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THE IMPACT OF FINANCIAL FACTORS ON MONETARY POLICY RESPONSES IN EMERGING MARKET ECONOMIES

Abstract

Purpose: This study investigates the monetary policy responses of emerging market inflation targeters to financial factors both before and after the 2008 global financial crisis (GFC).

Methodology: Taylor rules, augmented with the nominal exchange rate, the exchange market pressure index, and the U.S. federal funds effective rate, are analyzed by using the augmented mean group (AMG) panel estimator for 12 emerging market economies (EMEs) that adopted an inflation targeting regime. The sample is divided into two periods around the GFC: 2002Q1-2007Q4 and 2010Q1-2019Q4.

Results: Inflation significantly and positively impacted interest rate settings during both periods. The panel AMG results indicate that the EMEs' responses to financial variables only had a significant effect during the post-crisis period, while the federal funds effective rate had the most impact among the financial variables. The country-specific results indicate that some central banks also reacted to financial variables before the GFC.

Conclusion: Inflation played an important role in policy rate decisions for both periods despite the slightly decreasing weight in interest rate settings after the GFC due to the increasing influence of financial variables. Although financial variables were important in setting interest rates during both periods, the EMEs' post-GFC monetary policies focused more on financial stability. Furthermore, their monetary policies became more compatible with external financial conditions after the GFC.

Keywords: Emerging market economies, financial stability, monetary policy, panel AMG, Taylor rule

1. Introduction

The 2008 global financial crisis (GFC) showed that price stability is not sufficient to ensure financial stability. This has brought into question the "benign neglect" view, which suggests a reactive monetary policy strategy for financial instabilities and which represented the consensus before the GFC (Bernanke & Gertler, 2001; Greenspan, 2002). Research on the financial cycle and the risk-taking channel of monetary policy has triggered debates on whether monetary policy should focus on financial stability. First, it has been realized that financial cycles differ from traditional business cycles (Borio, 2014). Specifically, Claessens et al. (2012) and Drehman et al. (2012) reported that financial cycles last longer and have a greater amplitude than business cycles. Second, the risk-taking channel showed that monetary authorities that ignore financial stability handle trade-offs regarding output and inflation variability quite optimistically (King, 2012). Many studies have demonstrated that a low-interest-rate environment increases risk-taking behaviors (Adrian & Shin, 2008; De Nicolò et al., 2010; Ongena & Peydro, 2011; Borio & Zhu, 2012; Dell'Ariccia et al., 2013; Bruno & Shin, 2015). Therefore, financial stability has been considered a secondary goal of monetary policy regarding financial cycles and the risk-taking channel of monetary policy, while the policy horizon has lengthened (Smets, 2014). This view of a proactive monetary policy response to financial imbalances is called "leaning against the wind" (Borio & Lowe, 2002; White, 2006).

While the lean against the wind approach has gained considerable ground since the GFC, debates on the ability of monetary policy have focused on imbalances in advanced economies (AEs). However, emerging market economies (EMEs) face different financial risks than AEs. Unlike AEs, which do not depend on capital flows and foreign credit (Menna & Tobal, 2018; Tobal & Menna, 2020), exchange rate stability is more important for EMEs because they have liability dollarization and high exchange rate pass-through. Consequently, the implications of domestic currency depreciation for EME balance sheets and upward inflation pressures force EMEs to consider risks originating from capital flows, even if they are inflation targeters (Mishkin, 2008).

In AEs, monetary policy mainly focuses on the domestic business cycle. In contrast, global financial conditions can prevent EMEs from achieving domestic goals through monetary policy. The necessity to manage both external dominance due to the global financial cycle and the domestic business cycle can weaken monetary policy independence in these economies (Sheel, 2014). Indeed, Rey (2013) argues that the global financial cycle has transformed the "trilemma"[1] into a "dilemma". In a financially integrated world, flexible exchange rates are no longer sufficient for an independent monetary policy. In addition, EMEs cannot protect themselves against external financial shocks, even if they implement a flexible exchange rate regime (Siklos, 2018).

Various policy options are available to manage the implications of the global financial cycle. The best option is to manage the capital account with a separate tool, such as a macroprudential instrument (Rey, 2013). However, considering the deterrent effects of controls on capital inflows in the long run, this option may be unattractive to EMEs that have to maintain a current account balance (Sheel, 2014). Therefore, monetary policy may react to external financial conditions in these countries.

Motivated by the potential of the GFC to influence monetary policies, this study explores the monetary policy responses of emerging market inflation targeters to financial variables both before and after the GFC. It analyzes Taylor rules augmented with the nominal exchange rate, the exchange market pressure index (EMPI), and the U.S. federal funds effective rate using the augmented mean group (AMG) panel estimator for 12 EMEs in the pre- and the post-GFC. By doing so, it provides new empirical evidence of changing EMEs' monetary policy responses with the GFC.

The rest of the paper proceeds as follows. The following section reviews the literature. The third section explains the methodology. The fourth section describes models and data. The fifth section reports the findings. The sixth section ends the paper.

2. Literature review

This review focuses on studies dealing with country groups, although there are many country-specific studies exploring the impact of financial factors on monetary policy. The exchange rate is one of the primary variables used to examine the effect of financial stability on monetary policy in EMEs. Analyzing 13 EMEs, Mohanty and Klau (2004) showed that interest rate responses to the exchange rate are significant in most countries. Aizenman et al. (2011) investigated the role of the real exchange rate in inflation targeting in 16 EMEs, including inflation targeters and non-inflation targeters, from 1989Q1 to 2006Q4. They found that emerging market central banks that adopt inflation targeting reacted to inflation and real exchange rates. Feldkircher et al. (2016) examined central banks' reaction functions in four European inflation targeters from July 2004 to May 2015, and found that some countries tended to adjust interest rates to exchange rate movements. Fouejieu (2017) found that inflation targeting EMEs responded to exchange rate mis-

1 Mundell-Fleming's "trilemma" (also known as the "impossible trinity") refers to a country that can simultaneously achieve only two of three policy goals, namely financial integration, monetary independence, and exchange rate stability (Aizenman, 2019).

alignments between 2000Q1 and 2010Q4. Caporale et al. (2018) explored the interest rate settings in five EMEs for low- and high-inflation regimes and reported that central banks reacted to inflation, output, and real exchange rate movements. Fabris and Lazić (2022) analyzed the role of the exchange rate in the interest rate settings for 37 advanced countries and EMEs from 1995Q1 to 2018Q3. They reported that monetary policy response to the exchange rate is statistically significant in EMEs but insignificant in developed countries. Elsayed et al. (2023) investigated the relationship between financial stability and monetary policy for the four Gulf Cooperation Council countries between 2006Q4 and 2020Q2. They found that the real exchange rate is considered in the interest rate setting in Bahrain and Saudi Arabia. Furthermore, countries respond to financial stability with different reactions in the short or long term.

There is a growing body of evidence that external financial conditions impact interest rate settings in EMEs. Caputo and Herrera (2017) found that, along with inflation and the output gap, the Fed funds rate determined the policy rate in both EMEs and AEs that adopted inflation targeting. Turkay (2017) investigated the reaction functions of 15 inflation targeting EMEs by augmenting the Taylor rule with financial variables between January 2006 and October 2016. He found that EMEs responded to 10-year U.S. government bond yields, inflation, output, and the real exchange rate. Gülşen and Özmen (2020) analyzed the impact of global financial conditions and the Fed rate on monetary policy in 22 AEs and 38 EMEs between January 1990 and February 2016. The effect of the Fed rates on policy rates increased after the GFC in EMEs, although not as much as in AEs. Poirson et al. (2020) investigated the monetary policy responses of 66 non-reserving economies to global financial conditions from 1996Q1 to 2015Q4. Non-reserving economies increased their policy rates whenever the Federal fund rate increased. Similarly, Arimurti and Morley (2020) reported that inflation targeters raised their policy rates in line with increases in the Fed fund rate. Analyzing four EMEs between January 2002 and December 2019, Yildirim (2022) showed that EMEs' monetary policy responses to global financial risk shocks are procyclical.

Other studies have shown that inflation plays a greater role than financial factors in determining policy rates. For example, Cabral et al. (2020) analyzed the exchange rate effect on the reaction function in 24 EME central banks, including inflation targeters and non-targeters, from 2000Q1 to 2015Q2. They found that inflation targeters responded only to inflation. Similarly, Paranavithana et al. (2020), who augmented the Taylor rule with exchange rates, concluded that inflation carried more weight for inflation-targeting EMEs.

There are studies on country groups that examine the monetary policy responses to financial variables by considering the GFC as a turning point. However, some focus only on the exchange rate, while others concentrate on external factors. This study addresses both domestic and external financial variables for EMEs adopting inflation targeting. The research hypothesis to be tested is that monetary policy responses to financial factors have been changed after the GFC in emerging market inflation targeters.

3. Methodology

This paper employs the panel AMG estimator developed by Eberhardt and Bond (2009) and Eberhardt and Teal (2010) to estimate augmented Taylor rules. External financial conditions do not affect countries equally due to their idiosyncratic characteristics. Furthermore, spillovers may occur between countries from their monetary and fiscal policies. The AMG, which considers country-specific heterogeneity and cross-sectional dependence (CD) across countries, is an appropriate panel estimation framework for examining interest rate settings (Lanzafame, 2016, pp. 486-490).

Since the method allows for the investigation of the parameters of nonstationary variables, there is no pre-requisite test, such as unit root or cointegration (Danish et al., 2019; Destek & Sarkodie, 2019). Therefore, the only necessary preliminary tests are for CD and slope homogeneity. Pesaran et al.'s (2008) bias-adjusted Lagrange multiplier (LM_{adj}) test, which eliminates the drawbacks of previous tests, is used to evaluate cross-sectional dependency across countries, while delta tilde ($\tilde{\Delta}$) and adjusted delta tilde ($\tilde{\Delta}_{adj}$) tests of Pesaran and Yamagata (2008) are used to investigate the homogeneity of the slope coefficients.

The AMG is a two-stage estimator (Eberhardt & Bond, 2009, p. 3; Eberhardt & Teal, 2010, p. 7; Eberhardt, 2012, p. 64):

First stage: $\Delta\gamma_{i,t} = b'\Delta X_{i,t} + \sum_{t=2}^{T} c_t \Delta D_t + e_{i,t} \qquad \Rightarrow \hat{c}_t = \hat{u}_t^*$ (1)

Second stage: $\gamma_{i,t} = a_i + b_i' X_{i,t} + c_i t + d_i \hat{u}_t^* + e_{i,t} \qquad \hat{b}_{AMG} = N^{-1}\sum_i \hat{b}_i$ (2)

In Eq. 1, γ_{it} and X_{it} stand for the dependent and independent variables, respectively. ΔD_t shows the first-difference $T-1$ time dummies, while c_t is the parameter for the time dummies. The first-difference ordinary least squares regression augmented with $T-1$ time dummies in the first differences is estimated, and $\hat{\mu}_t^*$ replaces the estimated c_t. This indicates a common dynamic process. In the second stage, the obtained $\hat{\mu}_t^*$ is included in each N standard group-specific regression to obtain the omitted idiosyncratic processes. Alternatively, a common process is imposed on each group member with a unit coefficient by subtracting $\hat{\mu}_t^*$ from γ_{it}. In either case, following the MG method (Pesaran & Smith, 1995), the AMG estimates are the mean values of the group-specific parameters.

4. Models and data

To examine the effects of the GFC on the EMEs' interest rate setting, this study analyzes augmented Taylor rules for two periods, i.e., 2002Q1-2007Q4 and 2010Q4-2019Q4. The two samples exclude the GFC period itself, while the post-crisis sample ends in 2019Q4 to exclude the effects of the COVID-19 pandemic on monetary policy behavior. The sample consists of 12 EMEs[2] (Brazil, Chile, Colombia, the Czech Republic, Hungary, Korea, Mexico, Philippines, Poland, South Africa, Thailand, and Turkey) that adopted the inflation targeting regime in 2002 or before.[3]

Analyzing the Fed's monetary policy, Taylor (1993) proposed a short-term interest rate rule known as the Taylor rule. According to this rule, the short-term interest rate is mainly determined by inflation and output—the interest rate increases when inflation deviates positively from its target and output reaches above its potential (Hutchison et al., 2010). Many researchers enhance this baseline rule with several financial variables, especially for EMEs, which are more sensitive to financial shocks (Käfer, 2014).

Consistent with the literature, this study augments the Taylor rule with financial variables. The exchange rate is one financial variable used in the analysis. Furthermore, the Taylor rule is extended with the EMPI because there may be appreciation or depreciation pressures in the foreign exchange market, although the actual exchange rate is at the target (Klaassen & Mavromatis, 2016). Finally, the federal funds effective rate is used to explore the effect of external financial conditions on domestic monetary policy. Model 1 shows the standard Taylor rule, while models 2, 3, and 4 represent Taylor rules augmented with the nominal exchange rate, the EMPI, and the U.S. federal funds effective rate, respectively.

Model 1: $$\mathrm{int}_{i,t} = \alpha_i + \beta\,\mathrm{int}_{i,t-1} + \delta(\pi_{i,t} - \pi_{i,t}^*) + \theta(y_{i,t} - y_{i,t}^*) + \varepsilon_{i,t}\,, \quad (3)$$

Model 2: $$\mathrm{int}_{i,t} = \alpha_i + \beta\,\mathrm{int}_{i,t-1} + \delta(\pi_{i,t} - \pi_{i,t}^*) + \theta(y_{i,t} - y_{i,t}^*) + \omega\Delta ner_{i,t} + \varepsilon_{i,t}\,, \quad (4)$$

Model 3: $$\mathrm{int}_{i,t} = \alpha_i + \beta\,\mathrm{int}_{i,t-1} + \delta(\pi_{i,t} - \pi_{i,t}^*) + \theta(y_{i,t} - y_{i,t}^*) + \varphi empi_{i,t} + \varepsilon_{i,t}\,, \quad (5)$$

Model 4: $$\mathrm{int}_{i,t} = \alpha_i + \beta\,\mathrm{int}_{i,t-1} + \delta(\pi_{i,t} - \pi_{i,t}^*) + \theta(y_{i,t} - y_{i,t}^*) + \vartheta ffer_{i,t} + \varepsilon_{i,t}\,, \quad (6)$$

where i is the cross-section dimension and t is the time dimension; α_i and ε_{it} are the constant term and the error term, respectively; int_{it} denotes the policy interest rate; and π_{it} and π_{it}^* stand for the actual and target inflation, respectively. The annual percentage changes in the consumer price indices (2010=100) are used for inflation. The inflation gap $(\pi_{it} - \pi_{it}^*)$ is calculated by subtracting the inflation target from actual inflation. y_{it} shows the annual growth rate of real gross domestic product

2 The EMEs are identified from the Morgan Stanley Capital International (MSCI) market classification (MSCI, 2021).

3 Although Turkey switched to full-fledged inflation targeting in 2006, it is included in the analysis since it adopted implicit inflation targeting in 2002.

(GDP) in domestic currency, which is a proxy for output. The output gap $(y_{it} - y_{it}^{*})$ is calculated as the difference between the output from its trend obtained using the Hodrick-Prescott filter[4]. The series containing seasonality are adjusted.

Δner_{it} in Model 2 is the annual percentage change in the nominal exchange rate and it represents the domestic currency per U.S. dollar (period average). $empi_{it}$ in Model 3 is the EMPI, while $ffer_{it}$ in Model 4 is the Fed funds effective rate. Although there are different and sophisticated versions of the EMPI in the literature, a standard version of the EMPI is preferred in the study (Aizenman & Binici, 2016, p. 72). Instead of quarterly percentage changes of variables, annual percentage changes are used. The EMPI is as below:

$$empi_{i,t} = \Delta ner_{i,t} - \Delta ir_{i,t} \tag{7}$$

Δir_{it} is the annual percentage change in foreign exchange reserves excluding gold in the U.S. dollar. $empi_{it}$ is calculated as the difference between the foreign exchange reserves and the nominal exchange rate in their annual percentage change. An increase in $empi_{it}$ indicates depreciation pressure in the foreign exchange market, whereas a decrease indicates appreciation pressures.

The series employed in the study are retrieved from various databases. The monetary policy-related interest rates, consumer price indices, nominal exchange rates, and total foreign exchange reserves are imported from IMF International Financial Statistics. Constant GDP is obtained from the WB Global Economic Monitor, while the Fed funds effective rate is taken from the FRED database. Inflation targets are retrieved from the central banks' monetary policy-related reports. Table 1 shows the descriptive statistics of the variables.

Table 1 Descriptive statistics

2002Q1-2007Q4				
Variables	**Mean**	**Max.**	**Min.**	**Std. Dev.**
int_{it}	8.350	54.730	1.250	7.255
int_{it-1}	8.557	59.000	1.250	8.127
$\pi_{it} - \pi_{it}^{*}$	0.591	37.124	-6.266	3.481
$y_{it} - y_{it}^{*}$	5.613	4.905	-7.743	1.347
Δner_{it}	-2.890	65.654	-30.974	11.698
$empi_{it}$	-20.113	55.223	-150.772	25.038
$ffer_{it}$	2.954	5.340	0.940	1.620
2010Q1-2019Q4				
Variables	**Mean**	**Max.**	**Min.**	**Std. Dev.**
int_{it}	4.260	22.500	0.050	3.344
int_{it-1}	4.266	22.500	0.050	3.337
$\pi_{it} - \pi_{it}^{*}$	0.387	17.430	-3.662	2.325
$y_{it} - y_{it}^{*}$	1.041	11.617	-8.407	1.596
Δner_{it}	4.161	60.398	-25.863	11.667
$empi_{it}$	-1.935	87.205	-90.097	21.177
$ffer_{it}$	0.604	2.430	0.040	0.798

Source: Author's estimations

4 The smoothing parameter (λ) is set to 1600.

The mean and standard deviation values help compare the pre-and post-crisis periods. In particular, the striking decrease in the mean interest rate after the GFC reflects the abundance of global liquidity. Following the crisis, the mean and standard deviation of the inflation gap declined. On the other hand, the increasing standard deviation shows that output stability slightly decreased. The EMPI means indicate that the appreciation pressures in the foreign exchange markets also decreased considerably in the post-crisis period. Furthermore, the mean nominal exchange rate suggests that appreciation pressure on domestic currencies before the GFC was replaced by depreciation pressure after it. This is not surprising for EMEs exposed to the taper tantrum, which led to capital outflows after May 2013.

5. Empirical results and discussion

Before proceeding with the AMG estimation, the CD and slope homogeneity among the series were examined. Table 2 presents the results of the CD and slope homogeneity tests.

Table 2 Cross-sectional dependence and slope homogeneity test results

2002Q1-2007Q4			
	LM_{adj}	$\tilde{\Delta}$	$\tilde{\Delta}_{adj}$
Model 1	87.688***	1.801**	2.013**
Model 2	17.389***	2.719***	3.119***
Model 3	14.835***	2.384***	2.734***
Model 4	74.381***	4.141***	4.750***
2010Q1-2019Q4			
	LM_{adj}	$\tilde{\Delta}$	$\tilde{\Delta}_{adj}$
Model 1	29.850***	8.667***	9.249***
Model 2	10.735***	7.520***	8.139***
Model 3	15.766***	8.315***	8.999***
Model 4	38.660***	8.927***	9.662***

Note: *, **, and *** show significance at 10%, 5%, and 1%, respectively.

Source: Author's estimations.

The LM_{adj} test statistics for the pre-crisis period show that the probability values of all models are less than 1%. Therefore, the null hypothesis of no cross-sectional dependence between the countries is strongly rejected. Similarly, the LM_{adj} test statistics for the post-crisis period strongly indicate cross-section dependence between the countries for all models. Thus, in both periods, a shock in one country impacted other countries. Moreover, the $\tilde{\Delta}$ and $\tilde{\Delta}_{adj}$ test results reject the null hypothesis that the slope coefficients are homogenous for both periods and all models. That is, there is country-specific heterogeneity across countries in both periods.

The AMG estimator uses the Wald χ^2 test statistic as a post-estimation test for investigating the validity of the augmented Taylor rule models (Tachie et al., 2020). The Wald χ^2 test statistics with probability values in Table 3 indicate that all models are statistically significant.

Table 3 Panel AMG test results

2002Q1-2007Q4				
	Model 1	**Model 2**	**Model 3**	**Model 4**
int_{it-1}	0.653 (0.000)	0.707 (0.000)	0.649 (0.000)	0.409 (0.000)
$\pi_{it} - \pi_{it}^*$	0.220 (0.016)	0.224 (0.024)	0.205 (0.009)	0.366 (0.000)
$y_{it} - y_{it}^*$	0.156 (0.057)	0.122 (0.080)	0.153 (0.020)	0.183 (0.117)
Δner_{it}		-0.001(0.937)		
$empi_{it}$			0.001 (0.876)	
$ffer_{it}$				-0.180 (0.110)
α_i	3.474 (0.000)	2.420 (0.000)	3.335 (0.000)	4.561 (0.000)
Wald χ^2	56.27 (0.000)	86.78 (0.000)	138.33 (0.000)	114.16 (0.000)
2010Q1-2019Q4				
	Model 1	**Model 2**	**Model 3**	**Model 4**
int_{it-1}	0.821 (0.000)	0.857 (0.000)	0.851 (0.000)	0.747 (0.000)
$\pi_{it} - \pi_{it}^*$	0.206 (0.005)	0.159 (0.012)	0.155 (0.016)	0.211 (0.000)
$y_{it} - y_{it}^*$	0.070 (0.032)	0.044 (0.157)	0.054 (0.070)	0.053 (0.160)
Δner_{it}		0.014 (0.015)		
$empi_{it}$			0.008 (0.013)	
$ffer_{it}$				0.333 (0.076)
α_i	0.290 (0.060)	0.597 (0.000)	0.681 (0.000)	0.634 (0.002)
Wald χ^2	886.35 (0.000)	984.97 (0.000)	1406.93(0.000)	573.25 (0.000)

Note: Probability values are given in parentheses. The common dynamic process imposed with the unit coefficient in the AMG estimation.

Source: Author's estimations

The coefficients indicate that the EMEs' policy responses largely followed the standard Taylor rule for both periods. Inflation and the output gap had a positive impact on the policy rate, although the latter was insignificant for some models. The positive coefficients show that central banks increase policy rates when inflation and/or the output rise above the target and potential, respectively. On the other hand, responses to financial variables differed across the two periods as EMEs only reacted to financial variables after the GFC. More specifically, the exchange rate, the EMPI, and the Fed funds effective rate all significantly determined the policy rate after the GFC. The AMG estimator also provides country-specific estimation results. Tables 4 and 5 present the country-specific findings for each period.

Table 4 Country-specific AMG test results: 2002Q1-2007Q4

	int_{it-1}	$\pi_{it} - \pi^*_{it}$	$y_{it} - y^*_{it}$	Δner_{it}	$empi_{it}$	$ffer_{it}$
Brazil	0.939***	0.004	0.628**			
	1.004***	-0.154	0.426	0.045*		
	0.658**	0.124	0.368		0.018*	
	0.941***	0.122	0.770***			-0.107
Chile	0.758***	0.442**	0.289			
	1.096***	0.340***	0.309***	-0.084***		
	0.988***	0.390***	0.255*		-0.068***	
	0.095***	0.253***	-0.148			0.329***
Colombia	1.079***	0.122	-0.000			
	0.533*	0.571*	-0.017	-0.046*		
	0.648**	0.329	-0.000		-0.020	
	0.865***	0.480	0.101			0.035
Czech Rep.	-0.115	0.416***	-0.508			
	0.296***	0.279***	-0.022	0.026**		
	0.358***	0.193***	-0.059		0.014***	
	-0.734	0.372***	-0.066			-0.410***
Hungary	0.576***	0.370**	0.633**			
	0.603***	0.290*	0.613	-0.007		
	0.636***	0.322*	0.665*		-0.003	
	0.088	0.727***	1.127***			-1.102***
Korea	0.567	-0.629**	-0.121			
	0.571	-0.609***	-0.079	0.016		
	0.324	-0.449*	-0.100		0.020	
	0.370	0.406	-0.046			0.040
Mexico	0.601***	0.119	0.158			
	0.416**	0.605	0.260	-0.122**		
	0.624***	-0.082	0.229		0.013	
	0.463**	0.560	0.106			-0.054
Philippines	0.959***	0.393***	0.217			
	1.209***	0.296***	0.106	0.001		
	1.107***	0.347***	0.184		0.001	
	0.267	0.261***	0.283**			-0.155
Poland	0.535***	0.387***	0.027			
	0.605***	0.404***	-0.055	0.059***		
	0.516***	0.404***	0.045		0.031***	
	0.539***	0.387***	0.302			-0.472***
South Africa	0.240***	0.257***	-0.327**			
	0.500***	0.161***	-0.222	0.021***		
	0.391***	0.151***	-0.044		0.008**	
	0.181	0.281***	-0.362			-0.529***
Thailand	0.902***	0.613***	0.117			
	0.862***	0.512***	-0.027	-0.024		
	0.726***	0.598***	-0.030		-0.019	
	0.304	0.465***	0.143			0.106
Turkey	0.801***	0.151**	0.301*			
	0.786***	-0.007	0.171	0.098***		
	0.809***	0.131*	0.332*		0.018	
	0.872***	0.073	0.265*			0.152

Note: *, **, and *** show significance at 10%, 5%, and 1%, respectively. The common dynamic process imposed with the unit coefficient in the AMG estimation.

Source: Author's estimations

The standard Taylor rule estimations for the pre-crisis period show that the impact of the inflation gap was significant and positive in 8 out of 12 EMEs, whereas the output gap significantly affected the policy rate in only a few countries. The augmented Taylor rules indicate that five countries responded significantly and positively to the nominal exchange rate, as did four countries to the EMPI. The Fed funds effective rate was a significant factor for 5 out of 12 EMEs, while it had a negative impact on policy rates in 4 out of these 5 countries.

Table 5 Country-specific AMG test results: 2010Q1-2019Q4

	int_{it-1}	$\pi_{it} - \pi_{it}^{*}$	$y_{it} - y_{it}^{*}$	Δner_{it}	$empi_{it}$	$ffer_{it}$
Brazil	0.827***	0.593***	0.392***			
	0.807***	0.636***	0.345***	0.002		
	0.797***	0.637***	0.337***		0.000	
	0.810***	0.535***	0.348***			0.160
Chile	0.910***	-0.088	0.083*			
	0.909***	0.074	0.085**	-0.008		
	0.900***	0.026	0.089**		-0.001	
	0.817***	-0.121***	0.129***			-0.055
Colombia	0.686***	0.257***	0.014			
	0.662***	0.300***	0.020	0.006		
	0.678***	0.290***	0.022		0.004	
	0.729***	0.235***	0.035			0.171***
Czech Rep.	0.824***	0.127**	0.041			
	0.828***	0.053	0.036	0.005		
	0.837***	0.045	0.025		-0.000	
	0.754***	0.112**	0.035			0.429***
Hungary	0.959***	0.086**	0.090*			
	0.953***	0.030	0.057	0.017***		
	0.936***	0.078*	0.116**		0.009***	
	0.741***	0.289***	0.137***			-0.201
Korea	1.082***	0.091**	0.159***			
	1.079***	-0.014	0.131**	0.014*		
	1.031***	-0.037	0.120*		0.006	
	1.041***	0.097**	0.144**			0.287***
Mexico	0.932***	0.211***	0.040			
	0.938***	0.261***	-0.058	0.033***		
	0.913***	0.232***	0.007		0.017***	
	0.963***	0.205***	0.045			0.267
Philippines	0.624***	0.079**	0.012			
	0.754***	-0.003	-0.12	0.008		
	0.751***	0.007	-0.019		0.006**	
	0.639***	0.119***	0.027			0.228***
Poland	0.921***	0.105***	0.011			
	0.933***	0.026	0.014	0.005		
	0.906***	0.034	-0.005		0.003	
	0.522***	0.321***	-0.064**			-0.172**

	int_{it-1}	$\pi_{it} - \pi_{it}^{*}$	$y_{it} - y_{it}^{*}$	Δner_{it}	$empi_{it}$	$ffer_{it}$
South Africa	0.920***	0.086*	-0.003			
	0.976***	0.041	-0.025	0.015***		
	1.008***	0.038	-0.012		0.012***	
	0.923***	0.085*	-0.002			0.329***
Thailand	0.795***	0.102***	0.007			
	0.970***	-0.003	-0.001	0.004		
	0.985***	-0.022	0.005		-0.000	
	0.767***	0.094***	0.006			0.258***
Turkey	0.374***	0.821***	-0.010			
	0.469***	0.511***	-0.057	0.074***		
	0.468***	0.539***	-0.037		0.038***	
	0.259**	0.561***	-0.199			2.303**

Note: *, **, and *** show significance at 10%, 5%, and 1%, respectively. The common dynamic process imposed with the unit coefficient in the AMG estimation.

Source: Author's estimations

There is no dramatic change in the standard Taylor rule estimations for the post-crisis period. The output gap was an insignificant variable in most countries, as before the GFC, whereas the inflation gap had a significant and positive impact in all countries except Chile. The nominal exchange rate and the EMPI had significant positive effects in 5 out of 12 EMEs. Contrary to the pre-crisis period, the Fed funds effective rate had a significant positive impact in 7 out of 12 EMEs.

Taking the panel and country-specific findings together provides some important insights. The positive impact of inflation in both periods is largely confirmed by Aizenman et al. (2011), Paranavithana et al. (2020), and Cabral et al. (2020). However, the weight of inflation in policy rate decisions slightly decreased compared to the pre-crisis period. The positive coefficients of the nominal exchange rate and the EMPI indicate that EME central banks tried to reduce depreciation pressures on their domestic currency by increasing the policy rate. Furthermore, a statistically significant contribution of the exchange rate is confirmed by Mohanty and Klau (2004), Aizenman et al. (2011), Feldkircher et al. (2016), Fouejieu (2017), Turkay (2017), Caporale et al. (2018), Fabris and Lazić (2022), and Elsayed et al. (2023). Consistent with the findings of Turkay (2017), Gülşen and Özmen (2020), Poirson et al. (2020), Arimurti and Morley (2020), and Yildirim (2022), EMEs' policy rate setting was affected by external financial conditions. The coefficient of the Fed funds effective rate had the greatest impact among the financial variables and was significant for many countries in the post-crisis period.

The country-specific results show considerable heterogeneity across the EMEs. Each country responded to different financial variables, while some central banks did not react to financial variables during specific periods. Furthermore, some EMEs were already considered financial variables in their interest rate settings before the GFC. These heterogeneous results reflect each country's unique characteristics. Many factors affect policy rate decisions, including trade and capital openness, financial development and integration, the degree of liability dollarization, and exchange rate pass-through. For instance, where exchange rate pass-through is high, EMEs may focus more on exchange rate stability, whereas financially more integrated countries may produce a greater response to global financial conditions (Turkay et al., 2017; Arregui et al., 2018).

6. Conclusion

This paper analyzed the monetary policy responses of emerging market inflation targeters to the nominal exchange rate, the EMPI, and the U.S. federal funds effective rate for two periods around the GFC: 2002Q1-2007Q4 and 2010Q1-2019Q4. The findings indicate that inflation has been important for monetary policy in emerging market inflation targeters for both periods. However, the weight of inflation in policy rate decisions slightly decreased after the crisis due to the increasing influence of financial variables.

The panel AMG results show that EMEs only reacted to financial variables after the GFC, although the country-specific results indicate that not all EMEs aligned with the benign neglect view before the GFC. There is also considerable heterogeneity across countries depending on their idiosyncratic characteristics. However, the evidence is clear that EMEs have focused more on financial stability in their interest rate settings since the crisis.

The Fed funds effective rate had the greatest positive impact among financial variables and was significant for many countries in the post-crisis period. The effect of external financial conditions on policy rate settings confirms the dilemma (Rey, 2013) and reflects that EMEs have tried to follow a more accommodative monetary policies.

These findings should be interpreted cautiously. Considering the country-specific results for the pre-crisis period, EMEs increased the weighting of financial stability in their post-GFC monetary policies rather than switching sharply from a reactive to a proactive stance. Moreover, there are some limitations to the study. The variables considered in the analysis represent financial stability to some extent. Since the employing method is linear, the sample was divided into two periods to analyze the impact of the GFC. Therefore, future studies that examine the effects of different financial variables on monetary policy responses with nonlinear methods are needed.

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