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The natural rate of interest in emerging Asia: Long-term trends and the impact of crises

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ADB Working Paper Series

**THE NATURAL RATE OF INTEREST IN
EMERGING ASIA: LONG-TERM TRENDS
AND THE IMPACT OF CRISES**

Kensuke Tanaka, Prasiwi Ibrahim,
and Sybrand Brekelmans

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All remaining errors are the authors' responsibility.

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Abstract

This paper studies the evolution of the natural interest rate in five Southeast Asian countries and considers the effect of economic shocks on the natural interest rate in these countries. The natural interest rate is the interest rate that would prevail in an economy in equilibrium and in the absence of frictions. As such, it is a useful tool for formulating monetary policy, as well as for guiding policy makers in formulating other forms of economic policy such as fiscal policy. In this paper, we estimate the natural interest rate for five Southeast Asian countries using a state-space model over a period ranging from the early 1990s to 2020. We also estimate the effect of the Asian financial crisis and global financial crisis on the natural interest rate using local projections. We find that the natural interest rate has tended to decrease in the countries of our sample since 1990, although in some countries the rate has increased again recently due to the tightening of US monetary policy. We also find that the natural interest rate has tended to decline since the Asian financial crisis and the global financial crisis. In light of the current economic downturn, this paper argues that Southeast Asian countries should implement policies aimed at enhancing productivity and boosting aggregate demand, such as increasing the natural rate of interest.

Keywords: natural rate of interest, monetary policy, Southeast Asia, Asian financial crisis, global financial crisis, COVID-19

JEL Classification: E43, E31, E42, E52, E58, G18, O53, O23

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1. INTRODUCTION

The economic impact of the COVID-19 crisis has rekindled interest in the use of the natural rate of interest as one of the references in monetary policy regimes. The concept of the natural rate of interest came to the fore in the work of Wicksell (1898). He defined the natural rate of interest as: the rate of interest at which savings and investments are equal; the rate of interest that is consistent with aggregate price stability; and the marginal productivity of capital. Wicksell attributed these properties to the natural rate of interest that distinguish it from the market rate of interest. More recently, the natural rate of interest has often been defined as the rate that will prevail when actual output equals its potential (Holston, Laubach, and Williams 2017; Goyal and Arora 2013; Fiedler et al. 2018) and has reached maximum employment (Hong and Shell 2019). Mendes (2014) specified common concepts of the natural rate of interest such as: the rate of interest that would ensure a zero output gap in every period; and the rate of interest that should prevail after the effects of business cycle shocks have dissipated. Given the effects of the pandemic, such as lackluster growth, weak investment, and high unemployment, this concept could be useful in considering medium- to longer-term trends.

The natural rate of interest of an economy depends on several real economic factors, including productivity, demographic change (which shapes savings and investment preferences), the effectiveness of financial intermediation, and other structural factors (Brand, Bielecki, and Penalver 2018). The level of the natural rate of interest is, in theory, an important benchmark for monetary policy.

Using a state-space model, we estimate the natural interest rate for five Southeast Asian countries: Indonesia, Malaysia, the Philippines, Singapore, and Thailand. We find that, in general, the natural rate declined from 1990 to 2020, though for some countries, the natural rate has been slightly increasing again since 2013, influenced by the United States' monetary policy stance.

In addition, we also estimate the impact that large crises such as the Asian financial crisis and the global financial crisis had on the natural interest rate using a local projections method. We find that on average, for our sample of countries, these shocks led to a decline in the natural rate for a period spanning a maximum of 19 months. We argue that in the face of the structural drivers putting downwards pressure on Emerging Asia's natural interest rates, policies that enhance productivity and aggregate demand are needed.

This paper is structured as follows. Section 2 presents the data and our methodological approach. In Section 3, we discuss recent evolutions of the natural rate of interest, both globally and in Emerging Asian countries, and we present the results of our analysis. Section 4 focuses on the path of the natural rate of interest in the aftermath of the Asian financial crisis (AFC) of 1997–1998 and the global financial crisis (GFC) of 2007–2008. Section 5 outlines the factors that could influence the natural rate of interest in Emerging Asian economies post-COVID-19 and briefly discusses the need for policy makers to address the issue of declining natural rates. Section 6 presents our conclusion.

2. DATA AND METHODOLOGY

2.1 Data

We based our study on five Emerging Asian countries – Indonesia, Malaysia, the Philippines, Singapore, and Thailand. We also run our estimation method for the United States as a benchmark case. To estimate the natural rate of interest, we employed each country’s benchmark short-term interest rate: either the policy interest rate or the interbank lending rate. The specific interest rates used in the estimation are outlined in Table 1. We used the interbank rate rather than the central bank policy rate in some countries in our sample as it allows for longer time coverage, thus enabling a better picture of long-term trends. With regard to the inflation rate used to calculate the real interest rate, we used the headline consumer price index (CPI) data for all countries in our sample. All data are measured at a monthly frequency, and the interest rate data represent month-end values.

Table 1: Overview of Interest Rate Data Characteristics for Selected Asian Economies

Country	Indonesia	Malaysia	Philippines	Singapore	Thailand
Interest rate	Central bank policy rate	KLIBOR	Reverse repo rate	Central bank policy rate	Money market rate
Description	The Bank Indonesia rate is the policy rate reflecting the monetary policy stance adopted by Bank Indonesia and announced to the public	Interest rate on interbank loans with a 3-month maturity	The reverse repurchase rate (RPP) is the weighted average rate on reverse repurchase agreements between the CBP and banks.	Rate charged by the MAS on overnight repurchase agreements using government securities	Daily average of commercial banks' overnight rates for interbank lending
Date first observed	01 1990	01 1988	02 1986	01 1977	01 1989
Date last observed	09 2020	10 2020	11 2020	09 2020	10 2020
Source	CEIC	CEIC	CEIC	IMF	IMF

Note: For the United States we use the Effective Federal Funds Rate from FRED between 01 1985 and 10 2020.

Source: Authors' compilation based on CEIC and national source.

2.2 Methodology

In general, three methodological streams exist for estimating the natural rate of interest: the filtering approach, the state-space model approach, and the dynamic stochastic general equilibrium (DSGE) modeling approach. The simplest approach used to estimate the natural rate of interest relies on the Hodrick-Prescott (1997) filter, a linear filter decomposing the data into a trend component and a cycle component. Using this method to estimate the natural rate of interest amounts to extracting the trend component of the real interest rate (Zhu 2016). This approach is limited, however, both by its weak theoretical foundations, as it is a purely technical extraction process, and by the finite nature of the data, which causes filter leakage, compression, and exacerbation.

State-space approaches, such as those developed by Laubach and Williams (2003) and by Holston, Laubach, and Williams (2017), rely on the modeling of the autoregressive process of unobservable variables. Their models are optimized for the data using the Kalman filter and maximization of the likelihood that the errors are normally distributed. When estimating the natural rate of interest, both studies use an IS-LM framework with a standard New Keynesian Phillips curve and an intertemporal IS equation to describe the dynamics governing the output gap and inflation as a function of the real rate gap. An estimation of the natural real rate using a state-space model is used in Jordà, Singh, and Taylor (2020). They describe the natural interest rate as a latent unobserved variable that follows a random walk. These methods are, however, limited by the fact that they rely on the data themselves for the estimation of the natural rate.

Finally, the DSGE approach, as developed by Barsky, Justiniano, and Melosi (2014), Del Negro et al. (2015, 2017), and Hristov (2016), relies on a purely theoretical framework based on the optimization of the utility of a representative agent and firm subject to frictions. This approach assumes the natural rate to be the interest rate generated by the model in the case of a frictionless and unshocked economy. In contrast to the Laubach and Williams approach, the DSGE method tends to focus on the short-term fluctuations in the natural rate, taking the long-term value as constant. While this approach solves to some degree the self-fulfilling nature of the data-driven approaches, by proposing a theoretical data-generating process, it is limited by the assumptions incorporated in the model. These include rational behavior by investors and banks in the choice of funding sources.

Our method for estimating the natural real interest rate is based on Jordà, Singh, and Taylor (2020). We apply a model to estimate the natural rate of interest where we assume that this rate is a latent unobservable variable that follows a random walk. We also assume that the errors follow an AR(2) process. We therefore estimate the following equations using the Kalman filter and maximum likelihood methods:

$$r_t = r_t^* + u_t \quad (1)$$

$$r_t^* = r_{t-1}^* + v_t \quad (2)$$

$$u_t = \alpha_1 u_{t-1} + \alpha_2 u_{t-2} + \varepsilon_t \quad (3)$$

where r_t is the real interest rate, r_t^* the natural real interest rate, and the errors are assumed to be normally distributed. The size of the errors is determined by the model, as the error terms v_t and ε_t are optimized by the Kalman filter, while u_t is assumed to follow a random walk. The main advantage of this model is that it is flexible enough to capture any secular trends without the need to specify them directly.

In the second phase of our analysis, we use local projections to estimate the effect of the AFC and GFC on the natural interest rate in our selected countries, using the method of Jordà, Singh, and Taylor (2020). We use the following empirical setting:

$$r_{t+h}^* = c^h + \beta^h D_t + \sum_{l=1}^L \rho_l^h r_{t-l}^* + \varepsilon_{t+h}^h; \quad h = 1, \dots, H \quad (4)$$

In this setting, r_{t+h}^* refers to the natural interest rate at period t and horizon h . D_t is a dummy variable taking the value 1 at the onset of the AFC and GFC, c^h is a constant, β^h is our estimate of the impact of the AFC and GFC for a given lag, ρ_l^h is a control for past inflation, and ε_{t+h}^h is the error term. In our specifications, we set $H = 24$, which is equivalent to two years, and $L = 12$, which is equivalent to one year.

3. RECENT EVOLUTION OF THE NATURAL RATE OF INTEREST

3.1 Data Show a Global Trend Towards Declining Natural Interest Rates

Although observation of the natural rate of interest is not straightforward and its measurement poses many challenges, various studies have attempted to estimate this rate. There is broad consensus that the natural rate of interest has been declining globally over recent decades, although the magnitude of the decline varies across studies. Studies based on US data show that the natural rate of interest has declined since the 1980s, particularly since the Great Recession (Williams 2015). Another estimate showed that the natural rate of interest in the United States dropped to close to zero during the GFC and stayed there until 2016 (Holston, Laubach, and Williams 2017). However, estimates of the decline differ, ranging between 0% and 2%, depending on the concept used in the study (Fiedler et al. 2018). Lubik and Matthes (2015) estimate the natural interest using an alternative approach based on a vector autoregression (VAR) that captures dynamic correlations among output growth, inflation, and the real interest rate, without imposing coefficient restrictions from theory; they find a secular decline in the US natural rate over the last few decades. Other studies use theoretical models to estimate the long-term natural rate. In a DSGE framework, Del Negro et al. (2017) find a decline in the natural rate of interest in the United States since the 1990s. They attribute most of this decline to investors' increased preference for safe and liquid short-term assets, known as the "convenience yield."

A declining natural rate of interest trend is also observed in other advanced economies, including Canada, the euro area, and the United Kingdom, from 1961 to 2016 (Holston, Laubach, and Williams 2017; Hong and Shell 2019). Similar results were found by other studies focusing on Canada (Mendes 2014), the euro area (Constâncio 2016; Bonam et al. 2018), and Japan (Fujiwara et al. 2016). Haavio, Juillard, and Matheron (2017) indicated that the natural rate in the euro area was negative during the Great Recession, and has been since too. They also found that the main driver of negative natural rates of interest is risk shock, defined as shocks to households' willingness to hold riskless as opposed to risky assets, as this captures the effects of uncertainty on precautionary savings and investment decisions. Galesi, Nuño, and Thomas (2017) supported the evidence that the natural rate of interest has dropped over the past few decades, and even turned negative in some advanced economies, due to a combination of supply- and demand-side factors.

3.2 The Level of the Rate's Decline Differs Across Countries in Emerging Asia

Estimating the natural rate of interest in emerging countries is even more challenging in general due to the limited length of data series and ongoing structural changes (Goyal and Arora 2013). However, some studies have tried to provide estimations for Asian countries. Perrelli and Roache (2014) document the sizeable decline in the natural rate of interest in 24 emerging economies, including Asian economies. The authors reveal that in emerging economies, the likely ranges for the natural rate of interest plummeted by more than 200 basis points between 2002 and 2013. Similarly, (Zhu 2016) shows that, with the exception of the People's Republic of China, the natural rate of interest in Emerging Asian economies has fallen by more than 4 percentage points in recent

decades, mostly due to low-frequency demographic and global factors. Other estimates show that the natural rate in ASEAN countries has been declining since the start of the new millennium, suggesting that country-specific factors, like saving and investment rates, cannot alone explain the change in the natural rate of interest. Global factors that are also likely to have contributed to the decline include lower global interest rates, lower public debt, reduced sovereign risk, and an increased supply of savings that have translated into financial deepening (Maybank 2018).

As shown in Figure 1, all five Asian economies experienced a decline in their real natural rate of interest over the period under analysis. This finding concurs with the results of previous analyses that showed a decline in the natural rate of the emerging Asian countries (Zhu 2016; Maybank 2018). This decline was already in progress for these countries in the early 1990s, but the trend was halted by the AFC. Thailand, Indonesia, Malaysia, and the Philippines experienced sharper spikes than Singapore during the AFC, in line with how deeply the crisis affected their economies. We also observe that the decline in natural real interest rates picked up at the start of the 2000s in all countries in our sample. This trend was reversed once again in Singapore and Thailand from 2013 onwards after the tightening of monetary policy in the United States. In Indonesia and Malaysia, the natural real rate appears to have stabilized since the GFC.

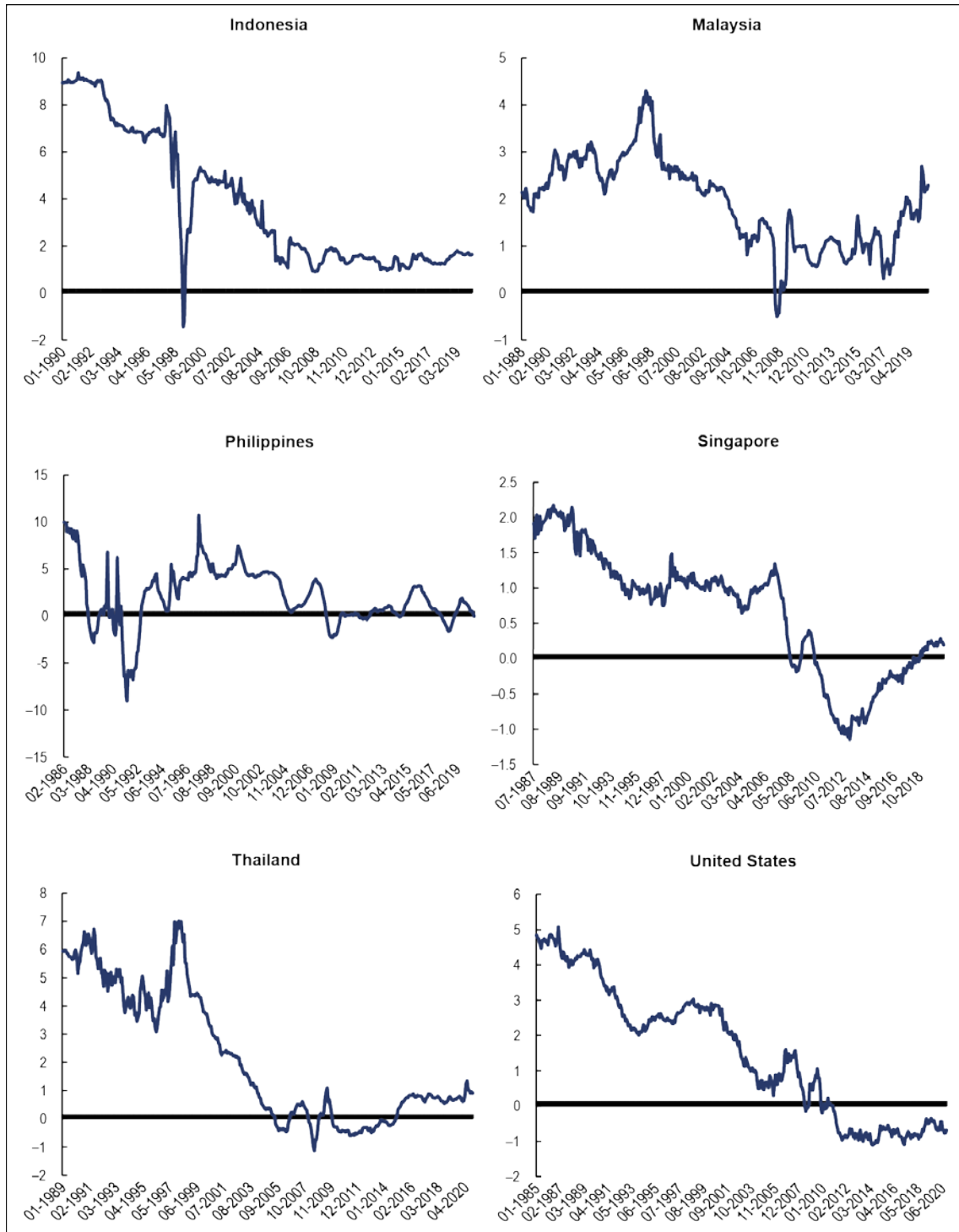
Our method also displays a declining trend in the natural interest rate in the United States, in a way that is very similar to the results of past and more detailed research on this topic. For instance, our results match those of Holston, Laubach, and Williams (2017) in the sense that we observe a strong decline in the natural rate in the early 2000s and a flat trend since 2010. Overall, in comparison with the United States, the Southeast Asian countries, especially Singapore and Thailand, follow a similar overall trend. Yet, all display idiosyncrasies that cannot be purely associated with shifts in the United States' interest rate. For instance, in Southeast Asian countries, the shock of the AFC had a much larger impact on the natural interest rate than in the United States. In addition, while the natural interest rate remained stable after 2010 in the United States, there were slight increases in some Southeast Asian countries after 2013.

On an individual level, we notice that the natural interest rate declined smoothly in Indonesia from the early 1990s and stabilized in the 2010s. In Malaysia, the natural interest rate increased until the AFC and started declining thereafter until the GFC. During the period following the GFC, the natural interest rate did not show a clear trend for Malaysia. As regards the Philippines, the figure is harder to interpret, although it is noticeable that over the period covered, the natural interest rate tended to decline. In the case of Singapore, we notice that the natural interest rate was declining in the early 1990s, although this trend came to a halt during the AFC. Afterwards, the natural interest rate stagnated but dropped substantially after the GFC. We notice that the United States' monetary tightening had a relatively strong impact on the natural interest rate in Singapore, as the rate started rising again after 2013. In the case of Thailand, we notice a declining trend overall until 2005; although this trend was halted temporarily by the AFC, it carried on during the early 2000s. After 2005, except for some noise due to the GFC, the natural interest rate was stable until 2013. That year, due to the tightening of the monetary policy stance in the United States, the natural interest rate increased to a new plateau.

With regard to the level of the natural real interest rate, we see large divergences across the ASEAN-5 economies. These differences have tended to close over time, however. In the late 1980s, the Philippines and Thailand experienced the highest levels

of real natural rates, with both having a level of about 6%. By the end of the sample period, 2020, the natural real rate was between 2.5% and 0% for all countries covered.

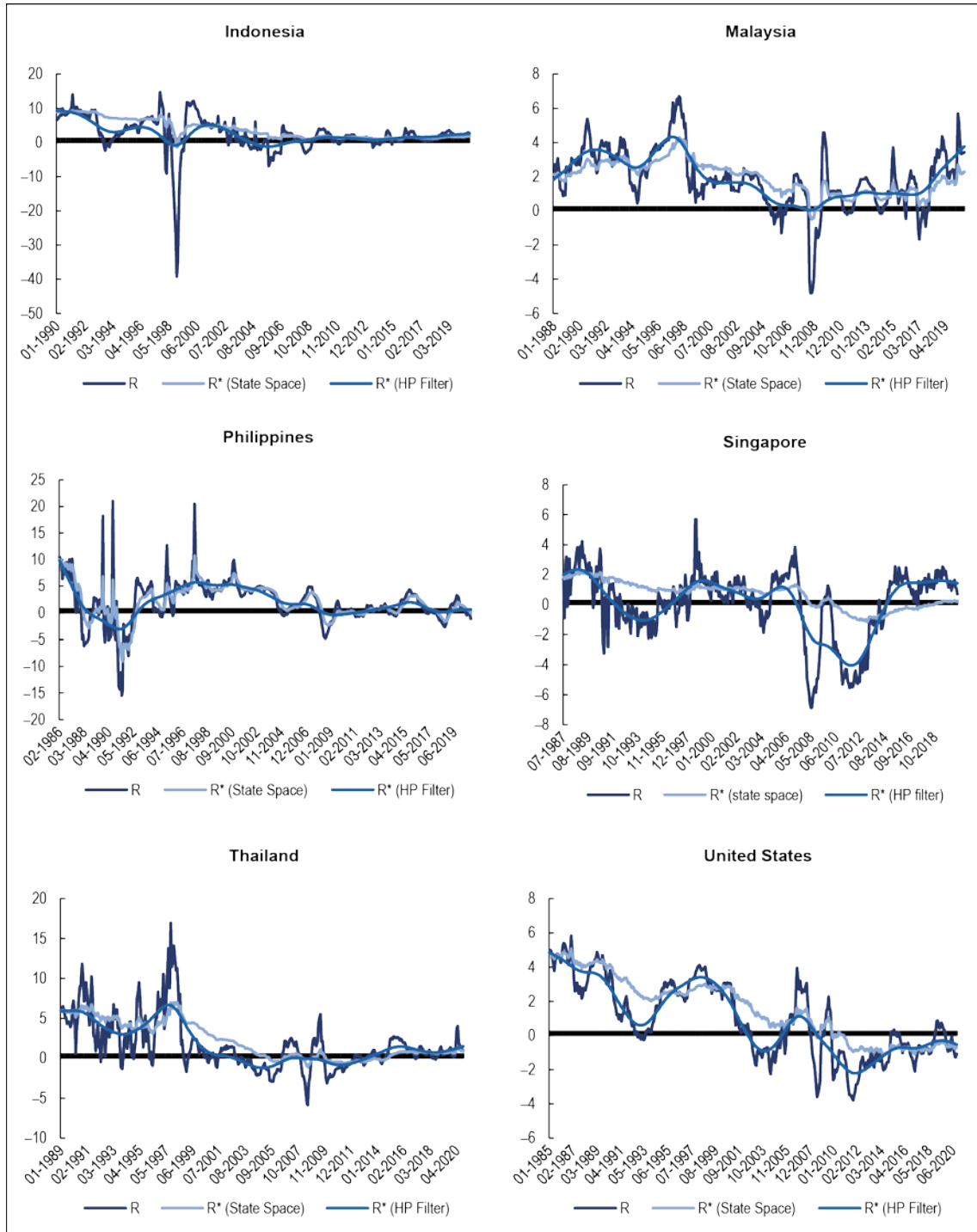
Figure 1: Real Natural Rate of Interest in Selected ASEAN Economies



Source: Authors' calculations.

Figure 2: Real Interest Rate and Natural Real Rate for Selected ASEAN Economies

Estimated using the state-space approach and HP filter approach.



Note: R* (state space) refers to the natural interested rate using the state-space model (eq 1–3), R* HP filter refers to the natural interest rate as estimated using the HP filter, R refers to the real interest rate.

Source: Authors' estimations.

Our estimates for the real natural rate of interest follow the overall trend of the real rate, without capturing the noise created by large short-term fluctuations. The interest rate extracted using the HP filter is less volatile, although it tends to move significantly with short-term fluctuations in the real interest rate (Figure 2). For Indonesia and the Philippines, the y-axis is stretched by large movements in the real rate, due to large movements in inflation. In Singapore, the AFC and the GFC caused movements in the real rate, but they were of the order of 400 bps and were not fully reflected in the natural real rate.

4. PATH OF THE NATURAL RATE OF INTEREST AFTER THE ASIAN AND GLOBAL FINANCIAL CRISES

4.1 Crisis Events Are Seen as Affecting the Natural Rate of Interest

Various studies document declining potential output and the natural rate of interest in the aftermath of crisis events. Holston, Laubach, and Williams (2017) estimate that the US natural rate of interest fell from 3% in 2000 to about 0% in 2011 and has remained there ever since. According to their study, approximately half of the natural rate decrease since the onset of the GFC of 2007–2008 can be attributed to a drop in trend growth. Holston, Laubach, and Williams (2017), using a slightly different model specification for the United States, Canada, the euro area, and the United Kingdom, document a decline in the natural rate of interest in all four economies since the GFC. According to these findings, the fall in the natural rate was most pronounced in the euro area. Barsky, Justiniano, and Melosi (2014) found that the natural rate was negative in the last three recessions and has remained persistently low since 2008. Using a wide range of models, a study by Brand, Bielecki, and Penalver (2018) found a prolonged decreasing trend in the natural rate of interest in advanced economies. The study argued that although the estimates are highly uncertain and model dependent, most of them have been negative in the wake of the financial crisis.

The literature on the impact of crisis events on the natural rate of interest in Emerging Asian countries is comparatively scarce. Overall, Asian economies experienced two changes in the aftermath of the AFC. First, the post-crisis decline in investment-to-GDP ratios in Asia has been substantial (Reinhart, Reinhart, and Tashiro 2016). Second, following the AFC, many of the East Asian countries seeking to stimulate their exports had high domestic rates of savings and depressed levels of domestic capital investment (Bernanke 2005). The combined action of these two factors lowered Asian countries' natural rate of interest after the AFC.

There have been some attempts to provide country-specific estimates of the natural rate of interest in the post-crisis period. One is a study by Kim and Park (2013). By applying and expanding the methodology developed by Laubach and Williams (2003), Kim and Park identified a decline in the natural rate of interest of the Republic of Korea after the AFC because of the drop in the potential growth rate and the long-standing current account surplus, which forms expectations of domestic currency appreciation and lowers the country risk premium. As shown in the same study, the Republic of Korea's natural rate of interest has possibly fallen further since the GFC, as the weakening of developed countries' growth potential has an impact on the Republic of Korea's potential growth (global factor). In another study, Behera, Pattanaik, and Kavediya (2017) estimated the natural rate of interest for India and found that the estimated natural rate declined after the GFC. In addition, the real interest rate gap,

defined as the actual real interest rate minus the estimated natural rate of interest, remained negative for a major part of the past decade, indicating that the monetary policy stance of the Reserve Bank of India was largely accommodative rather than anti-inflationary.

By applying the methodology developed by Holston, Laubach, and Williams (2017), Suzuki (2020) shows that the natural rates of interest of Taipei,China; Thailand; and the Republic of Korea declined during the past few decades. The Republic of Korea's natural rate of interest plummeted in the aftermath of both the AFC and the GFC; Thailand's natural rate of interest fell sharply only in the aftermath of the AFC; and Taipei,China's natural rate dropped substantially only post-GFC. In the same study, Suzuki posits that a combination of lower investment to GDP and a higher savings ratio drove the movements in the natural rate of interest during the two crisis events in Taipei,China; Thailand; and the Republic of Korea.

4.2 The Effects of Pandemics on the Natural Rate of Interest Can Last for Decades

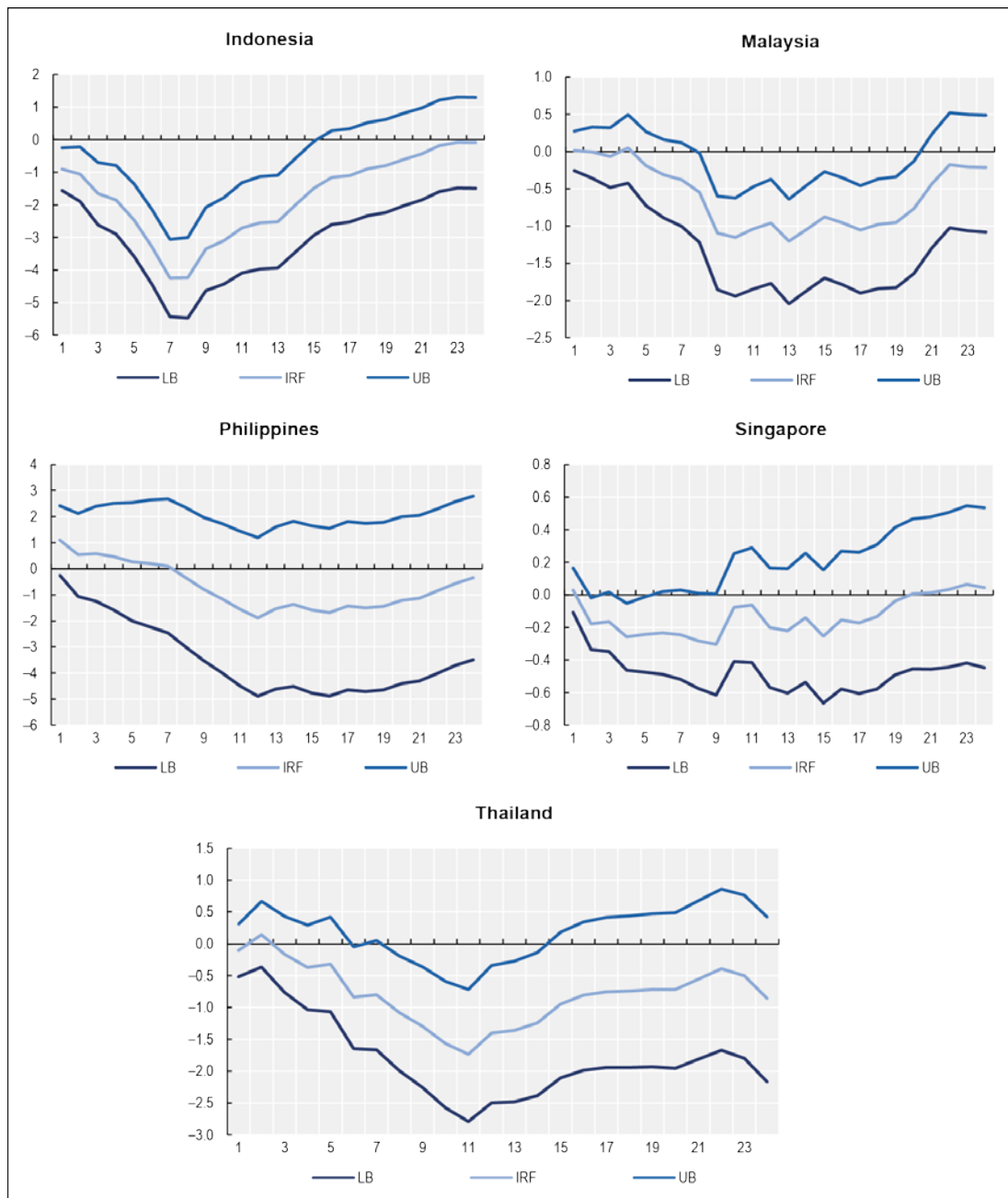
Pandemics also tend to have long-lasting effects on the natural rate of interest. Canzoneri, Cumby, and Diba (2012) showed that, in some economic environments and with some standard monetary policy rules, shocks to the economy can make the natural rate of interest move away considerably from its steady-state value for a very long time. Jordà, Singh, and Taylor (2020) studied the rates of return on assets using a data set stretching back to the 14th century, focusing on 15 major pandemics that resulted in more than 100,000 deaths. They found that significant macroeconomic effects of the pandemics lasted for around 40 years, with real rates of return being significantly low. Following a pandemic, the natural rate of interest declines for decades, reaching its lowest point about 20 years later, and returns to the level expected had the pandemic not taken place about four decades later. The study also found that real wages increased following pandemics, in line with pandemics creating labor scarcity and/or heightened desire to save due to larger precautionary savings or rebuilding of lost wealth used up at the peak of the disaster.

Figure 3 displays the average impact of the AFC and GFC on the natural rate of interest in the countries in our sample. We see that all countries experienced a decline in the real rate due to economic crises, followed by a return to equilibrium. As regards the natural rate, however, economic shocks cause a significant negative effect for varying durations according to the country. Overall, the results show that the impact of crises on the natural real rate tends to be short-lived, lasting a maximum of 21 months. Nevertheless, countries reach the trough in the decline of the natural real rate within different time frames. In Indonesia, the trough of the decline associated with the AFC and GFC is reached after eight months on average, while in Thailand the natural real rate bottoms out roughly 13 months after the shock on average.

Overall, in Indonesia, the AFC and GFC led on average to a maximum decline in the natural interest rate of 4.2 percentage points and the effect became insignificant after roughly 16 months. In Malaysia, we notice an average decline of 1.3 percentage points in the natural interest rate, reached 13 months after the shock, while the effect of the shock becomes insignificant after 21 months. For the Philippines, we do not measure a significant decline but do observe the shock having an impact on the natural interest rate. This might be partly due to data quality over the period of the AFC and due to the Philippines having been less affected by the AFC than other countries in the region (Noland 2000; Mijares 1999). In Singapore, the AFC and GFC led on average to a small decline in the natural interest rate (0.3 percentage points), which was only

significantly different from zero 8 and 9 months after the shock. In Thailand, we observe an average maximum decline of 1.7 percentage points, while the effect of the shocks was significant between the 6th and 15th month after the shock. We notice that the countries hardest hit by the AFC, Indonesia and, to a lesser extent, Thailand, are those that display the most significant effects on their natural interest rates. This gives us confidence in our approach.

Figure 3: Projected Impact of the AFC and GFC on the Natural Real Rate in Selected ASEAN Economies



Note: The darker blue lines are the error bands (90% confidence intervals) around the projection estimate; LB stands for lower bound and UB stands for upper bound; the light blue line in the middle is the projection estimate (IRF standing for impulse response function). The vertical axis refers to the natural interest rate and the horizontal axis to the months after the shocks.

Source: Authors' calculations.

Table 2: Details of Projected Impact of the AFC and GFC on the Natural Real Rate in Selected ASEAN Economies

Horizon	H = 1	H = 5	H = 10	H = 15	H = 20	H = 24
Indonesia						
AFC and GFC	-0.90*	-2.46***	-3.10***	-1.49*	-0.43	0.09
	(0.39)	(0.66)	(0.79)	(0.85)	(0.84)	(0.83)
<i>p-value</i>	0.02	0.00	0.00	0.08	0.47	0.91
Observations	369					
Malaysia						
AFC and GFC	0.01	-0.19	-1.15***	-0.88**	-0.77*	-0.21
	(0.16)	(0.29)	(0.39)	(0.42)	(0.45)	(0.47)
<i>p-value</i>	0.96	0.44	0.00	0.02	0.05	0.52
Observations	394					
Philippines						
AFC and GFC	1.10	0.27	-1.15	-1.58	-1.21	-0.34
	(0.79)	(1.35)	(1.70)	(1.91)	(1.90)	(1.87)
<i>p-value</i>	0.17	0.84	0.51	0.41	0.53	0.85
Observations	418					
Singapore						
AFC and GFC	0.03	-0.24*	-0.41	-0.66	-0.46	-0.45
	(0.08)	(0.14)	(0.20)	(0.24)	(0.27)	(0.29)
<i>p-value</i>	0.74	0.08	0.69	0.29	0.99	0.88
Observations	399					
Thailand						
AFC and GFC	-0.10	-0.32	-1.57**	-0.95	-0.72	-0.86
	(0.24)	(0.44)	(0.59)	(0.68)	(0.73)	(0.77)
<i>p-value</i>	0.67	0.46	0.01	0.16	0.31	0.25
Observations	382					

Note: Crises refer to an average of AFC and GFC. Standard errors are in parentheses.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Source: Authors' estimations.

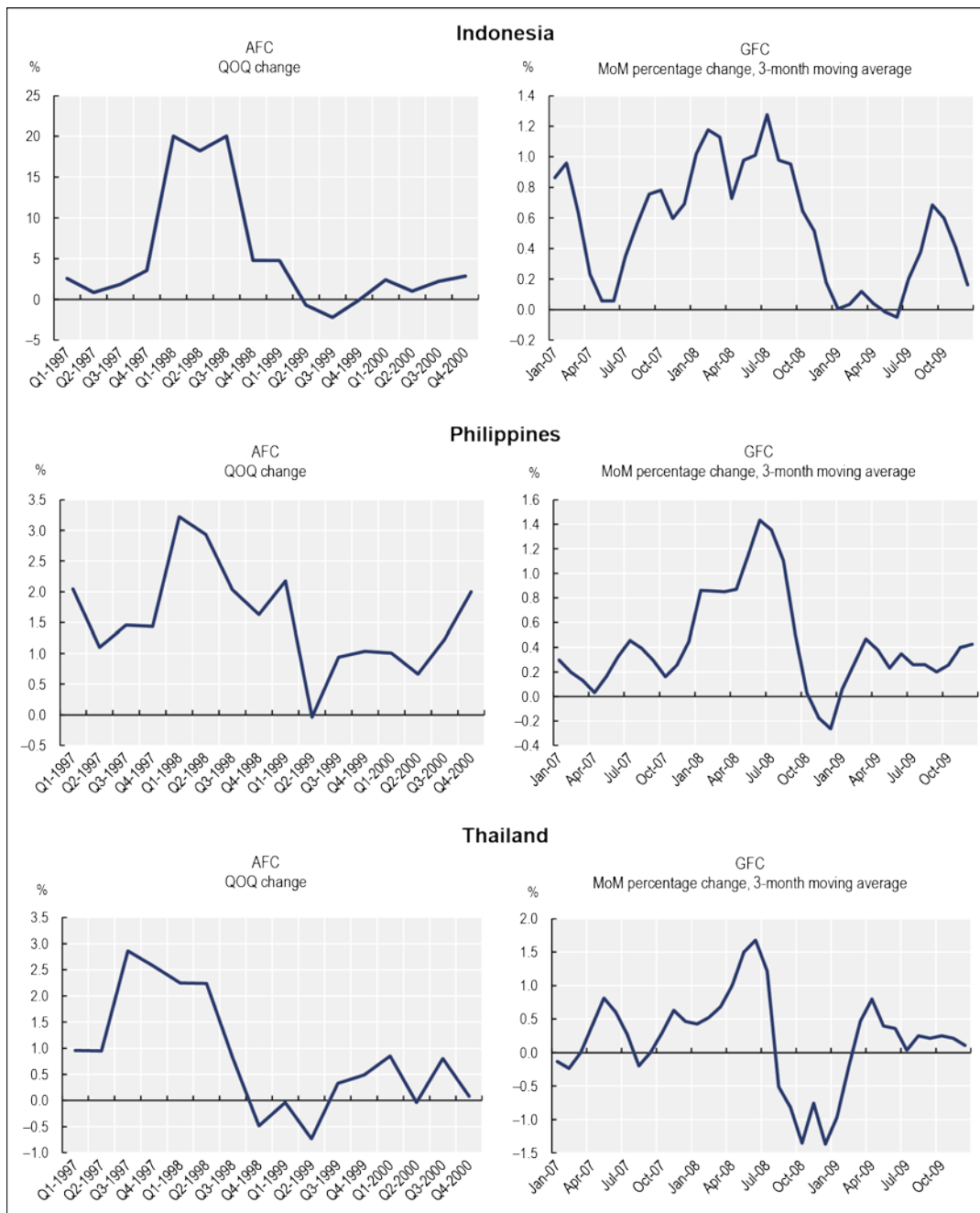
4.3 Inflation Movement is Highly Uncertain During Times of Crisis Due to a Variety of Factors

The path of inflation during and in the aftermath of a crisis episode is highly uncertain. A large number of studies have tried to explain this phenomenon. For example, Bernanke (2010) attributes the phenomenon of higher-than-anticipated inflation after a recession to the increased anchoring of expectations by a credible monetary policy. Daly and Hobijn (2014) emphasize the increased downward wage rigidities in a recession that bend the wage Phillips curve, while Christiano, Eichenbaum, and Trabandt (2015) explain the “missing disinflation” by a fall in total factor productivity and increased costs of working capital.

In addition, “inflation overshooting” phenomena appeared in many countries during the Asian financial crisis of 1997–1998 (AFC) and the GFC (Figure 4). For instance, at the height of the AFC in 1998, Indonesia experienced one of the sharpest increases in inflation among East Asian economies. The average annual inflation rate in Indonesia was approximately 59% in December 1998, up from 6.2% the year before (Siregar and Rajaguru 2005). As regards the GFC, some sort of temporary inflation overshooting was observed in the United States. At the peak of the GFC, the average annual

inflation rate, at 3.8% in 2008, was nearly twice the Federal Reserve's target. After the deflationary pressures recorded throughout 2009 and a period of reflation in 2010, inflation overshoot the 2% target in 2011, reaching 3.15%.

Figure 4: Consumer Price Index in Indonesia, the Philippines, and Thailand During the AFC and GFC



Note: The starting date for the Asian financial crisis is considered to be July 1997 when Thailand devalued its domestic currency, the Thai baht. The starting point for the global financial crisis is considered to be April 2007 when the subprime mortgage crisis began in the United States.

Source: Authors' compilation based on data from the CEIC.

5. POLICY IMPLICATIONS

5.1 Several Factors Can Influence the Natural Rate of Interest

The natural rate of interest is determined roughly by two categories of factors that can be broadly classified as structural as opposed to cyclical factors. While the cyclical component is currently prevailing as a result of the COVID-19 crisis, structural factors will arguably retake center stage once the impact of the pandemic has subsided. Several structural issues, therefore, pose nontrivial challenges to adopting the natural rate of interest as an implementable target of monetary policy. Like the level of potential output, the natural rate of interest is difficult to compute, as it must be inferred from the data rather than directly observed (Barsky, Justiniano, and Melosi 2014; Holston, Laubach, and Williams 2017). Arestis and Chortareas (2007) also argue that the natural rate of interest is an unobservable variable, and that attempts to estimate it have often resulted in values that are not precise enough. As a result, when the natural rate is used for policy purposes – i.e., to assess the monetary policy stance or as an inflation indicator – the uncertainty of the estimates becomes a particularly critical factor.

The natural rate of interest can be estimated based on very specific assumptions, but the resulting estimates depend critically on these assumptions. An analysis by Levrero (2019) found the limits of the natural rate as a benchmark for monetary policy, both on empirical and theoretical grounds. The study noted that estimates of the natural rate of interest are statistically uncertain and vary depending on the estimation method. Using data from euro area countries, Bonam et al. (2018) similarly found that the uncertainty of estimations and the lack of uniform definitions of the natural rate of interest limit its practical usefulness for monetary policy. Giammarioli and Valla (2004) likewise argue that no unifying framework has appeared so far to analyze the natural rate of interest and that a more substantial modeling exercise is needed to find the driving forces behind the natural real rate. This is necessary if central banks are to include a reliable measure of the natural real rate in their information set. Behera, Pattanaik, and Kavediya (2017) estimated the natural rate of interest for India and suggested that the estimates are highly sensitive to certain factors, including the choice of methodology, the measure of inflation used for deflating the nominal interest rate to derive the real interest rate, and the nature of other data used in the model.

Furthermore, there is unlikely to be one formulation of the natural rate of interest that would cater to the needs of all monetary policy makers (Amato 2005). In addition, attempts at estimating the natural rate of interest for countries running large trade surpluses may lead to biased results (Rachel and Summers 2019). Moreover, Filardo and Nakajima (2018) show that the natural rate of interest tends to decline with unexpected, unconventional expansionary monetary policies. Finally, setting nominal interest rates to track the natural rate of interest may not be feasible at times because of the existence of the zero lower bound (ZLB). If the nominal interest rate is close to the ZLB, the natural rate of interest may decrease enough to induce a positive real interest rate gap. In such a scenario, output would fall below potential, triggering deflation (Justiniano and Primiceri 2010).

In an attempt to illustrate how the natural rate of interest concept could be operationalized for practical monetary-policy decision-making, we compared the estimated natural nominal rate with the real interest rate and the current policy rate of the five countries included in the sample. Table 3 displays the results for Emerging Asian economies, taking the average of the period from January 2017 to December 2019 and thereby excluding the impact of COVID-19. Table 4 displays a snapshot of

the latest observations available as of December 2020. Please note that the general disclaimer associated with the interpretation of natural rate of interest estimates, which are highly uncertain, also applies to this comparison. Ideally, the natural rate of interest would be equal to the real interest rate. However, the natural rate of interest during the 2017–2019 period was on average lower than the real interest rate in all five countries under analysis. This suggests that monetary policy was on average tight during this three-year period in these countries, and that, viewed from the natural rate of interest approach, real interest rate levels are not necessarily well anchored by natural interest rates in some countries.

Table 3: Natural Rate of Interest, Real Interest Rate, and Policy Rates in Selected ASEAN Economies, 3-Year Average over 2017–2019

Country	Indonesia	Malaysia	Philippines	Singapore	Thailand
Natural nominal rate	4.82	3.08	3.73	0.51	1.53
Real interest rate	1.75	1.73	0.17	1.44	0.68
Policy rate	5.10	3.11	4.21	1.96	1.54

Table 4: Natural Rate of Interest, Real Interest Rate, and Policy Rates in Selected ASEAN Economies, Latest Observation as of 12/2020

Country	Indonesia	Malaysia	Philippines	Singapore	Thailand
Natural nominal rate	3.15	0.81	3.26	0.19	0.42
Real interest rate	2.70	3.43	-1.13	0.70	0.95
Policy rate	4.00	1.75	2.50	0.69	0.50

Note: The policy rates used are: the 7-day reverse repo rate for Indonesia, measured in 09/2020; the BMN overnight policy rate for Malaysia, measured in 10/2020; the BSP overnight lending facility rate for the Philippines, measured in 11/2020; the MAS standing facility borrowing rate for Singapore (09/2020) and the BOT 1-day repurchase rate for Thailand (10/2020).

Source: Authors' calculations based on data from the CEIC and national sources.

The level of the natural rate of interest is, in theory, an important benchmark for monetary policy. It has strong implications as it determines the neutral stance of monetary policy, such as inflation targeting based on the Taylor rule (1993). Galesi, Nuño, and Thomas (2017) point out that the natural rate of interest is important since it represents the real interest rate for a desirable situation, whether this be due to price stability, full employment, or a lack of rigidities preventing prices and wages from adjusting efficiently. The authors argue that the central bank must set the nominal interest rate so that the real interest rate draws closer to its natural level, as far as possible, since in this way GDP, unemployment, inflation, and other variables follow a welfare-maximizing path. (Haavio, Juillard, and Matheron 2017) found that the natural rate is a useful and relevant monetary policy indicator, both from the descriptive and the normative point of view. They argued that monetary policy rules that include the natural rate fit well to euro area data, compared to policy rules that do not include the natural rate.

Giammarioli and Valla (2003) investigate the performance of a simple Taylor rule that takes into account the time variations in the natural rate of interest in the euro area; they conclude that accounting for those fluctuations over time improves the stability of the economy, mostly through better stabilization of the output gap.

In a DSGE setting, Neiss and Nelson (2003) suggest that there are benefits to allowing for natural rate movements when modeling inflation and basing the construction of natural rate series on economic theory.

The natural rate of interest could also be an important reference for the purposes of inflation control. Woodford (2003) incorporated Wicksell's idea and used the gap between the level of the natural rate of interest and the interest rate controlled by the central bank as the main variable for analyzing inflationary and/or deflationary pressures. According to Woodford, the natural rate of interest is the rate at which the economy is in equilibrium and prices are fully flexible. In this equilibrium, the natural rate of interest is not necessarily constant but can fluctuate under the influence of shocks, such as aggregated demand and productivity shocks, or changes in the preferences of households. If the economy is not in balance, the real market interest rate can move away from the natural rate, which can then lead to inflationary or deflationary pressure. As also mentioned by Canzoneri, Cumby, and Diba (2012), inflation is brought to its target if the policy rate is brought to its natural rate. Bearing in mind the Taylor rule, when an increase in aggregate demand or a decrease in productivity leads to an increase in inflation above its target level, the policy rate should be raised above its natural rate for a period of time. This would raise the real rate of interest to limit the increase in inflation, and vice versa; if the opposite occurs, the policy rate should be cut. If the economy is in equilibrium, with stable inflation and unemployment at the natural rate, the rates should be set equal to the natural rate of interest. Behera, Pattanaik, and Kavediya (2017) pointed out that although the equilibrium real interest rate varies significantly over time, tracking the trajectory of the natural rate is important for the effective conduct of monetary policy, and for assessing its stance.

5.2 Policy Makers Need to Address the Issue of Declining Natural Rates Post-COVID

The COVID-19 crisis adds further downward pressure on interest rates due to its impact on investment demand, productivity, and savings. The adverse impact of some of these factors is expected to wane as the global economy heads towards recovery once the pandemic has been brought under control. Nevertheless, structural factors, most notably lower productivity growth, and demographic developments are likely to keep natural interest rates low for a long time in Emerging Asian economies. In formulating monetary responses, policy makers in Emerging Asia need to consider addressing this decline as one of the important challenges.

Several factors associated with savings and investment can influence the level of the natural rate of interest in the post-pandemic period. Very frequently the natural rate of interest is related to demographic changes. An increase in life expectancy is one of the main channels through which demographic factors exert downward pressure on real interest rates, as agents build up their savings in anticipation of a longer retirement period (Carvalho, Ferrero, and Nechio 2016). Arslanalp, Lee, and Rawat (2019) show that demographic trends in Asian countries could reduce interest rates by approximately 1–2 percentage points over the next decade, all else being equal. However, the same study concludes that the effects are likely to be less important for countries that are financially open and well integrated into global markets. For these countries, changes in the world interest rate, which may, in turn, be affected by global aging trends, will likely matter more than local demographics.

The natural rate of interest is also frequently related to potential output growth or productivity growth. Productivity growth is a key determinant of the growth potential of Emerging Asian countries in the long term, and hence of interest rates. A key question is whether further significant technological innovations will lift productivity and at least partly offset the demographic factor and the headwinds to further growth caused by

COVID-19. However, the benefits of the current wave of innovation may have started to diminish, and will therefore not lead to additional significant productivity gains over the medium term (IMF 2018).

Another factor that has been discussed in the literature is rising international financial integration, which implies that an increase in demand for safe assets, typically supplied by advanced economies, may have reduced risk-free interest rates (Caballero, Farhi, and Gourinchas 2017). Furthermore, post-COVID overhang of government and household debt can influence the natural rate of interest. A mix of higher taxes and lower expenditures can reduce the ratio of government debt to GDP, but higher taxes also imply a reduction in the growth rate of households' real disposable income relative to that of real GDP (Gordon 2012). Additional factors that have been discussed are: shifts in inequality that impact desired savings (Eggertsson, Mehrotra, and Robbins 2017); shifts in risk premia that influence desired investment (CEA 2015); and changes in the relative supply of low-risk assets (Galesi, Nuño, and Thomas 2017). In the context of the COVID-19 crisis, large government spending and borrowing will likely diminish the savings surplus and thus lead to a rise in interest rates (Goy and van den End 2020).

Compared with other monetary responses, policy makers in Emerging Asia tend to underestimate the need to address declines in the natural rate of interest. Galesi, Nuño, and Thomas (2017) conclude that monetary policy can mitigate the effects of a low natural rate of interest; in principle, however, it cannot adjust this rate directly. Importantly, a combination of structural measures to boost productivity growth, on the one hand, and fiscal measures to stimulate global aggregate demand and support long-term economic growth, on the other, is needed to reverse the drop in the natural rate.

6. CONCLUSION

This paper has illustrated the potential usefulness of the natural rate of interest approach as an important reference for monetary policy, though many technical problems associated with the estimation of the natural rate of interest pose nonnegligible challenges to operationalizing this approach in practical monetary-policy decision-making. Nevertheless, the evidence provided in this paper shows that the natural rate of interest of several Emerging Asian economies, including Indonesia, Malaysia, the Philippines, Singapore, and Thailand, has fallen over the past two to three decades. This is consistent with several other studies that document a declining trend in the natural rate of interest in the United States and other advanced economies. In addition, we show that economic crises have further reduced the natural rate of interest of the five ASEAN economies, although the timing has varied to a certain extent. Several factors could explain this decrease, including demographic change, productivity growth, financial integration, debt overhang, and rising inequality. The risk that the COVID-19 crisis will accentuate some of these factors, and thus put further downward pressure on the natural rate of interest, points to the need for structural policies to counter the natural rate decline.

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