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**ADBI Working Paper Series** 

### CENTRAL BANK ASSET PURCHASE PROGRAMS IN EMERGING MARKET ECONOMIES

John Beirne and Eric Sugandi

No. 1364 March 2023

# **Asian Development Bank Institute**

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#### Abstract

We investigate the impact of asset purchase programs (APPs) by 14 EME central banks during COVID-19, finding a statistically significant effect in compressing bond spreads vis-à-vis the US. A counterfactual analysis shows that in the absence of APPs, EME bond spreads would have been significantly higher. Country-specific VAR impulse response functions indicate that a shock imposed on asset purchases becomes persistent on bond spreads after around five to ten days, with a peak effect of around 40 basis points. Persistent stabilizing effects are also found on exchange rates and capital flow volatility, while stock markets and inflation expectations are overall not affected by the APPs.

Keywords: asset purchase program, quantitative easing, emerging market economies

JEL Classification: E44, E52, E58

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# 1. INTRODUCTION

During the pandemic, central banks in some emerging market economies (EMEs) implemented quantitative easing (QE) policies, particularly through asset purchase programs (APPs) for government bonds. These APPs, complementing conventional monetary policy, were aimed at lowering government bond yields and supporting the stability of EME financial markets (IMF 2020; ADB 2021; World Bank 2021). Unlike in advanced economies (AEs) that regularly engaged in QE through asset purchases as part of the overall monetary policy toolkit, this type of unconventional monetary policy tool was largely new for many EMEs. It is an important consideration therefore to understand whether it has been successful for EMEs. In addition, lower liquidity overall in EME bond markets constitutes a further reason for examining EMEs, which could affect the relative impact of QE, and differences in capital flow dynamics in times of heightened financial stress in EMEs compared to AEs. In this paper, using data over the period January 2010 to September 2021, we investigate the impact of APPs on asset markets, capital flow volatility and inflation expectations for 14 EMEs, while also controlling for other macroeconomic and financial factors.

Seminal work by Bernanke and Reinhart (2004) on central bank policy options in the face of a zero lower bound was followed by work on QE effectiveness in advanced economies and spillovers to EMEs (e.g., Apostolou and Beirne 2019; Fratzscher et al. 2018: Gambacorta et al. 2014: Hattori et al. 2016: Cecioni et al. 2018). These papers largely found that QE helps to dampen market uncertainty, with ample liquidity leading to portfolio reallocation and capital inflows to EMEs. More recently, as EMEs engaged directly in QE, Arslan et al. (2020) examined the impacts of APPs on the bond markets of 14 EMEs based on a short window of March to May 2020, which was the initial phase of the COVID-19 pandemic. They find that APPs stabilized the bond markets, where local currency bond yields declined significantly following the APP announcements, while there was little effect found on exchange rates (see also Rebucci et al. 2022; Sever et al. 2020; Fratto et al. 2021; Ha and Kinberg-Hanlon 2021; Arena et al. 2021). On capital flows, Mimir and Sunel (2021) explained that asset purchases eased financial conditions in EMEs during the pandemic by curbing capital outflows and strengthening banks' balance sheets. Central bank credibility has also been identified an important factor underpinning the effectiveness of QE. Benigno et al. (2020) suggest that credible emerging market central banks could rely on purchases of local currency government bonds to help finance government health and welfare expenditure, and broader fiscal stimulus, during the pandemic. One of the concerns on QE, especially when poorly communicated by the central bank or without a clear exit strategy, relates to the potential inflationary impact over the medium to long term. Related to this, and pertaining to government debt monetization as one way to conduct APPs, Felipe et al. (2020) showed that the inflationary risk from debt monetization is more muted with a sterilization of monetary policy.

This paper has three main contributions. First, addressing a shortcoming of previous studies that have relied on dummy variables for the QE period and announcement dates, this paper permits a more precise assessment of impact using a proxy for actual APP quantities. Second, we conduct a counterfactual analysis to determine the trajectory of the bond spread under a scenario of no APP. We find that the APPs compress the bond spread relative to the US in EMEs. In addition, a counterfactual analysis reveals that in the absence of the APPs, EME bond spreads would have been higher, thereby demonstrating the effectiveness of the operations. This type of approach, which draws on pre-pandemic EME bond spread determinants over a long time window, permits a more comprehensive assessment of QE impact relative to

prevailing studies that examine the pandemic period only. Third, we conduct a countryspecific impulse response function analysis across the 14 EMEs in order to determine the persistence of the QE effects over time, also addressing a drawback of existing panel studies that cannot provide country-specific policy implications. Our results show that a shock imposed on asset purchases exhibits persistence on bond spreads after around 5 to 10 days, with a peak effect of around 40 basis points. Persistent stabilizing effects are also found on exchange rates and capital flow volatility. We find no significant effect of APP shocks on stock markets and inflation expectations overall, the latter of which allays concerns that QE by EMEs may pose risks to price stability over the medium term.

The remainder of the paper is structured as follows: Section 2 briefly discusses related literature on the transmission of QE policies, Section 3 describes the methodology and data used, Section 4 discusses the empirical results, and Section 5 concludes.

## 2. RELATED LITERATURE

This paper contributes to the literature on the effectiveness of QE and the transmission of monetary policy, particularly in times of crisis. Arslan, Drehmann, and Hofmann (2020) examine the impacts of APPs on the bond markets of 13 EMEs between March and May 2020, which was the initial phase of the COVID-19 pandemic. They find that APPs stabilized the bond markets, where local currency bond yields declined significantly following the APP announcements, while there was little effect on exchange rates. The APPs also restored investor confidence, showing no evidence either of aggravating inflation expectations. The actual market impacts varied widely among countries, depending on the program design and central bank communication on implementation. In a related study, Sever et al. (2020) found that asset purchase announcements lowered bond yields in EMEs, with muted impacts on currencies and equities. They also found that APPs did not lead to heightened investor concerns about fiscal dominance, thereby allaying potential financial stability risks linked to higher yields, currency depreciation, and rising inflation expectations.

Other studies on the impacts of QE in EMEs that are in line with these papers include Fratto et al. (2021) and Ha and Kindberg-Hanlon (2021), who also find significant impacts on bond yields but only a marginal effect on the exchange rate. The latter paper also indicated that APPs in EMEs have been more effective at lowering government and private sector bond yields and sovereign CDS than announcements of policy rate cuts and spillovers from AE APP announcements. In addition, they found that the reduction in bond yields driven by APP announcements was largest in economies with higher CPI inflation, as well as higher initial bond yields and CDS spreads. On capital flows, Mimir and Sunel (2021) explained that asset purchases ease financial conditions in the EMEs during the pandemic by curbing capital outflows, as QE strengthens banks' balance sheets. They suggested that EME QE policies ease financial conditions with no currency depreciation and inflation risks. Nonetheless, the APP becomes less effective if such purchases cause de-anchoring in inflation expectations. In the context of emerging Europe, Arena et al. (2021) investigated the APP impacts on the bond markets of five European EMEs (i.e., Hungary, Romania, Poland, Croatia, and Türkiye) during the pandemic. They found that APPs in European EMEs stabilized government bond markets and boosted equity prices, with no indication of exchange rate pressure. Initial announcements of the APPs in March and April 2020 halted the increase in bond spreads and helped facilitate smooth fiscal financing.

Central bank credibility has been identified as an important factor underpinning the effectiveness of QE. Benigno et al. (2020) suggest that credible emerging market central banks could rely on purchases of local currency government bonds to help finance government health and welfare expenditures and fiscal stimulus during the pandemic. For countries with flexible exchange rate regimes and well-anchored inflation expectations, QE would help to ease financial conditions and minimize the risks of large currency depreciations and spiraling inflation.

Other studies have examined different dynamics for the implementation of QE in AEs compared to EMEs. Pordeli, Schofer, and Sutton (2021) pointed out two key differences between QE in AEs and in EMEs. First, QE have been conducted with policy rates mostly well above zero in the EMEs whereas the policy rates in many AEs are closer to zero. Second, for the most part, QE in the EMEs have not been used to provide a broader easing of financial conditions by lowering longer-term risk-free interest rates as in the AEs. In this sense, QE by EMEs constitutes an additional monetary policy tool where there also exists space for accommodative conventional monetary policy. In this context, Rebucci, Hartley, and Jiménez (2022) conducted a study on 30 QE announcements made by 21 central banks on daily government bond vields and bilateral US dollar exchange rates in March and April 2020 amid the global financial turmoil due to the COVID-19 outbreak. They found that QE has not lost effectiveness in AEs and that its international transmission is consistent with long-run uncovered interest rate parity and a large dollar shortage shock during the COVID-19 period. They found that the impact of QE on bond yields is much stronger in EMEs than in AEs, while the EME QE transmission to exchange rates is gualitatively different than in AEs.

One of the concerns about QE, especially when poorly communicated by the central bank or without a clear exit strategy, relates to the potential inflationary impact over the medium to long term. In regard to the government debt monetization as one way to conduct APPs, Felipe et al. (2020) showed, however, that the inflationary risk from debt monetization is more muted. They noted that the People's Republic of China (PRC), the Philippines, Singapore, and the United States have long practiced government debt monetization. The central banks of these economies accompany government debt monetization with a sterilization of monetary policy. In a corridor interest rate targeting system, central bank purchases of government debt are offset by a reduction in its assets or an increase in its interest-bearing liabilities. In a floor system, the central bank sterilizes the impact of monetization by raising interest on its reserve base. This paper contributes to the related literature in this field, examining the impact of government bond purchases by EME central banks during the pandemic, with a particular focus on the transmission to bond spreads, exchange rates, stocks markets, capital flow volatility, and inflation expectations.

## 3. DATA AND METHODOLOGY

As the actual amount and the timing of the asset purchases are not publicly available, we use data on central bank claims to the government as a proxy indicator of purchases under the APPs. This proxy is selected because central bank purchases of government debt securities are recorded as the central bank's claim to the government. Figures 1 and 2 show that there were substantial increases in EME central bank claims to the central government (either measured in USD billion or as a percentage of nominal GDP) in 2020. To mitigate the negative impacts of the COVID-19 pandemic on their economies, some EME countries began to implement the APPs as early as the first quarter of 2020. As shown in Figures 1 and 2, central bank claims to the

government were at a level of zero or relatively flat in the period prior to the pandemic, i.e., before March 2020. Our assumption therefore is that changes in central bank claims to the government in the period from March 2020 are an approximation of the scale of purchases under the APP.



Source: CEIC, authors' calculations.

In the first part of our analysis, we estimate a pooled regression over the period 2 March 2020 to 2 September 2021 to investigate the impact of the central bank purchases of government debt securities (i.e., the APP) on the EME bond spread, after controlling other determining factors. This provides an overview of the average effect of the APP for the pandemic period only. We calculate the EME bond spread by subtracting the yield of the ten-year US Treasury bond from the yield of the ten-year EME government bond. Our prior is that an effective transmission of the APP would imply a reduction in the EME bond spread.

The equation estimated is as follows:

$$Y_t = \beta_0 + \beta_1 CONTROL_{i,t-1} + \beta_2 APP_{i,t-1} + \varepsilon_t$$
(1)

where Y is the EME bond spread;  $\beta_0$  is the constant term; *CONTROL* is a set of macroeconomic and financial factors, including inflation, expected inflation, stock market indices, the ten-year US Treasury bond yield, the USD bilateral exchange rate, and the volatility portfolio debt and portfolio equity net flows; *APP* is the asset purchase program variable, which is proxied by the central bank claim to the central government (denoted either as billion USD or as a percentage of nominal GDP); and  $\varepsilon$  is the error term. Index *i* is the country index while index *t* is the time index;  $\beta_1$  and  $\beta_2$  are coefficient matrices for the respective variables in the model. We use one-period lagged values of the independent variables to tackle the issue of endogeneity.

Table A2 in the Appendix displays the list of variables used in the analysis, the associated data, and the data sources. All data are in working day frequency (i.e., five days per week); quarterly and monthly data are converted to working day frequency

using the quadratic interpolation method. We use cross-section weights to tackle the problem of cross-section heteroskedasticity and select the White diagonal to have robust computations for unstructured heteroskedasticity covariance.

In a second stage, using the same variables equation (1), we estimate a panel regression on the determinants EME bond spreads over the period 1 January 2010 to 28 February 2020 (i.e., the pre-pandemic period, before COVID-19 APPs were introduced by EME central banks). Fixed effects allow for within-panel variation over this longer pre-pandemic time period. The pre-pandemic coefficients estimated are used to compute projected bond spreads for the pandemic period, i.e., bond spreads that proxy a scenario of no APP. The bond spread gap is calculated by subtracting the actual bond spread from the bond spread based on pre-pandemic coefficients for each EME. A lower actual bond spread than the bond spread based on pre-pandemic coefficients implies that the APP was effective. We use one-period lagged values of the independent variables to alleviate endogeneity concerns.<sup>1</sup>

In a third stage, we estimate country-specific vector autoregression (VAR) models over the period from 7 January 2010 to 1 September 2021 to investigate the persistence of the transmission of the APP to asset markets, capital flow volatility, and inflation expectations.<sup>2</sup> The generic form is specified as follows:

$$Y_t = \sum_{\tau=1.k} Y_{t-\tau} A_{\tau} + X_t B_t + c_t + \varepsilon_t$$
(2)

where  $Y_t$  is the vector of endogenous variables;  $X_t$  is the matrix of exogenous variables;  $A_{\tau}$  and  $B_t$  are the coefficient matrices;  $c_t$  is the vector of constants; and  $\varepsilon_t$  is the vector of error terms. Indexes t and  $\tau$  are the time indexes, while k is the optimum time lag for the VAR model based on the Akaike information criterion (AIC).

The endogenous variables in our VAR model for each EME (all in first-differenced form) based on their ordering are: (1) the yield of the ten-year US Treasury bond; (2) the APP (either in USD billion or as a percentage of nominal GDP); (3) the bond spread; (4) inflation; (5) expected inflation; (6) the log of the stock market index; (7) the log of the exchange rate; (8) the volatility of portfolio debt net inflows; and (9) the volatility of portfolio equity net inflows. The exogenous variables are the time dummy and the seasonal dummies. All of the variables in the VAR models are stationary in the first-difference forms. Our VAR analysis focuses on the impulse response functions (IRFs) of the variables to a shock stemming from the change in the APP variable.

### 4. EMPIRICAL RESULTS AND ANALYSIS

### 4.1 Cross-country Pooled Regressions

Table 1 shows the results of pooled data regressions, focusing on the primary transmission channel, through its impact on EME bond spreads relative to the US. The APP is denoted in USD billion in Model 1 and as a percentage of nominal GDP in Model 2.

<sup>&</sup>lt;sup>1</sup> Alternative methods for addressing endogeneity such as IV approaches are fraught with difficulty given the lack of suitable IVs for studies involving macroeconomic and financial times series. Nonetheless, our baseline findings are also consistent with a 2SLS estimation, conditioned on two lags of the regressors as instruments.

<sup>&</sup>lt;sup>2</sup> The impulse response analysis was also estimated for the pandemic period only, the results of which are fully consistent with the longer sample period.

	Model 1	Model 2
Regressors		
Constant	3.896*** (0.018)	3.499*** (0.020)
Inflation (-1)	-1.507*** (0.134)	-1.448*** (0.141)
Expected Inflation (-1)	-0.879** (0.301)	-0.958*** (0.324)
Log(Stock Market Index (-1))	0.828** (0.421)	0.705 (0.484)
Log(Exchange Rate (-1))	2.352** (1.147)	3.069** (1.213)
10Y US Treasury Yield (-1)	-0.175 (0.126)	-0.322** (0.127)
Debt flow volatility (-1)	0.483*** (0.078)	0.507*** (0.088)
Equity flow volatility (-1)	-1.061** (0.499)	-0.989** (0.499)
APP (–1)	-0.039*** (0.001)	-0.126*** (0.007)
Fixed Effects (Cross)		
_Colombia	1.609	2.036
_Croatia	-3.676	-2.836
_Hungary	-2.331	-1.800
_Indonesia	4.245	2.890
_India	7.963	2.359
_Malaysia	-1.905	-1.515
_Peru	-0.393	0.019
_Philippines	-0.119	0.075
_Poland	-2.822	-2.738
_Romania	-1.245	-0.839
_South Africa	4.563	4.948
_Serbia	-1.914	-1.361
_Thailand	-2.911	-2.714
_Türkiye	2.219	2.341
Adjusted R-squared	0.971	0.948
No. of observations	5,263	5,263
No. of cross sections	14	14

Table 1: Im	pact of APP	on EME Bor	nd Spreads
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Note: \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% significance levels, respectively.

The APP variable is statistically significant and negative in both Models 1 and 2, implying that an increase in central bank asset purchases of government debt securities reduces the bond spread. This is in line with economic intuition and an effective transmission of QE. As the EME government bond yield falls, the spread between the yield of the EME government bond and the US Treasury bond narrows. Rising bond spreads are also significantly affected by capital flow volatility. While rising portfolio debt volatility is associated with rising bond spreads, the reverse is the case for portfolio equity volatility, pointing towards the presence of portfolio rebalancing.

### 4.2 Counterfactual Analysis

In order to quantify the additionality of the APP in respect of its transmission to EME bond spreads, we conduct a counterfactual analysis based on the application of pre-pandemic fundamental bond spreads.<sup>3</sup> Figure 3 displays the bond spread gaps between the actual spread and the spread implied by pre-pandemic determinants. Our results indicate that the APP has helped to compress EME bond spreads to some degree below what they would otherwise have been. As can be expected, there is wide variation in the extent of the APP additionality, as well as its persistence.

In most cases, while there is substantial variation across both time and country, the additionality of the APP seems to be most pronounced in the latter half of 2020 and first half of 2021 overall. This is evident, for example, in the cases of Croatia, India, the Philippines, Thailand, Peru, Serbia, and to a lesser extent in Indonesia. For some economies, however, the additionality was immediate, such as in the cases of Hungary and Poland.

### 4.3 Impulse Responses to APP Shocks

Next, we turn to the VAR IRF results. Here we focus the discussion on the response of the bond spread and exchange rate to APP shocks. As shown in Figure 4, the APP shock has a significant impact on the bond spread for nine of the 14 EMEs in our sample, namely Colombia, Hungary, India, Indonesia, Malaysia, Peru, South Africa, Thailand, and Türkiye. The bond spread declines following a positive APP shock, implying an effective transmission of QE. An increase in the APP raises the demand for government bonds, which leads to a fall in the EME government bond yield (or an increase in the government bond price). As the EME yield falls vis-à-vis the US Treasury bond yield, the spread narrows.

The magnitude of the effect varies across economies, with the largest bond spread compressions evident in the cases of Indonesia and Türkiye, with spread reductions of around 40 basis points at the peak after around three days. The responses to shocks remain persistent over time. Spread compression effects of around 10–20 basis points are evident in the cases of Colombia, Peru, Hungary, and South Africa. Effects on bond spreads lower than 10 basis points due to an APP shock are found for India, Malaysia, and Thailand. It is notable that the APP shocks are almost immediately transmitted to bond spreads in all cases, and where initially significant, this remains the case over the time horizon. The responses of EME exchange rates to APP shocks are shown in Figure 5.

<sup>&</sup>lt;sup>3</sup> For brevity, while the results are consistent across both APP representations, those presented are based on the APP variable definition as per Model 1 in Section 3.1.

150

100

50

-80 -100 -120

-50

-100 -150

30

250

200 150

100

-50

-40 -60

-100 -120

ш

2020



Beirne and Sugandi

Note: Reported is the difference between the actual bond spread and the bond spread implied based on the estimation of Equation (1) for the pre-pandemic period. Where the actual spread is lower, denoted in the chart as a negative gap, the inference is that the APP was effective in compressing the bond spread.

2021

ш

2020

500 400 300

200 100

II 2021 ш





Note: Reported are the accumulated IRFs based on Equation (2), using a Cholesky identification scheme and block recursive restriction. The dotted lines indicate 95% confidence intervals. The vertical axis represents percentage points while the horizontal axis refers to the number of days.





Note: Reported are the accumulated IRFs based on Equation (2), using a Cholesky identification scheme and block recursive restriction. The dotted lines indicate 95% confidence intervals. The vertical axis represents percentage points while the horizontal axis refers to the number of days.

As can be seen, the effect is statistically significant. The implementation of QE by EME central banks leads to an accommodative monetary policy stance through an initial depreciating effect on exchange rates, which rapidly stabilizes. As in the case of the response of bond spreads, there is some degree of heterogeneity in the magnitude of the exchange rate reactions across countries. For example, the impact on the

exchange rate is the strongest in the cases of Columbia, Indonesia, and Türkiye, with currency depreciations of around 0.4%. Typically, EMEs are wary of incurring currency depreciations given the inflationary effect and the potential for a de-anchoring of inflation expectations, as well as the potential for capital outflows. Improved institutional development and central bank credibility in EMEs, particularly since the global financial crisis (GFC) of 2008, have helped to allay many of the concerns associated with currency fluctuations that would have prevailed historically. Inflation targeting and effective central bank communication have helped largely to anchor inflation expectations over the medium term. Moreover, liquidity in EME financial markets and overall higher levels of financial development in the period since the GFC have helped to improve the resilience of EMEs, particularly in Asian economies. In the case of Asian economies, it should also be borne in mind that exchange rates are less overvalued than historically, with rates more closely aligned to equilibrium levels. In addition, current account balances are in a more favorable position, with less reliance on external financing.

On capital flow volatility, as shown in Figures A1 and A2 in the Appendix, APPs by EME central banks helped to dampen the volatility of capital flow overall. Statistical significance is mostly only apparent at the immediate impact of the shock, with volatility declining across both bond and equity flows sharply, although rapidly converging, and the effect becomes insignificant over the time horizon. Figure A3 in the Appendix provides details of the response of EME stock markets to APP shocks. The effect is mostly statistically insignificant. While stock markets recovered over the course of the pandemic, aggregate demand remained negatively affected during this period due to lockdowns and social-distancing impositions. Coupled with sporadic supply chain disruptions, the ramifications for exporting performance by EMEs was undoubtedly stark, with negative spillovers to stock markets. Under such circumstances, a lack of significance of central bank APPs on stock markets can be understood. In order to ascertain the impact of the APP on inflation expectations, Figure A4 in the Appendix shows that the effect is statistically insignificant in the majority of EMEs. There is some evidence of significant rising inflation expectations for Colombia, Croatia, and Hungary. However, the effects are very low in magnitude and become insignificant over a short time horizon. This tempers fears that the APP in EMEs is de-anchoring inflation expectations and threatening price stability over the medium term.

### 5. CONCLUSIONS

This paper investigates the impact of asset purchases under the APPs introduced by 14 EME central banks in response to the pandemic. We focus the empirical analysis on the effectiveness of the transmission to EME asset markets, capital flow volatility, and inflation expectations. Using data on central bank claims to the government data as a proxy for the APP, cross-country pooled regressions show that APPs have a statistically significant effect in compressing the bond spreads in the majority of EMEs. This finding is supported by a counterfactual analysis that projects the trajectory of bond spreads in the pandemic period based on pre-pandemic model coefficients and compares these spreads with actual levels.

Impulse responses generated from country-specific VARs reinforce the findings from the pooled regression, but also enable a determination to be made of the persistence of the impact over time. Overall, we find strong evidence to show that bond spread compressions are persistent over time, thereby revealing permanent effects. We also find that APP shocks have persistent and significant stabilizing effects on EME exchange rates, while also tempering capital flow volatility. Stock market reactions are not significant overall, also related to aggregate demand and exporting constraints due to the pandemic. Importantly for central banks, there is no statistically significant effect on inflation expectations for the vast majority of EMEs. For the cases where inflation expectations rise, the effect dissipates rapidly and also becomes statistically insignificant over a short time horizon.

Our results have key implications for EME central banks in broadening the monetary policy toolkit available to counteract negative exogenous shocks. This is particularly important in an era of constrained fiscal and conventional monetary policy space. QE measures by EMEs have been effective overall in their objectives, relieving pressure on long-term bond yields and supporting stability in asset markets, while also not aggravating the inflation outlook. Further research avenues may include examining more granularly the impact of QE under alternative threshold levels of central bank policy rates and the implications of direct financing by the central bank in primary bond markets for long-term resilience in local currency bond markets and inflation expectations over the medium to long term. Our overall findings for EMEs are broadly in alignment to previous studies carried out on advanced economies in terms of the significance of the impact on bond spreads. Given that the central bank purchases government bonds under these programs, a failure to find any impact would indicate a disruption or friction in the monetary policy transmission mechanism. Differences as regards scale and duration of QE impact for EMEs compared to advanced economies can be related to alternative market liquidity conditions and investor risk preferences. Further research avenues may include examining more granularly the impact of QE under alternative threshold levels of central bank policy rates, and exploring potential asymmetric impacts on EME financial markets due to the exit from QE (or quantitative tightening).

### REFERENCES

- Apostolou, A., and J. Beirne. 2019. "Volatility spillovers of unconventional monetary policy to emerging market economies". *Economic Modelling* 79(C), pp. 118–129.
- Arena, M., R. Bems, N. Ilahi, J. Lee, W. Lindquist, and T. Lybek. 2021. Asset Purchase Programs in European Emerging Markets. *IMF Departmental Paper*, No 2021/021. Washington, DC: International Monetary Fund.
- https://www.imf.org/-/media/Files/Publications/DP/2021/English/APPEEMEA.ashx.
- Arslan, Y., M. Drehmann, and B. Hofmann. 2020. Central Bank Bond Purchases in Emerging Market Economies. *BIS Bulletin* 20. https://www.bis.org/publ/ bisbull20.pdf.
- Asian Development Bank. 2021. Asia Bond Monitor, September 2021. Manila: Asian Development Bank. https://www.adb.org/publications/asia-bond-monitor-september-2021.
- Banco de España. 2020. Report on the Latin American Economy: Second Half of 2020. Banco de España Economic Bulletin 4/2020. https://repositorio.bde.es/ bitstream/123456789/13928/1/be2004-art31e.pdf.
- Bernanke, B. S., and V. R. Reinhart. 2004. "Conducting monetary policy at very low short-term interest rates". *American Economic Review* 94(2), pp. 85–90.
- Benigno, G., J. Hartley, A. García-Herrero, A. Rebucci, and E. Ribakova. 2020. Credible Emerging Market Central Banks Could Embrace Quantitative Easing to Fight COVID-19, HKUST IEMS Working Paper Series 2020-75, HKUST Institute for Emerging Market Studies.
- Cecioni, M., G. Ferrero, and A. Secchi. 2018. "Unconventional monetary policy in theory and in practice." In Douglas D. Evanoff, George G. Kaufman, and A. G. Malliaris (eds). *Innovative Federal Reserve Policies During the Great Financial Crisis*, pp. 1–36.
- Felipe, J., S. Fullwiler, G. Estrada, M. H. Jaber, M. A. Magadia, and R. Patagan. 2020. How "Monetization" Really Works—Examples from Nations' Policy Responses to COVID-19. ADB Economics Working Paper Series 627. Manila: Asian Development Bank. https://www.adb.org/publications/how-monetization-workspolicy-responses-covid-19.
- Fratto, C., B. Harnoys Vannier, B. Mircheva, D. de Padua, and H. Poirson. 2021. Unconventional Monetary Policies in Emerging Markets and Frontier Countries. IMF Working Paper WP/21/14. Washington, DC: International Monetary Fund. https://www.imf.org/-/media/Files/Publications/WP/2021/English/wpiea2021014print-pdf.ashx.
- Fratzscher, M., M. Lo Duca, and R. Straub. 2018. "On the International Spillovers of US Quantitative Easing." *Economic Journal*, 128(608), pp. 330–377.
- Gambacorta, L., B. Hofmann, and G. Peersman. 2014. "The Effectiveness of Unconventional Monetary Policy at the Zero Lower Bound: A Cross-Country Analysis." *Journal of Money, Credit and Banking*, 46(4), pp. 615–642.
- Ha, J. and G. Kindberg-Hanlon. 2021. "Asset Purchases in Emerging Markets: Unconventional Policies, Unconventional Times" in Global Economic Prospects". Chapter 4. Washington, DC: World Bank. pp. 169–198. https://elibrary.worldbank.org/doi/10.1596/978-1-4648-1612-3\_ch4.

- Hattori, M., A. Schrimpf, and V. Sushko. 2016. "The Response of Tail Risk Perceptions to Unconventional Monetary Policy." *American Economic Journal: Macroeconomics*, 8(2), pp. 111–136.
- International Monetary Fund. 2020. Global Financial Stability Report, October 2020: Bridge to Recovery. Washington, DC: International Monetary Fund. https://www.imf.org/en/Publications/GFSR/Issues/2020/10/13/global-financialstability-report-october-2020.
- Mimir, Y. and E. Sunel. 2021. *Quantitative Easing in Emerging Market Economies: Benefits, Risks, and Limitations*. London: Centre for Economic Policy Research. https://voxeu.org/article/quantitative-easing-emerging-market-economies.
- Pordeli, S., L. Schofer, and M. Sutton. 2021. The Response by Central Banks in Emerging Market Economies to COVID-19. RBA Bulletin – March 2021. https://www.rba.gov.au/publications/bulletin/2021/mar/pdf/the-response-bycentral-banks-in-emerging-market-economies-to-covid-19.pdf.
- Rebucci, A., J. S. Hartley, and D. Jiménez. 2022. An Event Study of COVID-19 Central Bank Quantitative Easing in Advanced and Emerging Economies. In *Essays in Honor of M. Hashem Pesaran: Prediction and Macro Modeling: Volume 43A.* pp. 291–322. Bingley: Emerald Publishing Group. https://www.emerald.com/ insight/content/doi/10.1108/S0731-90532021000043A014/full/html.
- Sever, C., R. Goel, D. Drakopoulos, and E. Papageorgiou. 2020. Effects of Emerging Market Asset Purchase Program Announcements on Financial Markets During the COVID-19 Pandemic. IMF Working Paper WP/20/292. Washington, DC: International Monetary Fund. https://www.imf.org/en/Publications/WP/Issues/ 2020/12/18/Effects-of-Emerging-Market-Asset-Purchase-Program-Announcements-on-Financial-Markets-During-49967.
- United Nations Department of Economic and Social Affairs (UN DESA). 2022. The Monetary Policy Response to COVID-19: The Role of Asset Purchase Programmes. UN DESA Policy Brief No. 129. https://www.un.org/development/ desa/dpad/wp-content/uploads/sites/45/publication/PB\_129\_FINAL.pdf.
- World Bank. 2021. *Global Economic Prospects January 2021*. Washington, DC: World Bank. http://hdl.handle.net/10986/34710.

## APPENDIX

Colombia	Croatia	Hungary	India	
Indonesia	Malaysia	Peru	Philippines	
Poland	Romania	Serbia	South Africa	
Thailand	Türkiye			

### Table A1: List of Countries

Variables	Data	Source
Bond spread (%)	<ul> <li>Yield of 10-year local currency government bond of the EME</li> <li>Yield of 10-year US Treasury bond</li> </ul>	Bloomberg
Inflation (y/y, %)	Consumer Price Index (CPI)	CEIC
Inflation expectations (y/y, %)	Economists' inflation forecasts	Bloomberg
Stock market index	Stock market index closing level	Bloomberg
Yield of 10-year US Treasury bond	Yield of 10-year US Treasury bond closing level	Bloomberg
Local currency to USD nominal exchange rate	Local currency to USD nominal exchange rate	Bloomberg
Portfolio debt and equity volatilities	Net flows; volatilities computed as standard deviations	IMF
APP (billion USD or as percentage of nominal GDP)	<ul> <li>Central bank claim to central government as a proxy variable for the APP</li> <li>Nominal Gross Domestic Product (GDP)</li> <li>Local currency to USD nominal exchange rate</li> </ul>	<ul><li>CEIC</li><li>Bloombe</li></ul>

### Table A2: Data Used in the Empirical Analysis



#### Figure A1: Impulse Responses of Portfolio Debt Volatility to APP Shock

Note: Reported are the accumulated IRFs based on Equation (2), using a Cholesky identification scheme and block recursive restriction. The dotted lines indicate 95% confidence intervals. The vertical axis represents percentage points while the horizontal axis refers to the number of days.



### Figure A2: Impulse Responses of Portfolio Equity Volatility to APP Shock

Note: Reported are the accumulated IRFs based on Equation (2), using a Cholesky identification scheme and block recursive restriction. The dotted lines indicate 95% confidence intervals. The vertical axis represents percentage points while the horizontal axis refers to the number of days.

Figure A3: Impulse Responses of EME Stock Markets to APP Shock (Percentage Points)



Note: Reported are the accumulated IRFs based on Equation (2), using a Cholesky identification scheme and block recursive restriction. The dotted lines indicate 95% confidence intervals. The vertical axis represents percentage points while the horizontal axis refers to the number of days.

Figure A4: Impulse Responses of EME Expected Inflation to APP Shock (Percentage Points)



Note: Reported are the accumulated IRFs based on Equation (2), using a Cholesky identification scheme and block recursive restriction. The dotted lines indicate 95% confidence intervals. The vertical axis represents percentage points while the horizontal axis refers to the number of days.