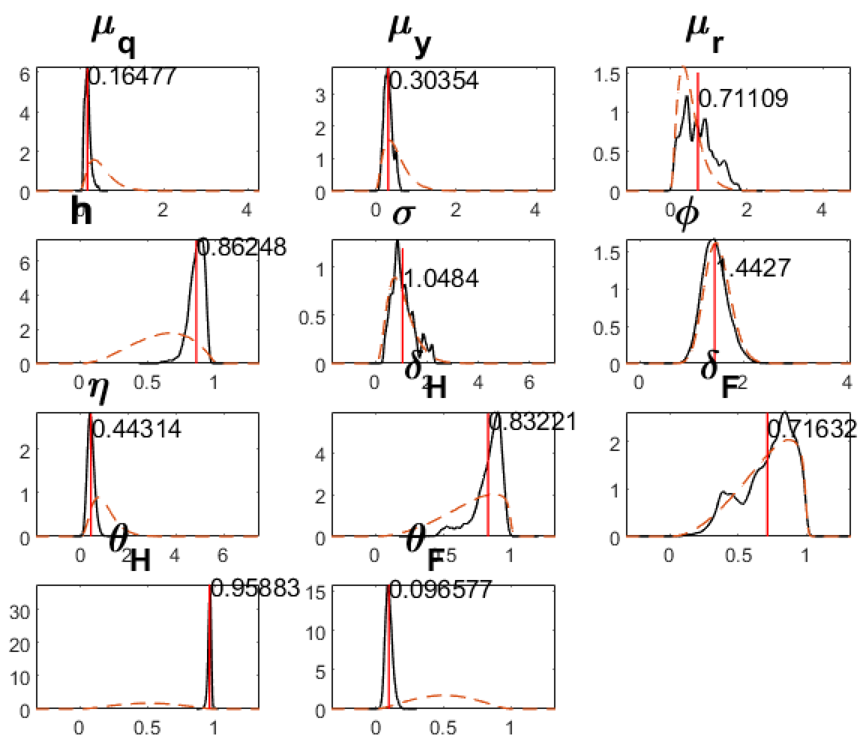

Figure 4: Prior and Posterior Distributions of Key Parameters for Ghana under Complete Markets and Positive Weight on Real Exchange-Rate stabilisation, $\mu_q > 0$. Posterior (solid) and Prior (dashed). Acceptance rate = 39.11%; log marginal likelihood is -1742.10, the highest across the 4 model versions estimated and, hence preferred estimation in terms of Bayesian model comparison.

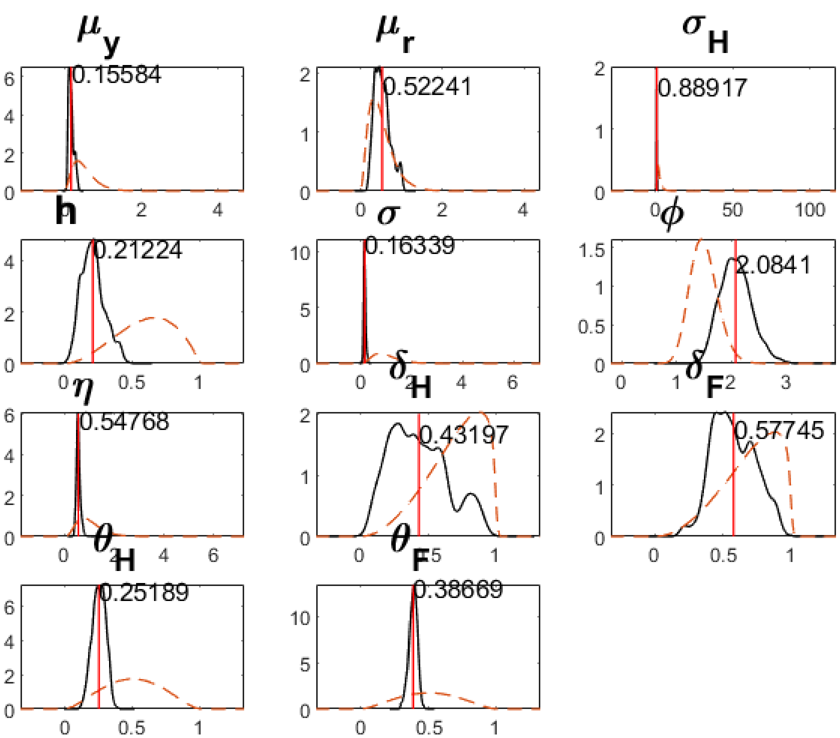

Figure 5: Posterior Distributions of Key Parameters for South Africa under Incomplete Markets and Zero Target Weight on Real Exchange-Rate Stabilisation, $\mu_q = 0$. Posterior (solid) and prior (dashed) Acceptance rate = 50.77%; log marginal likelihood is -1925.50, the highest across the 4 model versions estimated and, hence, preferred estimation in terms of Bayesian model comparison.

The inverse of the elasticity of intertemporal substitution in consumption, σ (or the coefficient of relative risk aversion) in Ghana and South Africa are 1.05 and 0.64, respectively (versus a prior of 1). The range for this parameter from the previous literature and the recent common sample is 0.22 to 2.54, respectively. The results reveal that Chile, Peru and South Africa have a high elasticity of intertemporal substitution in consumption[23] relative to other countries.

The parameter estimate of the inverse of the Frisch elasticity of intertemporal labor supply,[24] ϕ, in the previous literature and the recent common sample period has ranged between 1.26 and 2.08. Ghana and South Africa's parameter estimates are 1.44 and 2.08 respectively. Brazil recorded the lowest value for this parameter estimate for the 10 IT countries surveyed in this paper. In complete asset markets, purely transitory wage-rate changes should have no impact on the marginal utility of wealth. The Frisch elasticity of labor supply is important in explaining the impact of transitory tax or productivity shocks and predictable life-cycle patterns on wage rates. There is no consensus in the literature on the size of the Frisch elasticity of labor supply. Quantitative macroeconomic models tend to require relatively large values for the Frisch elasticity of labor supply, but the microeconomic literature typically estimates smaller values for this parameter. The relatively lower value for the inverse of the Frisch elasticity of intertemporal labor supply of Ghana compared to the other countries points to a larger reaction of changes in the labor supply in Ghana due to changes in net real wages.

Another important structural parameter estimated is the elasticity of substitution between home and foreign goods, η. It links the time series variation in exports and imports to movements in the terms of trade.[25] The

[23] It measures the sensitivity of consumption to a change in real interest-rate expectations. The literature on the probable values of EISC is conflicting. Guvenen (2006) indicated that whilst the growth literature suggests an EISC value close to 1, the empirical consumption literature pointed to a value close to zero.

[24] Following Bredemeier et al. (2019), the Frisch elasticity of intertemporal labor supply measures the percentage change in labor hours worked due to a one percentage change in the net wage rate holding the marginal utility of wealth constant. This measure reflects changes in labor supply emanating from wage rate changes that lead to pure intertemporal substitution effects but no income effects.

[25] The international macroeconomics literature has used this parameter to determine the business cycle effects of certain macroeconomics shocks, in which a low elasticity between home and foreign goods explained short-term fluctuations in international relative prices

Table 7: Comparison with Posterior Mean Parameter Estimates in Previous Studies When Re-Estimated in the Preferred Model Version for the Common Recent Sample (2009:Q1–2021Q4)

Country	h	σ	ϕ	η	δ_H	δ_F	θ_H	θ_F	a_1	b_2	c_3	ρ_a	ρ_q	ρ_s
Australia	0.92	1.07	1.51	0.23	0.71	0.42	0.92	0.89	0.85	0.44	0.71	0.72	0.93	0.41
Canada	0.86	0.93	1.51	0.93	0.43	0.63	0.89	0.46	0.87	0.44	0.70	0.33	0.86	0.21
New Zealand	0.90	1.46	1.50	1.89	0.77	0.52	0.90	0.36	0.81	0.42	0.81	0.70	0.87	0.43
Brazil	0.61	0.22	1.26	0.35	0.56	0.86	0.66	0.97	0.91	0.41	0.70	0.56	0.89	0.98
Chile	0.73	0.93	1.47	1.25	0.94	0.66	0.90	0.66	0.92	0.42	0.79	0.28	0.61	0.20
Colombia	0.76	0.61	1.32	0.27	0.72	0.48	0.69	0.96	0.93	0.40	0.74	0.38	0.70	0.96
Mexico	0.68	2.54	1.50	0.84	0.86	0.72	0.89	0.42	0.72	0.41	0.70	0.66	0.84	0.25
Peru	0.66	1.00	1.47	0.85	0.84	0.66	0.89	0.24	0.73	0.43	0.65	0.50	0.90	0.30
Ghana	0.86	1.05	1.44	0.44	0.83	0.72	0.96	0.10	0.93	0.41	0.68	0.89	0.81	0.15
South Africa	0.21	0.16	2.08	0.55	0.43	0.58	0.25	0.39	0.59	0.41	0.68	0.84	0.98	0.10

range of estimates for this parameter from previous studies and computations in this paper is between 0.23 and 1.89. Ghana and South Africa's parameter estimates are 0.44 and 0.55, respectively, and are within this range.

Inflation persistence estimates for both domestic-output markets θ_H and imported-goods markets θ_F, known as Calvo-pricing parameters, in previous studies and in this paper range between 0.18 and 0.98 for θ_H and between 0.07 and 0.96 for θ_F. The estimates of θ_H for Ghana and South Africa are 0.96 and 0.25, respectively, and are consistent with the referenced literature. The estimates of θ_F for Ghana and South Africa of 0.10 and 0.39, respectively, although comparatively lower for Ghana, are also in line with the results of previous studies and in this work.

The backward-looking parameters of the New Keynesian Philips Curve, that is, the degree of indexation of the domestic-output markets (δ_H) and the degree of indexation of the imported-goods markets (δ_F,) were also estimated. δ_H was 0.83 and 0.43 for Ghana and South Africa, respectively, and the range

such as terms of trade and real exchange rates, see Crucini and Davis (2016).

Table 8: Comparison with Posterior Mean Parameter Estimates in the Original Previous Studies

Country	h	σ	ϕ	η	δ_H	δ_F	θ_H	θ_F	a_1	b_2	c_3	ρ_a	ρ_q	ρ_s
Australia	0.93	1.03	1.49	0.22	0.40	0.05	0.80	0.72	0.26	0.75	0.89	0.73	0.70	0.85
Canada	0.91	1.29	1.46	0.48	0.66	0.87	0.92	0.85	0.27	0.72	0.90	0.37	0.73	0.26
New Zealand	0.81	1.31	1.59	0.92	0.17	0.08	0.77	0.68	0.24	0.72	0.89	0.62	0.71	0.72
Brazil	0.30	1.82	1.51	1.18	0.85	0.80	0.93	0.07	0.93	0.79	0.83	0.80	0.90	0.32
Chile	0.91	0.20	1.87	0.11	0.39	0.27	0.60	0.61	0.98	0.75	0.89	0.27	0.88	0.72
Colombia	0.40	1.77	1.49	0.79	0.77	0.14	0.95	0.31	0.94	0.75	0.83	0.60	0.86	0.21
Mexico	0.37	1.15	1.47	0.67	0.87	0.63	0.98	0.92	0.97	0.82	0.82	0.64	0.66	0.33
Peru	0.38	0.01	1.58	1.22	0.75	0.38	0.18	0.52	0.80	0.85	0.74	0.86	0.71	0.30

of estimates from previous studies and this work is between 0.17 and 0.94. δ_F is 0.72 and 0.58 for Ghana and South Africa, respectively, and the range of this parameter estimate from previous studies and this paper is between 0.14 and 0.86. The estimates of the backward-looking parameters of the NKPC are within the ranges obtained from previous studies.

5.5. Estimated Persistence and Volatility of Shock Processes

The persistence and shock innovations parameters are worth comparing in a brief summary, too. For Ghana, the autoregressive persistence parameters were in the range of 0.15 and 0.93, which does not appear excessive.

The parameters for the standard deviation of the shock processes are particularly high for the imported-goods cost-push, technology shock, and the terms of trade shock when compared with their priors for Ghana. For South Africa, we also observe very high mean estimates of the standard deviation of the shock processes for the technology shock and the terms of trade shock compared to other shocks and their respective priors.

The parameter estimates of the shock processes for Ghana and South Africa are comparable with those obtained in our re-estimated later sample for earlier similar studies.

6. Concluding Remarks

Our empirical results based on NK SOE DSGE theory confirm that Ghana and South Africa are committed to their mandates for price stability. Ghana's relative weight (that is, out of 100%), assigned to inflation stabilization in the actual implementation of monetary policy, is 46%, while South Africa's relative weight is even higher, 60%. The results of the previous original studies and the recent common sample period for 10 IT countries had estimated weights for the inflation stabilisation parameter between 36%, for Peru in McKnight et al. (2020), and 63% for Mexico in McKnight et al. (2020) and for Australia in our recent common sample period estimations. Thus, the weights we found for Ghana and South Africa fall well within this range.

Concerning whether other policy targets are also important for the AfITs, in their deeds if not always in their legal mandates, we conclude that interest rate smoothing, with a relative weight of 33%, comes second to inflation stabilization as a policy preference for Ghana. This is the highest weight among IT central banks according to the recent common sample estimates we compiled. Output stabilisation is not as important for Ghana, but remains a significant consideration, with a relative weight of 14%. For South Africa also, in addition to inflation stabilization, interest-rate inertia emerges as the next important policy concern, with a weight of 31%, followed by output-gap stabilization, with a weight of 9%. South Africa's focus on interest-rate smoothing is second only to Ghana among the 10 IT countries in the comparative analysis in the common recent sample we presented. Ghana and South Africa, as expected from IT central banks, placed the least weight out of the four typical monetary policy options we studied on stabilization of the real exchange-rate. South Africa joins Australia, Brazil, and Colombia, as the 4 IT countries to have completely ignored exchange-rate fluctuations in our common updated sample of 2009:Q1–2021:Q4 according to our Bayesian model comparison.

The average weight of AfITs for inflation stabilisation of 53% is the highest among the three country groups compared to the average weight of 51% and 48% for the LAITs and ACITs, respectively, estimated over the same period and via the same DSGE model.

The second preferred policy option for the AfITs after inflation stabilization is interest-rate smoothing, with an average weight of 32%, followed by output-gap stabilization, with an average weight of 12%. The least preferred policy target for AfITs was found to be real exchange-rate stabilization, with an average policy weight of 4%, the lowest among the averages of the IT country groups.

The most preferred policy option of the ACITs in the recent common sample remains price stability, with an average weight of 48%, followed by output-gap stabilization and interest-rate smoothing which were equally weighted at 19%. Unlike previous results in the literature, where ACITs did not care at all about exchange-rate stabilization in an analogous DSGE estimation, our study now uncovers a significant weight of 14% for the updated sample period we used, which excludes the Global Financial Crisis, but captures the most affected quarters of the COVID-19 pandemic.

The second important policy target of the LAIT central banks after inflation stabilization is output-gap stabilization, with an average weight of 20% in the common recent sample. This preference is followed by exchange-rate stabilization, with an average weight of 16%. The least preferred policy target is the smoothing of the interest-rate with an average weight of 13%. Compared with previous results in the literature, we observed a clear drop in the central bank preferences in the ACITs and LAITs for interest-rate smoothing and an evident increase in the policy preference for exchange-rate stabilization.

All three regional groups revealed their primary preference for inflation stabilization as a policy option. Although the AfITs and, much less so, now the ACITs in the common recent sample came out as least relying on exchange-rate stabilization, the rankings of the two other policy options between the the LAITs and ACITs were mixed with the AfITs showing clear preference to interest-rate smoothing after inflation stabilization.

No matter the many plausible results that came out of our present work, it remains limited and interpretations should be cautious, with a need for further updates of the data sample and possibly additional details in the underlying theoretical model. We would mention weaknesses in at least the following three dimensions that will need revisiting and refinements: (1) the data sample, 2009:Q1-2021:Q4, remains relatively short, and it also captures an unprecedented period of turbulence, the COVID-19 pandemic near the end of the sample, 2020:Q1-2021:Q4; (2) the estimation diagnostics could be improved in most of the considered IT countries; (3) more IT countries could be added in the comparative analysis.

APPENDIX: FOR ONLINE PUBLICATION

Appendix A. The Model Economy

The model in this section employs the dominant framework developed in prior research for a SOE by Schmitt-Grohé and Uribe (2003), Galí and Monacelli (2005), Monacelli (2005), Kam et al. (2009), Justiniano and Preston (2010), and McKnight et al. (2020), expanding over the years from small- to medium-scale DSGE models and from their calibration to estimation. As this economy is an infinitesimally small part of the world economy, its output does not have a significant impact on the rest of the world (RoW). Ghana and South Africa, on which we focus here, suit well in this sense the role of the SOE, respectively, and the United States of America (USA), similarly, is an approximation for the RoW, which is common in related work.

The domestic SOE is inhabited by four categories of rational and forward-looking agents. These are infinitely-lived households, domestic-goods producers, foreign-goods importing retail firms and a central bank. The retail firms are assumed to import goods at competitive world prices and they, as well as the domestic-goods producers, operate under monopolistic competition and set prices in a Calvo (1983) staggered-fashion.

Following Monacelli (2005) and the subsequent literature, we assume that the law of one price does not hold due to market power in the retail sector, which results in incomplete exchange-rate pass-through (ERPT). International financial markets can be complete (CAM) or incomplete (IAM), which gives rise to two model versions, as will be described. As in Kam et al. (2009) and McKnight et al. (2020), the SOE inflation targeting central bank is treated as an optimizing agent who uses discretion in each petiod t to minimize a quadratic loss function by placing the preferred weights on inflation stabilization, output stabilization, real exchange-rate stability and interest-rate smoothing.

As is standard, households seek to maximize their discounted lifetime expected utility by consuming and supplying labor and capital to firms, while firms produce goods and aim to maximize discounted expected profit through their pricing decisions. Variables without an i-index refer to the SOE being modeled and variables with an $i \in [0, 1]$ subscript are used to refer to economy i, which is one of among a continuum of SOEs that make up the world economy. Variables with a star superscript refer to the world economy as a whole, and subscripts H and F denote variables of home and foreign origin, respectively.

Appendix A.1. Households

The SOE is inhabited by a representative household that seeks to maximize the following expected discounted utility function:

$$E_0 \sum_{t=0}^{\infty} \beta^t U(C_t, H_t, N_t) \tag{A.1}$$

where $\beta \in (0,1)$ is the discount factor and N_t represents hours of labor in period t. The household receives income in the form of wages, W_t, and $H_t = hC_{t-1}$ denotes external habit, with $h \in [0,1]$ capturing the degree of habit persistence. The household also receives profits, Π_t, from ownership of domestic retail firms. C_t is a composite consumption index defined by:

$$C_t = \left[(1-\alpha)^{1/\eta} (C_{H,t})^{\frac{\eta-1}{\eta}} + \alpha^{1/\eta} (C_{F,t})^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta-1}{\eta}} \tag{A.2}$$

In the above equation, $C_{H,t}$ represents real consumption of domestic goods, $C_{F,t}$ real consumption of imported goods, $\eta > 0$ is the elasticity of substitution between domestic and foreign goods, and $\alpha \in [0,1]$ defines the weight of foreign goods in the composite consumption basket.

The utility function is assumed to have the following functional form:

$$U(C_t, H_t, N_t) = \frac{(C_t - H_t)^{1-\sigma}}{1-\sigma} - \frac{N_t^{1+\phi}}{1+\phi} \tag{A.3}$$

where $\sigma, \phi > 0$ are the inverse elasticities of intertemporal substitution of consumption and labor supply, respectively.

Next we define $C_{H,t}$ and $C_{F,t}$ as follows:

$$C_{H,t} = \left[\int_0^1 C_{H,t}(i)^{\frac{\epsilon-1}{\epsilon}} di \right]^{\frac{\epsilon-1}{\epsilon}}, \quad C_{F,t} = \left[\int_0^1 C_{F,t}(j)^{\frac{\epsilon-1}{\epsilon}} dj \right]^{\frac{\epsilon-1}{\epsilon}} \tag{A.4}$$

where $i, j \in [0,1]$ denote differentiated domestic and foreign goods, respectively, and $\varepsilon > 1$ denotes the elasticity of substitution between the varieties of goods produced domestically and abroad.

It is standard that the optimal consumption demand of domestic and foreign goods can be derived respectively as:

$$C_{H,t} = (1-\alpha)\left(\frac{P_{H,t}}{P_t}\right)^{-\eta} C_t, \quad C_{F,t} = \alpha\left(\frac{P_{F,t}}{P_t}\right)^{-\eta} C_t \tag{A.5}$$

where $P_{H,t}$ and $P_{F,t}$ represent the domestic-output price index and the imported-goods price index, respectively, defined as follows:

$$P_{H,t} = \left[\int_0^1 P_{H,t}(i)^{1-\epsilon} di\right]^{\frac{1}{1-\epsilon}}, \quad P_{F,t} = \left[\int_0^1 P_{F,t}(j)^{1-\epsilon} dj\right]^{\frac{1}{1-\epsilon}} \tag{A.6}$$

The optimal allocation of household expenditure across each good type results in the following demand functions:

$$C_{H,t}(i) = \left(\frac{P_{H,t}(i)}{P_{H,t}}\right)^{-\varepsilon} C_{H,t}, \quad C_{F,t}(j) = \left(\frac{P_{F,t}(j)}{P_{F,t}}\right)^{-\varepsilon} C_{F,t}, \tag{A.7}$$

Substituting the above indices into the composite consumption index (C_t) yields the consumer price index (P_t) as follows:

$$P_t = \left[(1-\alpha)P_{H,t}^{1-\eta} + \alpha P_{F,t}^{1-\eta}\right]^{\frac{1}{1-\eta}} \tag{A.8}$$

If we let P_t^* denote the rest of the world consumer price index and $\tilde{e}_t$ the home nominal exchange rate, we can the define the conventional real exchange rate for the domestic economy, $\tilde{q}_t$ as:

$$\tilde{q}_t = \tilde{e}_t \frac{P_t^*}{P_t} \tag{A.9}$$

and the home terms of trade (ToT):

$$S_t = \frac{P_{F,t}}{P_{H,t}} \tag{A.10}$$

Following McKnight et al. (2020), we incorporate the presence of international financial markets, distinguishing between complete asset markets

(CAM)[26] versus incomplete asset markets (IAM), in two model versions.

Appendix A.1.1. Incomplete Asset Markets

We first describe the IAM case. In it, let B_{t-1} and B^*_{t-1} represent the quantities of bond holdings of domestic and foreign risk free bonds respectively that mature in period t with nominal interest rates of $\tilde{r}_t$ and $\tilde{r^*_t}$ respectively.

We assume the only assets available to households are one-period domestic and foreign bonds, therefore household optimization occurs subject to the following budget constraint:

$$P_tC_t+B_t+\tilde{e}_tB^*_t = B_{t-1}(1+\tilde{r}_{t-1})+\tilde{e}_tB^*_{t-1}(1+\tilde{r^*}_{t-1})\phi_t(D_t)+W_tN_t+\Pi_t \quad (A.11)$$

where Π_t is the profit a household earns from ownership of domestic and imported goods firms and $\phi_t(.)$ is a function that represents a debt-elastic interest-rate premium defined as follows:

$$\phi_t = exp[-\chi(D_t + \tilde{\phi}_t] \quad (A.12)$$

where $\tilde{\phi}_t$ is the risk premium shock and

$$A_t = \frac{\tilde{e}_{t-1}B^*_{t-1}}{Y_{ss}P_{t-1}} \quad (A.13)$$

represents the ratio of the real quantity of foreign bond holdings to steady-state output, Y_{ss}, expressed in SOE's currency. The functional form of the debt-elastic interest-rate premium is such that, as in Schmitt-Grohé and Uribe (2003), stationarity of the level of foreign debt is ensured in the log-linear approximation to the model.

The household optimization problem under IAM requires that three first-order conditions be satisfied. First, the intratemporal condition that relates labor supply to the real wage requires that the marginal rate of substitution between consumption and leisure must equal the marginal product of labor. This intratemporal labor supply condition is expressed as follows:

[26]Following Benigno (2009), this market is one in which domestic and foreign households can trade in a set of risk-free securities that deliver one unit of the home and/or foreign currency in each state of nature.

$$(C_t - H_t)^{\sigma} N_t^{\phi} = \frac{W_t}{P_t} \tag{A.14}$$

Second, the optimal household decision making yields the familiar stochastic intertemporal consumption Euler equation:

$$\beta(1+\tilde{r}_t)\mathbb{E}_t\left\{\left(\frac{C_{t+1}-H_{t+1}}{C_t-H_t}\right)^{-\sigma}\left(\frac{P_t}{P_{t+1}}\right)\right\} = 1 \tag{A.15}$$

Third, the interest-rate parity condition yields:

$$\mathbb{E}_t\left\{\frac{(C_{t+1}-H_{t+1})^{-}\sigma}{P_{t+1}}\left[(1+\tilde{r}_t)-(1+\tilde{r}_t^*)\left(\frac{\tilde{e}_{t+1}}{\tilde{e}_t}\right)\phi_t(D_t,\tilde{\phi}_t)\right]\right\} = 0 \tag{A.16}$$

Appendix A.1.2. Complete Asset Markets

Now, assuming identical global preferences and CAM, the interest-rate parity condition yields a perfect risk-sharing condition for all dates and states:

$$\left(\frac{C_{t+1}-H_{t+1}}{C_t-H_t}\right)^{-\sigma}\left(\frac{P_t}{P_{t+1}}\right) = \left(\frac{C^*_{t+1}-H^*_{t+1}}{C^*_t-H^*_t}\right)^{-\sigma}\left(\frac{P^*_t}{P^*_{t+1}}\right)\left(\frac{\tilde{e}_{t+1}}{\tilde{e}_t}\right) \tag{A.17}$$

Re-arranging, the above equation becomes:

$$\frac{\left(\frac{C^*_{t+1}-H^*_{t+1}}{C^*_t-H^*_t}\right)^{-\sigma}}{\left(\frac{C_{t+1}-H_{t+1}}{C_t-H_t}\right)^{-\sigma}} = \frac{\frac{P^*_{t+1}\tilde{e}_{t+1}}{P_{t+1}}}{\frac{P^*_t\tilde{e}_t}{P_t}} = \frac{\tilde{q}_{t+1}}{\tilde{q}_t} \tag{A.18}$$

We can interpret the above equation arising under CAM in the sense that real exchange-rate growth equates to the marginal rate of substitution in consumption growth across countries. Thus, CAM incorporates perfect risk sharing, whereas under an IAM there is a higher domestic-inflation to output-gap trade-off. Alonso-Carrera and Kam (2016) show that the equilibrium policy trade-off between domestic inflation and the output gap can be steeper under IAM than CAM.

Appendix A.2. Domestic-Goods Producers

The domestic-goods market is made up of a continuum of monopolistically competitive firms $i \in [0,1]$ that produce differentiated goods. These firms hire labor to produce output using a linear production technology:

$$Y_{H,t}(i) = \epsilon_{a,t} N_t(i) \tag{A.19}$$

where $\epsilon_{a,t}$ is an exogenous domestic technology shock. Domestic firms are assumed to set prices optimally using Calvo (1983) in each period, t, with probability $1-\theta_H$. The remaining fraction $\theta_H \in [0,1]$ of firms partially adjust their prices following the domestic price index:

$$P_{H,t}(i) = P_{H,t-1}(i) \left(\frac{P_{H,t-1}}{P_{H,t-2}} \right)^{\delta_H} \tag{A.20}$$

All firms receive the same signal to reset prices or do not receive any signal and therefore pursue the same pricing strategies. The evolution of the aggregate price index of domestic goods assumes a Calvo price setting as follows:

$$P_{H,t} = \left\{ (1-\theta_H)(\tilde{P}_{H,t})^{1-\varepsilon} + \theta_H \left[P_{H,t-1} \left(\frac{P_{H,t-1}}{P_{H,t-2}} \right)^{\delta_H} \right]^{1-\varepsilon} \right\} \tag{A.21}$$

where $\delta_H \in [0,1]$ measures the *degree of inflation indexation.* Let firm i set its price at time t, optimally as $P_{H,t}(i)$. At time t+s, for $s \geq 0$ if the price $P_{H,t}(i)$ still prevails, then the firm will face market demand for its product which takes into account the inflation indexation between time t and t+s based on the following constraint:

$$Y_{H,t+s}(i) = \left[\frac{P_{H,t}(i)}{P_{H,t+s}} \left(\frac{P_{H,t+s-1}}{P_{H,t-1}} \right)^{\delta_H} \right]^{-\varepsilon} (C_{H,t+s} + C^*_{H,t+s}) \tag{A.22}$$

A domestic firm i that is faced with changing its price at time t, chooses $P_{H,t}(i)$ to maximize the present value of the stochastic stream of profits as follows:

$$\max_{P_{H,t}(i)} \mathbb{E}_t \sum_{n=0}^{\infty} Q_{t,t+s}\theta_H^s Y_{H,t+s}(i) \Bigg[P_{H,t}(i) \left(\frac{P_{H,t+s-1}}{P_{H,t-1}} \right)^{\delta_H} - \\ P_{H,t+s} MC_{H,t+s} exp(\epsilon_{H,t+s}) \Bigg] \tag{A.23}$$

where $\epsilon_{H,t} \sim i.i.d(0, \sigma_H)$ is the *independent cost-push shock to domestic goods producers* and represents the structural shock to real marginal cost, with the real marginal cost defined as:

$$MC_{H,t+s} = \frac{W_{t+s}}{\epsilon_{a,t+s} P_{H,t+s}}. \tag{A.24}$$

Finally, the first order necessary condition for domestic firms' optimal pricing is given as:

$$\max_{P_{H,t}(i)} \mathbb{E}_t \sum_{n=0}^{\infty} Q_{t,t+s}\theta_H^s Y_{H,t+s}(i) \Bigg[\tilde{P}_{H,t}(i) \left(\frac{P_{H,t+s-1}}{P_{H,t-1}} \right)^{\delta_H} - \\ \left(\frac{\varepsilon}{\varepsilon - 1} \right) P_{H,t+s}(i) MC_{H,t+s} exp(\epsilon_{H,t+s}) \Bigg] = 0 \tag{A.25}$$

Appendix A.3. Import Retail Firms

Assuming a continuum of monopolistically competitive import retailers $j \in [0, 1]$ who add markups to differentiated goods imported at competitive world market prices. These retail firms price similarly to domestic goods producers following Calvo optimal pricing methods and partial inflation indexation for firms that do not set their prices optimally. The pricing behavior of import retailing firms is similar to domestic goods producing firms with the imports price index as follows:

$$P_{F,t} = \left\{ (1-\theta_F)(\tilde{P}_{F,t})^{1-\varepsilon} + \theta_F \left[P_{F,t-1} \left(\frac{P_{F,t-1}}{P_{F,t-2}} \right)^{\delta_H} \right]^{1-\varepsilon} \right\}^{1-\varepsilon} \tag{A.26}$$

The import retail firm j at time t+s, for $s \geq 0$ faces a product demand as follows:

$$Y_{F,t+s}(j) = \left[\frac{P_{F,t}(j)}{P_{F,t+s}} \left(\frac{P_{F,t+s-1}}{P_{F,t-1}} \right)^{\delta_H} \right]^{-\varepsilon} C_{F,t+s}. \tag{A.27}$$

An import retail firm j, faced with changing its price at time t for a good imported at a cost of $\tilde{e}_t P^*_{F,t}(j)$ would maximize its expected discounted value of profits as follows:

$$\max_{P_{F,t}(j)} \mathbb{E}_t \sum_{n=0}^{\infty} Q_{t,t+s} \theta_F^s Y_{F,t+s}(j) \left[P_{F,t}(j) \left(\frac{P_{F,t+s-1}}{P_{F,t-1}} \right)^{\delta_H} - \tilde{e}_{t+s} P^*_{F,t+s}(j) exp(\epsilon_{F,t+s}) \right] \tag{A.28}$$

This optimization equation is subject to the product demand constraint, $Y_{F,t+s}(j)$ where $\epsilon_{F,t} \sim i.i.d(0, \sigma_H)$ is the *cost-push shock* that import retail firms face.

Finally the first order necessary condition that characterized import retail firms pricing behavior is specified as:

$$\max_{P_{H,t}(j)} \mathbb{E}_t \sum_{n=0}^{\infty} Q_{t,t+s} \theta_F^s Y_{F,t+s}(j) \left[\tilde{P}_{F,t}(j) \left(\frac{P_{F,t+s-1}}{P_{F,t-1}} \right)^{-\delta_H} - \left(\frac{\varepsilon}{\varepsilon - 1} \right) \tilde{e}_{t+s} P_{F,t+s}(j) exp(\epsilon_{F,t+s}) \right] = 0 \tag{A.29}$$

Appendix A.4. Market Clearing

The market clearing condition in the goods market in the small open economy requires that domestic output must equal total domestic and foreign demand for home produced goods. This is expressed as follows:

$$Y_{H,t}(i) = C_{H,t}(i) + C^*_{H,t}(i) \tag{A.30}$$

Substituting demand functions for the households from equation (A.4) yields the goods market clearing condition for domestic firms as:

$$Y_{H,t}(i) = \left(\frac{P_{H,t}(i)}{P_{H,t}}\right)^{-\varepsilon} [C_{H,t} + C^*_{H,t}] \tag{A.31}$$

$$Y_t \equiv \int_0^1 Y_{H,t}(i)di = C_{H,t} + C^*_{H,t} \tag{A.32}$$

where $C^*_{H,t} = \alpha \left(\frac{P^*_{H,t}}{P^*_t}\right)^{-\eta} C^*_t \quad \text{and } Y^*_t = C^*_t$

Finally, the domestic bond market is cleared by assuming that the net supply of domestic debt is zero so that:

$$B_t = 0 \tag{A.33}$$

for all t.

Appendix B. Raw Data for Ghana and South Africa

Figures B.6 and B.7 show trends in the raw data for Ghana and South Africa, respectively. Real GDP was growing steadily in both countries but dropped sharply in South Africa and the USA in 2020 due to the impact of the COVID-19 pandemic. Notably, real GDP did not drop in Ghana during the pandemic but grew at a slower pace. CPI inflation showed similar trends for Ghana and South Africa, yet in the latter case it was more volatile. Both the nominal and the real exchange rate for the Ghanaian cedi and the South African rand showed similar trends, with the nominal rates depreciating over the sample period. By contrast, both currencies experienced real appreciation between 2016 and 2018 and after 2020. Money market rates for both Ghana and South Africa have declined since 2016, similarly US money market rates have declined since 2019. Ghana's terms of trade declined between 2017 and 2020 but rose after that. South Africa's terms of trade has generally declined between 2014 and 2020 but started increasing afterwards.

Figure B.6: Raw Data for Ghana

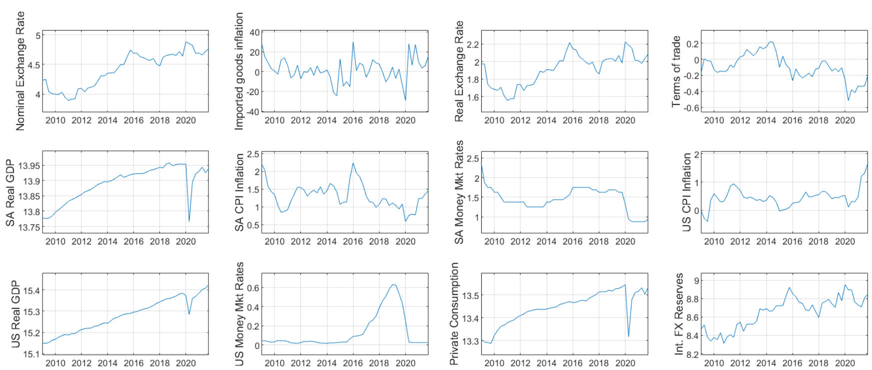

Figure B.7: Raw Data for South Africa

Appendix C. Priors and Posterior Distributions of Key Parameters for IT Countries in Past Studies Now Updated to the Common Recent Sample, 2009:Q1–2021:Q4

Table C.9: Posterior Estimates: Australia – Common Recent Sample (2009:Q1–2021:Q4), $\alpha = 0.30$.

	Post Mean	Post SD	2.5%	97.5%	NSE(8%)	p-value	B-GF
h	0.92	0.13	0.19	0.93	0.03	0.00	1.22
σ	1.07	0.36	0.27	2.19	0.08	0.22	1.03
ϕ	1.51	0.25	1.05	2.03	0.01	0.51	1.00
η	0.23	0.20	0.27	2.19	0.03	0.00	1.15
δ_H	0.71	0.23	0.25	0.98	0.05	0.01	1.10
δ_F	0.42	0.20	0.25	0.98	0.04	0.16	1.03
θ_H	0.92	0.03	0.13	0.87	0.01	0.57	1.00
θ_F	0.89	0.06	0.13	0.87	0.01	0.00	1.16
a_1	0.85	0.05	0.19	0.96	0.01	0.00	1.09
b_2	0.44	0.12	0.19	0.96	0.00	0.05	1.00
c_3	0.71	0.08	0.19	0.96	0.01	0.59	1.00
ρ_a	0.72	0.15	0.13	0.87	0.03	0.98	1.00
ρ_q	0.93	0.09	0.24	1.00	0.01	0.21	1.02
ρ_s	0.41	0.26	0.01	0.72	0.06	0.09	1.05
μ_y	0.30	0.14	0.09	1.24	0.03	0.04	1.06
μ_r	0.30	0.15	0.09	1.24	0.03	0.62	1.00
σ_H	2.51	0.54	0.91	7.34	0.06	0.21	1.01
σ_F	8.35	2.79	0.91	7.33	0.70	0.00	1.57
σ_a	0.38	0.09	0.52	2.67	0.00	0.92	1.00
σ_q	1.58	0.37	0.32	0.87	0.03	0.57	1.00
σ_s	0.60	0.10	0.52	2.65	0.01	0.00	1.03
$\sigma_{\pi *}$	0.43	0.10	0.52	2.66	0.01	0.00	1.06
σ_{y*}	1.06	0.13	0.52	2.66	0.01	0.00	1.01
σ_{r*}	0.43	0.07	0.52	2.65	0.00	0.90	1.00
σ_r	0.40	0.08	0.52	2.65	0.01	0.03	1.03

Note: Preferred model version in the Bayesian model comparison is the one under complete markets and zero target weight on real exchange-rate stabilization, $\mu_q = 0$. The numerical standard error (NSE) as given in Geweke (1999). The p-value is computed using $L = 0.08$, i.e., an 8% autocovariance tapered estimate, as in Geweke (1999). The univariate Brooks-Gelman shrink factor (B-GF) as in Brooks and Gelman (1998).

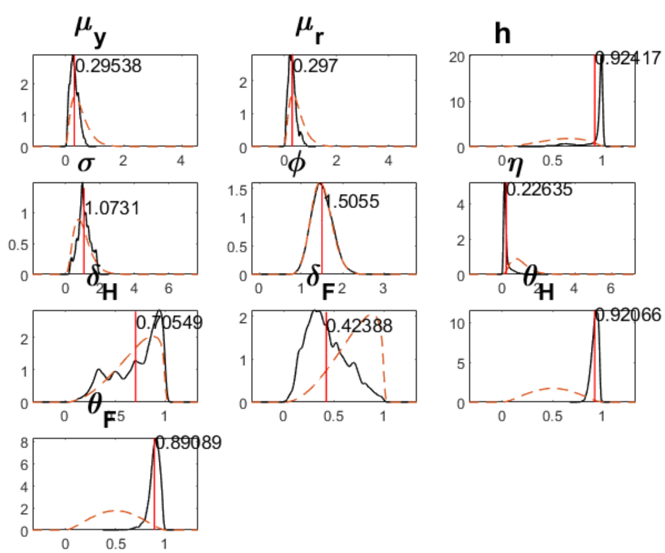

Figure C.8: Prior and Posterior Distributions of Key Parameters for Australia – Common Recent Sample (2009:Q1–2021:Q4). Posterior (solid); prior (dashed).

Table C.10: Posterior Estimates: Brazil – Common Recent Sample (2009:Q1–2021:Q4), $\alpha = 0.17$.

	Post Mean	Post SD	2.5%	97.5%	NSE(8%)	p-value	B-GF
h	0.61	0.14	0.19	0.93	0.02	0.03	1.06
σ	0.22	0.10	0.27	2.19	0.02	0.90	1.00
ϕ	1.26	0.23	1.05	2.03	0.02	0.21	1.00
η	0.35	0.21	0.27	2.19	0.03	0.00	1.07
δ_H	0.56	0.20	0.25	0.98	0.05	0.00	1.15
δ_F	0.86	0.12	0.25	0.98	0.02	0.53	1.01
θ_H	0.66	0.09	0.13	0.87	0.02	0.00	1.18
θ_F	0.97	0.01	0.13	0.87	0.00	0.07	1.03
a_1	0.91	0.01	0.19	0.96	0.00	0.56	1.00
b_2	0.41	0.11	0.19	0.96	0.00	0.19	1.00
c_3	0.70	0.09	0.19	0.96	0.00	0.50	1.00
ρ_a	0.56	0.29	0.13	0.87	0.07	0.00	1.20
ρ_q	0.89	0.14	0.24	1.00	0.03	0.11	1.04
ρ_s	0.98	0.02	0.01	0.72	0.00	0.00	1.14
μ_y	0.66	0.28	0.09	1.24	0.07	0.29	1.02
μ_r	0.18	0.15	0.09	1.24	0.03	0.07	1.05
σ_H	0.74	0.18	0.91	7.33	0.03	0.00	1.08
σ_F	1.36	1.45	0.91	7.37	0.36	0.00	1.16
σ_a	0.31	0.07	0.52	2.66	0.00	0.28	1.00
σ_q	5.67	1.20	0.32	0.87	0.27	0.91	1.00
σ_s	1.56	0.31	0.52	2.66	0.05	0.16	1.02
$\sigma_{\pi*}$	0.87	0.17	0.52	2.66	0.01	0.17	1.01
σ_{y*}	1.20	0.14	0.52	2.66	0.01	0.94	1.00
σ_{r*}	0.40	0.07	0.52	2.65	0.00	0.92	1.00
σ_r	0.30	0.06	0.52	2.66	0.00	0.04	1.00

Note: Preferred model version in the Bayesian model comparison is the one under complete markets and zero target weight on real exchange-rate stabilization, $\mu_q = 0$. The numerical standard error (NSE) as given in Geweke (1999). The p-value is computed using $L = 0.08$, i.e., an 8% autocovariance tapered estimate, as in Geweke (1999). The univariate Brooks-Gelman shrink factor (B-GF) as in Brooks and Gelman (1998).

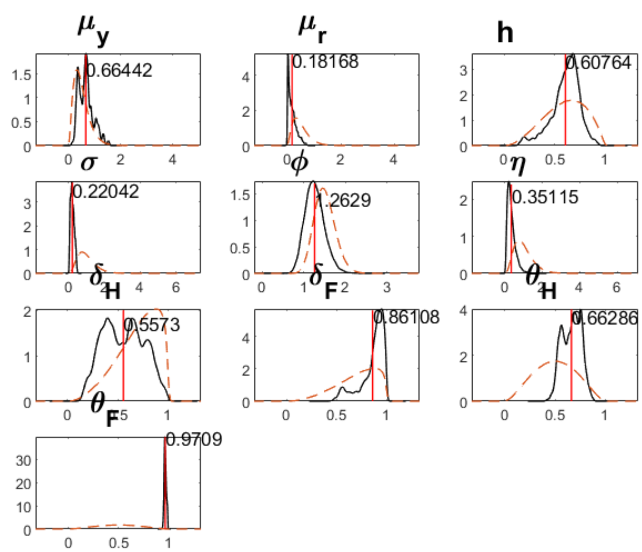

Figure C.9: Prior and Posterior Distributions of Key Parameters for Brazil – Common Recent Sample (2009:Q1–2021:Q4). Posterior (solid); prior (dashed).

Table C.11: Posterior Estimates: Canada – Common Recent Sample (2009:Q1–2021:Q4), $\alpha = 0.42$.

	Post Mean	Post SD	2.5%	97.5%	NSE(8%)	p-value	B-GF
h	0.86	0.06	0.19	0.93	0.01	0.06	1.03
σ	0.93	0.23	0.27	2.20	0.05	0.04	1.07
ϕ	1.51	0.25	1.05	2.03	0.01	0.05	1.00
η	0.93	0.45	0.27	2.19	0.03	0.71	1.00
δ_H	0.43	0.16	0.25	0.98	0.03	0.75	1.00
δ_F	0.63	0.17	0.25	0.98	0.03	0.79	1.00
θ_H	0.89	0.02	0.13	0.87	0.00	0.91	1.00
θ_F	0.46	0.13	0.13	0.87	0.02	0.67	1.00
a_1	0.87	0.03	0.19	0.96	0.00	0.71	1.00
b_2	0.44	0.11	0.19	0.96	0.00	0.92	1.00
c_3	0.70	0.10	0.19	0.96	0.01	0.13	1.00
ρ_a	0.33	0.15	0.13	0.87	0.03	0.48	1.01
ρ_q	0.86	0.16	0.24	1.00	0.04	0.00	1.26
ρ_s	0.21	0.15	0.01	0.72	0.03	0.00	1.12
μ_q	0.65	0.33	0.09	1.24	0.08	0.00	1.14
μ_y	0.37	0.18	0.09	1.24	0.04	0.00	1.15
μ_r	0.53	0.28	0.09	1.24	0.06	0.02	1.10
σ_H	3.01	0.57	0.91	7.33	0.09	0.09	1.03
σ_F	12.13	1.90	0.91	7.36	0.44	0.00	1.18
σ_a	0.34	0.07	0.52	2.66	0.00	0.61	1.00
σ_q	3.37	0.78	0.32	0.87	0.14	0.01	1.09
σ_s	0.41	0.08	0.52	2.66	0.01	0.03	1.01
$\sigma_{\pi*}$	0.37	0.06	0.52	2.66	0.00	0.69	1.00
σ_{y*}	1.03	0.13	0.52	2.66	0.01	0.28	1.00
σ_{r*}	0.40	0.07	0.52	2.65	0.00	0.16	1.00
σ_r	0.29	0.06	0.52	2.66	0.00	0.02	1.00

Note: Preferred model version in the Bayesian model comparison is the one under complete markets and positive target weight on real exchange-rate stabilization, $\mu_q > 0$. The numerical standard error (NSE) as given in Geweke (1999). The p-value is computed using $L = 0.08$, i.e., an 8% autocovariance tapered estimate, as in Geweke (1999). The univariate Brooks-Gelman shrink factor (B-GF) as in Brooks and Gelman (1998).

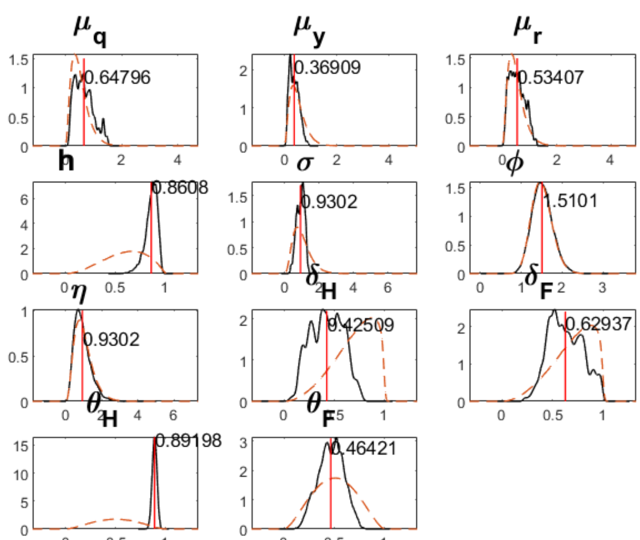

Figure C.10: Prior and Posterior Distributions of Key Parameters for Canada – Common Recent Sample (2009:Q1–2021:Q4). Posterior (solid); prior (dashed).

Table C.12: Posterior Estimates: Chile – Common Recent Sample (2009:Q1–2021:Q4), $\alpha = 0.39$.

	Post Mean	Post SD	2.5%	97.5%	NSE(8%)	p-value	B-GF
h	0.73	0.11	0.19	0.93	0.02	0.01	1.07
σ	0.93	0.27	0.27	2.20	0.06	0.00	1.58
ϕ	1.47	0.24	1.05	2.03	0.01	0.32	1.00
η	1.25	0.48	0.27	2.19	0.05	0.28	1.01
δ_H	0.94	0.04	0.25	0.98	0.00	0.72	1.00
δ_F	0.66	0.17	0.25	0.98	0.03	0.29	1.02
θ_H	0.90	0.02	0.13	0.87	0.00	0.00	1.03
θ_F	0.66	0.09	0.13	0.87	0.01	0.09	1.03
a_1	0.92	0.02	0.19	0.96	0.00	0.00	1.08
b_2	0.42	0.11	0.19	0.96	0.00	0.97	1.00
c_3	0.79	0.11	0.19	0.96	0.01	0.03	1.01
ρ_a	0.28	0.11	0.13	0.87	0.02	0.00	1.23
ρ_q	0.61	0.34	0.24	1.00	0.08	0.00	1.49
ρ_s	0.20	0.12	0.01	0.72	0.02	0.38	1.01
μ_q	0.37	0.20	0.09	1.24	0.04	0.00	1.24
μ_y	0.33	0.19	0.09	1.24	0.04	0.44	1.01
μ_r	0.39	0.19	0.09	1.23	0.04	0.59	1.00
σ_H	14.11	1.50	0.91	7.33	0.33	0.01	1.10
σ_F	23.20	1.00	0.91	7.36	0.17	0.55	1.01
σ_a	1.03	0.52	0.52	2.66	0.07	0.79	1.00
σ_q	6.45	1.35	0.32	0.87	0.31	0.02	1.10
σ_s	2.29	0.31	0.52	2.66	0.04	0.22	1.01
$\sigma_{\pi*}$	0.38	0.08	0.52	2.66	0.00	0.05	1.00
σ_{y*}	1.09	0.13	0.52	2.66	0.00	0.07	1.00
σ_{r*}	0.38	0.07	0.52	2.65	0.00	0.10	1.00
σ_r	0.29	0.06	0.52	2.66	0.00	0.30	1.00

Note: Preferred model version in the Bayesian model comparison is the one under complete markets and positive target weight on real exchange-rate stabilization, $\mu_q > 0$. The numerical standard error (NSE) as given in Geweke (1999). The p-value is computed using $L = 0.08$, i.e., an 8% autocovariance tapered estimate, as in Geweke (1999). The univariate Brooks-Gelman shrink factor (B-GF) as in Brooks and Gelman (1998).

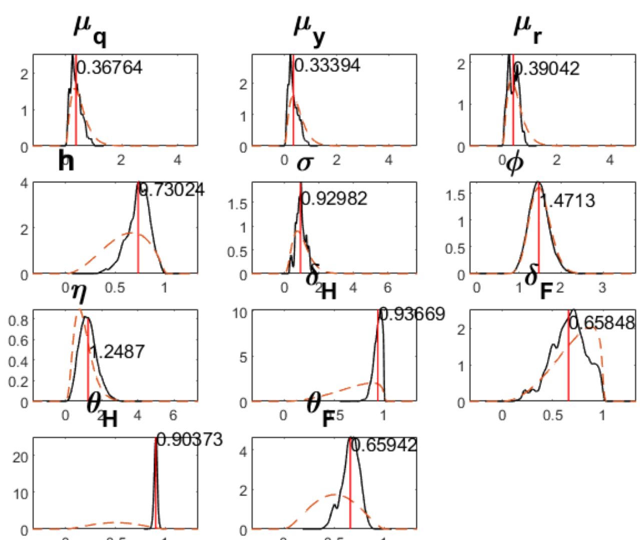

Figure C.11: Prior and Posterior Distributions of Key Parameters for Chile – Common Recent Sample (2009:Q1–2021:Q4). Posterior (solid); prior (dashed).

Table C.13: Posterior Estimates: Colombia – Common Recent Sample (2009:Q1–2021:Q4), $\alpha = 0.26$.

	Post Mean	Post SD	2.5%	97.5%	NSE(8%)	p-value	B-GF
h	0.76	0.14	0.19	0.93	0.03	0.00	1.12
σ	0.61	0.20	0.27	2.20	0.04	0.10	1.04
ϕ	1.32	0.23	1.05	2.03	0.01	0.01	1.01
η	0.27	0.13	0.27	2.20	0.02	0.16	1.01
δ_H	0.72	0.14	0.25	0.98	0.02	0.67	1.00
δ_F	0.48	0.22	0.25	0.98	0.05	0.51	1.01
θ_H	0.69	0.06	0.13	0.87	0.01	0.08	1.04
θ_F	0.96	0.02	0.13	0.87	0.00	0.00	1.09
a_1	0.93	0.02	0.19	0.96	0.00	0.00	1.03
b_2	0.40	0.11	0.19	0.96	0.00	0.01	1.01
c_3	0.74	0.09	0.19	0.96	0.00	0.08	1.00
ρ_a	0.38	0.18	0.13	0.87	0.04	0.01	1.10
ρ_q	0.70	0.23	0.24	1.00	0.05	0.17	1.03
ρ_s	0.96	0.03	0.01	0.72	0.00	0.24	1.01
μ_y	0.36	0.15	0.09	1.24	0.03	0.08	1.05
μ_r	0.26	0.27	0.09	1.24	0.07	0.00	1.23
σ_H	1.21	0.23	0.91	7.35	0.02	0.00	1.05
σ_F	1.83	1.41	0.91	7.33	0.33	0.38	1.01
σ_a	0.42	0.10	0.52	2.66	0.01	0.19	1.00
σ_q	7.52	1.76	0.32	0.88	0.44	0.00	1.23
σ_s	0.99	0.17	0.52	2.65	0.01	0.51	1.00
$\sigma_{\pi*}$	0.46	0.09	0.52	2.66	0.00	0.00	1.02
σ_{y*}	1.18	0.13	0.52	2.66	0.00	0.21	1.00
σ_{r*}	0.39	0.06	0.52	2.66	0.00	0.56	1.00
σ_r	0.29	0.06	0.52	2.65	0.01	0.00	1.02

Note: Preferred model version in the Bayesian model comparison is the one under complete markets and zero target weight on real exchange-rate stabilization, $\mu_q = 0$. The numerical standard error (NSE) as given in Geweke (1999). The p-value is computed using $L = 0.08$, i.e., an 8% autocovariance tapered estimate, as in Geweke (1999). The univariate Brooks-Gelman shrink factor (B-GF) as in Brooks and Gelman (1998).

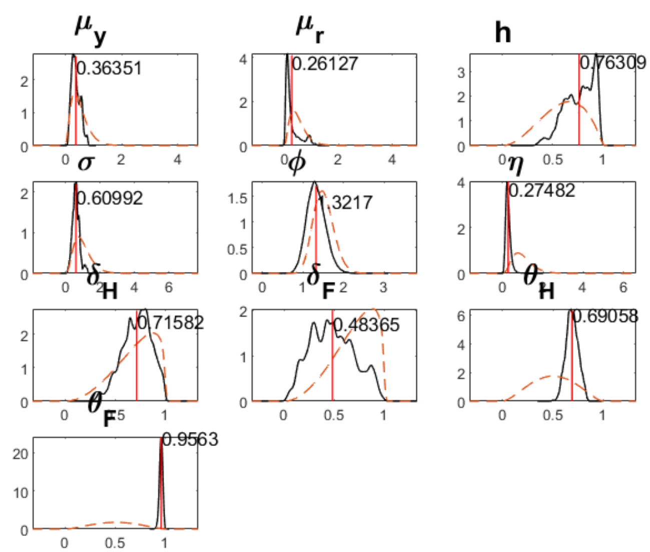

Figure C.12: Prior and Posterior Distributions of Key Parameters for Columbia – Common Recent Sample (2009:Q1–2021:Q4). Posterior (solid); prior (dashed).

Table C.14: Posterior Estimates: Mexico – Common Recent Sample (2009:Q1–2021:Q4), $\alpha = 0.44$.

	Post Mean	Post SD	2.5%	97.5%	NSE(8%)	p-value	B-GF
h	0.68	0.20	0.19	0.93	0.04	0.02	1.08
σ	2.54	0.59	0.27	2.20	0.15	0.54	1.01
ϕ	1.50	0.25	1.05	2.03	0.01	0.45	1.00
η	0.84	0.46	0.27	2.19	0.03	0.51	1.00
δ_H	0.86	0.08	0.25	0.98	0.01	0.67	1.00
δ_F	0.72	0.14	0.25	0.98	0.02	0.98	1.00
θ_H	0.89	0.02	0.13	0.87	0.00	0.71	1.00
θ_F	0.42	0.08	0.13	0.87	0.01	0.55	1.00
a_1	0.72	0.14	0.19	0.96	0.01	0.27	1.00
b_2	0.41	0.11	0.19	0.96	0.00	0.61	1.00
c_3	0.70	0.11	0.19	0.96	0.01	0.29	1.00
ρ_a	0.66	0.12	0.13	0.87	0.02	0.40	1.01
ρ_q	0.84	0.17	0.24	1.00	0.03	0.48	1.01
ρ_s	0.25	0.19	0.01	0.72	0.04	0.01	1.09
μ_q	0.85	0.27	0.09	1.24	0.06	0.01	1.11
μ_y	0.26	0.14	0.09	1.24	0.02	0.33	1.01
μ_r	0.18	0.11	0.09	1.24	0.02	0.03	1.05
σ_H	3.28	0.64	0.91	7.33	0.08	0.00	1.08
σ_F	21.76	2.01	0.91	7.36	0.51	0.20	1.03
σ_a	0.27	0.05	0.52	2.66	0.00	0.52	1.00
σ_q	9.67	2.20	0.32	0.87	0.56	0.00	1.29
σ_s	0.30	0.05	0.52	2.66	0.00	0.47	1.00
$\sigma_{\pi *}$	0.36	0.07	0.52	2.66	0.00	0.84	1.00
σ_{y*}	1.11	0.14	0.52	2.66	0.00	0.91	1.00
σ_{r*}	0.38	0.06	0.52	2.65	0.00	0.48	1.00
σ_r	0.29	0.06	0.52	2.65	0.00	0.77	1.00

Note: Preferred model version in the Bayesian model comparison is the one under complete markets and positive target weight on real exchange-rate stabilization, $\mu_q > 0$. The numerical standard error (NSE) as given in Geweke (1999). The p-value is computed using $L = 0.08$, i.e., an 8% autocovariance tapered estimate, as in Geweke (1999). The univariate Brooks-Gelman shrink factor (B-GF) as in Brooks and Gelman (1998).

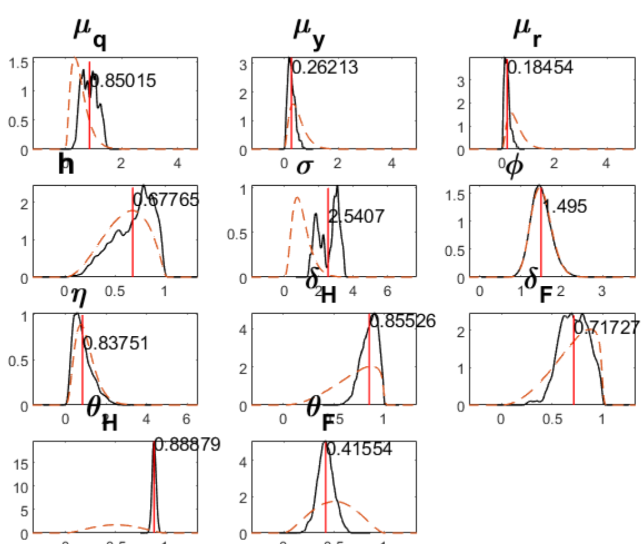

Figure C.13: Prior and Posterior Distributions of Key Parameters for Mexico – Common Recent Sample (2009:Q1–2021:Q4). Posterior (solid); prior (dashed).

Table C.15: Posterior Estimates: New Zealand – Common Recent Sample (2009:Q1–2021:Q4), $\alpha = 0.40$.

	Post Mean	Post SD	2.5%	97.5%	NSE(8%)	p-value	B-GF
h	0.90	0.05	0.19	0.93	0.01	0.00	1.06
σ	1.46	0.34	0.27	2.20	0.08	0.00	1.25
ϕ	1.50	0.25	1.05	2.03	0.01	0.12	1.00
η	1.89	0.73	0.27	2.19	0.07	0.57	1.00
δ_H	0.77	0.17	0.25	0.98	0.03	0.14	1.03
δ_F	0.52	0.22	0.25	0.98	0.04	0.06	1.06
θ_H	0.90	0.03	0.13	0.87	0.00	0.20	1.00
θ_F	0.36	0.08	0.13	0.87	0.01	0.00	1.10
a_1	0.81	0.05	0.19	0.96	0.01	0.70	1.00
b_2	0.42	0.11	0.19	0.96	0.00	0.00	1.01
c_3	0.81	0.07	0.19	0.96	0.00	0.30	1.00
ρ_a	0.70	0.20	0.13	0.87	0.04	0.61	1.00
ρ_q	0.87	0.13	0.23	1.00	0.02	0.77	1.00
ρ_s	0.43	0.15	0.01	0.72	0.02	0.00	1.17
μ_q	0.41	0.20	0.09	1.24	0.04	0.02	1.08
μ_y	0.57	0.18	0.09	1.24	0.03	0.03	1.06
μ_r	0.40	0.18	0.09	1.24	0.04	0.20	1.03
σ_H	0.79	0.31	0.91	7.33	0.04	0.01	1.05
σ_F	14.73	2.46	0.91	7.35	0.62	0.89	1.00
σ_a	0.33	0.07	0.52	2.66	0.00	0.65	1.00
σ_q	3.37	0.75	0.32	0.87	0.14	0.02	1.07
σ_s	1.30	0.24	0.52	2.66	0.02	0.16	1.01
$\sigma_{\pi*}$	0.45	0.09	0.52	2.66	0.00	0.93	1.00
σ_{y*}	1.05	0.13	0.52	2.66	0.01	0.38	1.00
σ_{r*}	0.38	0.06	0.52	2.65	0.00	0.43	1.00
σ_r	0.29	0.06	0.52	2.65	0.00	0.12	1.00

Note: Preferred model version in the Bayesian model comparison is the one under complete markets and positive target weight on real exchange-rate stabilization, $\mu_q > 0$. The numerical standard error (NSE) as given in Geweke (1999). The p-value is computed using $L = 0.08$, i.e., an 8% autocovariance tapered estimate, as in Geweke (1999). The univariate Brooks-Gelman shrink factor (B-GF) as in Brooks and Gelman (1998).

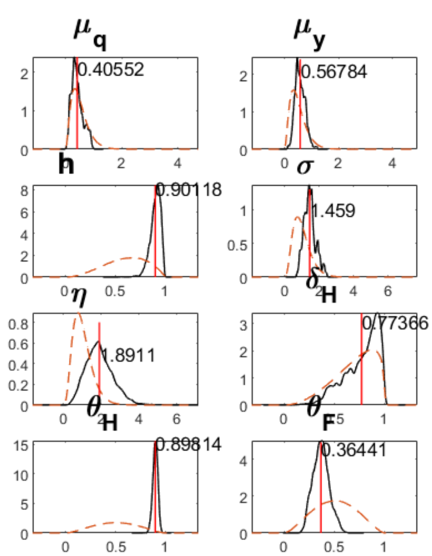

Figure C.14: Prior and Posterior Distributions of Key Parameters for New Zealand – Common Recent Sample (2009:Q1–2021:Q4). Posterior (solid); prior (dashed).

Table C.16: Posterior Estimates: Peru – Common Recent Sample (2009:Q1–2021:Q4), $\alpha = 0.35$.

	Post Mean	Post SD	2.5%	97.5%	NSE(8%)	p-value	B-GF
h	0.66	0.21	0.19	0.93	0.04	0.37	1.01
σ	1.00	0.26	0.27	2.20	0.05	0.04	1.07
ϕ	1.47	0.24	1.05	2.03	0.01	0.23	1.00
η	0.85	0.46	0.27	2.19	0.04	0.68	1.00
δ_H	0.84	0.11	0.25	0.98	0.02	0.79	1.00
δ_F	0.66	0.18	0.25	0.98	0.03	0.23	1.02
θ_H	0.89	0.02	0.13	0.87	0.00	0.11	1.02
θ_F	0.24	0.08	0.13	0.87	0.01	0.33	1.01
a_1	0.73	0.06	0.19	0.96	0.00	0.91	1.00
b_2	0.43	0.11	0.19	0.96	0.00	0.88	1.00
c_3	0.65	0.09	0.19	0.96	0.01	0.65	1.00
ρ_a	0.50	0.16	0.13	0.87	0.03	0.10	1.04
ρ_q	0.90	0.16	0.23	1.00	0.03	0.03	1.07
ρ_s	0.30	0.23	0.01	0.72	0.05	0.08	1.05
μ_q	0.50	0.30	0.09	1.24	0.08	0.00	1.26
μ_y	0.35	0.19	0.09	1.24	0.03	0.00	1.11
μ_r	0.23	0.11	0.09	1.24	0.01	0.45	1.01
σ_H	4.89	1.02	0.91	7.33	0.19	0.55	1.01
σ_F	12.44	2.06	0.91	7.36	0.50	0.50	1.01
σ_a	0.72	0.23	0.52	2.66	0.03	0.00	1.07
σ_q	22.64	1.45	0.32	0.87	0.29	0.17	1.03
σ_s	0.58	0.22	0.52	2.66	0.02	0.24	1.01
$\sigma_{\pi *}$	0.69	0.13	0.52	2.66	0.01	0.25	1.00
$\sigma_{y *}$	1.00	0.14	0.52	2.66	0.01	0.70	1.00
$\sigma_{r *}$	0.44	0.08	0.52	2.65	0.00	0.70	1.00
σ_r	0.33	0.08	0.52	2.65	0.00	0.01	1.01

Note: Preferred model version in the Bayesian model comparison is the one under complete markets and positive target weight on real exchange-rate stabilization, $\mu_q > 0$. The numerical standard error (NSE) as given in Geweke (1999). The p-value is computed using $L = 0.08$, i.e., an 8% autocovariance tapered estimate, as in Geweke (1999). The univariate Brooks-Gelman shrink factor (B-GF) as in Brooks and Gelman (1998).

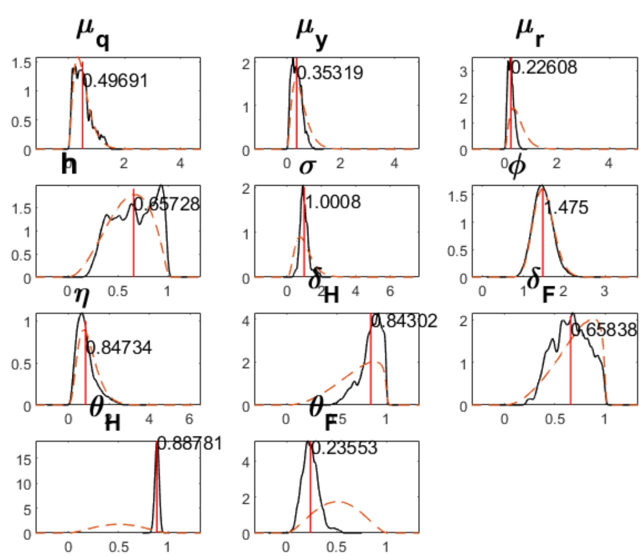

Figure C.15: Prior and Posterior Distributions of Key Parameters for Peru – Common Recent Sample (2009:Q1–2021:Q4). Posterior (solid); prior (dashed).

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