International Monetary Spillovers to Frontier Financial Markets: Evidence from Bangladesh*†

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Abstract

This paper investigates international monetary spillovers to stock prices in Bangladesh, a frontier market that has been excluded from prior studies in the literature. Using daily stock price data for over 300 publicly traded firms in a high-frequency event study framework, we find that contractionary monetary shocks originating from the US, euro area, and China lower stock prices, with Chinese monetary shocks having the largest impact. Contractionary shocks originating from India, on the other hand, lead to a statistically significant increase in stock returns. The positive response is driven by a small number of policy decisions. When these outlier decisions are removed from the sample, contractionary Indian monetary shocks lead to a decline in stock prices in line with spillovers from the other countries.

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1 Introduction

A growing literature has documented monetary spillovers from the major advanced economies to international financial markets. The effects of Federal Reserve policy have received special attention, particularly spillovers from the unconventional actions taken in the wake of the Great Recession. The focus on spillovers from major central banks has provided valuable insight on the mechanisms underlying the global financial cycle. However, there is limited evidence on monetary spillovers from larger emerging economies to their smaller counterparts. This paper contributes to filling that gap.

Using detailed firm-level stock data from Bangladesh, we implement an event study framework to analyze international monetary spillovers to a frontier financial market. Frontier markets are considered to be more developed than the least developed countries, but smaller and less accessible than the major emerging economies.[1] FTSE, specifically, describes frontier markets as "developing countries with high rates of economic growth but small and relatively illiquid stock markets."[2] As shown in Figure 1, the share of global GDP accounted for by the 26 countries FTSE classifies as frontier markets is projected to have nearly doubled from 2002 to 2027. It is therefore increasingly important to clarify monetary and financial linkages between the major economies and this fast growing segment of the global economy.

Bangladesh presents an especially interesting case. Despite being one of the five largest frontier markets by 2021 GDP and having experienced the third highest growth rate among frontier economies since 2000, it has been excluded from prior studies on international monetary spillovers.[3] In this paper we estimate the response of Bangladeshi stock prices to monetary policy decisions by Bangladesh's four largest trading partners: the United States, Germany (euro area monetary policy), China, and India. This analysis offers three novel contributions. We are the first study to investigate monetary spillovers from *any* central bank to Bangladeshi financial markets. Second, we consider spillovers not only from advanced economies like the US and euro area (as is common in the literature), but also from major emerging economies like China and

India. Lastly, our analysis takes place at a very granular level, as we exploit a large panel of high-frequency firm-level data.

With daily stock price data for over 300 Bangladeshi firms, we focus on a 2013-2019 sample period. Consistent with much of the international spillover literature, we find that contractionary monetary shocks in the US, euro area, and China lead to a statistically significant decline in Bangladeshi stock returns. Chinese monetary shocks generate a larger and more persistent response than shocks emanating from the US or euro area. Interestingly, contractionary Indian monetary shocks result in a significant *rise* in stock returns, as firm-level stock prices increase, on average, around a Reserve Bank of India policy decision. Specifications analyzing the DSE Broad (DSEX) and DSE 30 (DS30) indexes confirm this result, as a contractionary shock leads to a statistically significant rise in both indexes. The positive response turns out to be driven by five unique RBI policy decisions. When these decisions are excluded from the sample, a contractionary Indian shock leads to a decline in Bangladeshi stock prices, in line with spillover effects from the three other central banks.

Sectoral analysis sheds additional light on the asymmetric spillovers. Textiles, one of Bangladesh's major exports to the US, euro area, and China, decline meaningfully following a contractionary shock from any of the three countries. Euro area and Chinese monetary shocks also have a notable impact on Bangladesh's financial sector. The insurance sector, on the other hand, appears to be the main driver of the positive baseline response to contractionary RBI decisions.

Research on international monetary policy spillovers has tended to focus either on the impact of unconventional policy, i.e., quantitative easing, or on the impact of conventional policy, i.e., changes to the expected path of the short-term policy rate. Studies such as Anaya et al. (2017), Bowman et al. (2015), and Bauer and Neely (2014) document the impact of unconventional US monetary policy on international markets. Albagli et al. (2019), Gilchrist et al. (2019), Hausman and Wongswan (2011), and Ehrmann and Fratzscher (2009) present evidence on conventional US monetary policy spillovers to financial markets in a range of advanced and emerging economies. This paper adds to the literature by estimating spillovers of US monetary policy to stock prices

in Bangladesh, a country which has been excluded from previous investigations.

The literature has also noted international spillovers from ECB monetary policy. Fratzscher et al. (2016) and Georgiadis and Gräb (2016) document spillovers of unconventional ECB policy to equity markets in advanced economies. Falagiarda et al. (2015), Kucharčuková et al. (2016), and Potjagailo (2017) provide evidence of unconventional and conventional ECB policy spillovers to financial markets in non-euro area European countries. Walerych and Wesołowski (2021) compares the spillover effects of conventional Fed and ECB policy actions in a panel of emerging markets, while Kim and Nguyen (2009) perform a similar analysis for stock markets in the Asia-Pacific region. We extend this line of study by estimating the impact of ECB monetary policy on Bangladeshi equities.

As China's global economic influence continues to grow, spillovers from the People's Bank of China have received increasing attention. Koluk and Mehrotra (2009) find evidence of PBC spillovers to real variables in a panel of East and Southeast Asian countries. Miranda-Agrippino et al. (2020) and Beirne et al. (2021) compare the global transmission of Chinese and US monetary shocks. While not explicitly focused on monetary spillovers, Yang et al. (2019), Belke et al. (2018), and Arslanalp et al. (2016) document significant international financial spillovers from China, particularly to other regional Asian economies. On the other hand, the only study analyzing international spillovers of Indian monetary policy that we are aware of is Cekin et al. (2019), which investigates monetary interlinkages between the BRICS countries (Brazil, Russia, India, China, and South Africa). A major contribution of this study is to produce the first high-frequency estimates of Chinese and Indian monetary spillovers to a frontier equity market.

The rest of the paper is organized as follows. Section 2 introduces our data on Bangladeshi stock prices and international monetary policy shocks. Section 3 presents our baseline results and investigates differential spillover effects from the four central banks. Section 4 discusses policy implications and concludes.

2 Data

2.1 Bangladeshi Stock Market Data

The Dhaka Stock Exchange (DSE) is the oldest and largest in Bangladesh.[4] We have daily stock price data for a rich panel of over 300 firms traded on the DSE through 2019. Since 2013, the DSE has also hosted two major indexes, the DSE Broad (DSEX) and the DSE 30 (DS30). The DSEX aims to reflect approximately 97% of the DSE total market capitalization while the DS30 reflects approximately 51%.

2013 is an appealing starting point for our estimation sample for multiple reasons. First, the two main DSE indexes are introduced at that time. Second, the Bangladeshi stock market experienced a bubble from 2009 to 2011 that featured an extreme boom in share prices in 2009 and 2010 before crashing in 2011.[5] The aftermath of the crash had subsided by 2013, ensuring that our estimation is not unduly influenced by the bubble years. Third, as will be discussed in the following section, Chinese and Indian monetary policy actions became more systematic and transparent during this period, allowing for cleaner estimates of monetary spillovers from these countries. We end our sample in 2019 due to limitations on firm-level stock price data.

2.2 International Monetary Policy Shocks

We explore monetary spillovers from Bangladesh's four largest trading partners: the United States, Germany (euro area monetary policy), China, and India.[6] A number of studies, referenced above, have documented monetary spillovers from the US to a broad panel of emerging economies. A smaller subset of studies have provided evidence on spillovers from euro area and Chinese monetary policy. Bangladesh's stock market has been excluded from these samples however. Furthermore, to the best of our knowledge, this paper is the first to estimate high-frequency monetary spillovers from major emerging economies such as China and India to a frontier market.

We use an event study framework to analyze the response of Bangladeshi stock prices to monetary policy decisions in the four countries over the 2013-2019 sample. The event study framework requires a high-frequency measure of the surprise change in monetary policy around

each decision, i.e., a monetary policy shock measure. Dates for US monetary policy actions are from the website of the Board of Governors of the Federal Reserve System and dates for euro area actions are from the European Central Bank's website. While the Federal Reserve and ECB have regularly scheduled policy meetings where the majority of monetary policy actions are announced, the People's Bank of China and Reserve Bank of India have a more nuanced policy environment. Both central banks have employed multiple policy instrument regimes, with China evolving towards an interest rate corridor system in recent years, and the Reserve Bank of India formally adopting an inflation targeting regime in 2016. The use of multiple instruments and shifting policy regimes makes it difficult to consistently measure changes in the stance of policy over time.

Kamber and Mohanty (2018) and Lakdawala and Sengupta (2021) have addressed this problem by creating time series of unanticipated changes to monetary policy in China and India, respectively, which capture movements in short-term funding conditions around PBC and RBI policy decisions, regardless of the instrument being targeted. They produce series of high-frequency monetary policy surprises around central bank policy decisions, analogous to those created by, e.g, Kuttner (2001) for Fed decisions or Altavilla et al. (2019) for ECB decisions. Specifically, Kamber and Mohanty (2018) include changes in the reserve requirement ratio, changes to the benchmark lending and deposit rates, publication of quarterly monetary policy reports, and adjustments to exchange rate policy in their sample of PBC policy decisions. Lakdawala and Sengupta (2021), in turn, include dates when information was revealed about the repo rate, reverse repo rate, bank rate, or cash reserve ratio in their sample of RBI policy decisions. Accordingly, we use the respective dates provided by these studies as the basis for our PBC and RBI event windows.[7]

Our monetary policy shock measure for each of the four countries is the change in the two year government bond yield during a two-day window centered around the central bank's policy action. Daily data on government bond yields is obtained from Bloomberg. Our focus on two year government bonds as the monetary instrument and a two-day event window around policy

actions follows Hanson and Stein (2015). We select the two year government bond as our primary instrument because it allows us to capture shocks to forward guidance, an important component of US and euro area monetary policy during this period, in addition to direct shocks to the policy rate. The two-day event window ensures that we capture the market's full reaction to a monetary policy decision. As will be discussed below, our results are robust to using monetary policy surprises constructed from short-term futures and derivatives data as our policy instrument and to using a narrower one-day event window around policy actions.

2.3 Summary Statistics Summary statistics for firm-level stock returns, DSEX index returns, and DS30 index returns calculated in a two-day window around international monetary policy decisions are presented in Panel A of Table 1. There are 47 FOMC decisions, 55 ECB decisions, 34 PBC decisions, and 41 RBI decisions in this period. Bangladeshi stock returns fall, on average, around FOMC and ECB decision days. Mean and median stock returns on PBC days are mixed. Interestingly, the average return on RBI days is positive across firms and for both indexes, although the median DS30 return is slightly negative. The standard deviation of stock returns on international monetary policy decision days is slightly higher than the standard deviation across the sample as a whole.

Summary statistics for the international monetary policy shocks are presented in Panel B of Table 1. The shocks are standardized to have unit standard deviation for each country. US and Indian monetary shocks are negative on average, with a negative shock representing an unexpected easing of policy. Mean and median monetary shocks for the euro area and China are close to zero. The largest positive (contractionary) shock in the sample occurred for the euro area on December 3, 2015 when the ECB surprised markets by cutting the deposit facility rate by less than forecasted and by failing to increase the size of its monthly asset purchases. The largest negative (expansionary) shock in the sample occurred for India on September 29, 2015 when the RBI cut the benchmark repo rate by a larger than expected 50 basis points to a four year low of 6.75%.

3 Results

3.1 Firm-Level Spillovers We begin by estimating the following firm-level regression equation for each central bank j's sample of monetary policy decisions:

$$\Delta S_{it}^{j} = \alpha^{j} + \beta^{j} mp_{t}^{j} + \phi_{i}^{j} + \epsilon_{it}^{j} \tag{3.1}$$

where ΔS_{it}^{j} is firm i's two-day stock return around central bank j's time t monetary policy decision, mp_{t}^{j} is central bank j's time t monetary shock, and ϕ_{i}^{j} is a firm fixed effect over central bank j's policy decisions.

Results are presented in Table 2, with robust standard errors clustered at the firm-level in brackets. The first three columns show that contractionary shocks in the US, euro area, and China lead to statistically significant declines in firm-level stock returns. Specifically, a one standard deviation US monetary shock results in a 0.07% decline in Bangladeshi stock returns. This is equivalent to a 0.35% decline following a surprise 25 basis point tightening, in line with prior studies such as Hausman and Wongswan (2011), who report a 0.25% decline in international stock indexes following an equivalent US shock. With even larger magnitudes, a one standard deviation euro area shock results in a 0.27% decline and a one standard deviation Chinese shock results in a 0.59% decline. Surprisingly, column four shows that Bangladeshi stock returns actually increase in response to a contractionary Indian monetary shock, as a one standard deviation Indian monetary shock results in a statistically significant 0.08% rise in Bangladeshi stock returns.

In our baseline results we implement a two-day event window and use the change in two-year government bond yields as our monetary shock measure. The results in Table 2 are robust to alternative specifications however. We re-estimate equation 3.1 with a one-day event window, and replace mp_{t}^{j} with monetary policy surprises constructed from short-term interest rate futures and derivative contracts. The US measure is based on four Eurodollar futures contracts, expiring

one quarter ahead to four quarters ahead. Similar to Nakamura and Steinsson (2018), we take the first principal component of changes in the four Eurodollar futures prices on FOMC decision days as our US monetary policy surprise. This is a parsimonious way of capturing surprise changes to the expected path of short and medium-term interest rates. A similar measure of monetary policy surprises for the euro area, the change in the two-year Overnight Index Swap rate on an ECB decision day, is provided by the Euro Area Monetary Policy Event-Study Database (EA-MPD) introduced by Altavilla et al. (2019). Lakdawala and Sengupta (2021) provide an analogous monetary policy surprise measure for India based on changes in Overnight Index Swap rates around RBI policy decisions. While Kamber and Mohanty (2018) produce a similar monetary policy surprise measure for China, the series is not publicly available, hence we omit Chinese monetary spillovers from this robustness check.

With a narrower one-day event window and an alternative measure of monetary policy shocks, Table 3 reports results that are consistent with the baseline findings in Table 2. Specifically, contractionary monetary policy surprises in the US and euro area result in declines in firm-level Bangladeshi stock returns, whereas contractionary Indian monetary policy surprises lead to an increase in stock prices. All coefficients are precisely estimated and highly statistically significant.

3.2 Equity Indexes Having documented international monetary spillovers to firm-level Bangladeshi stock returns, we next analyze spillovers to the major stock indexes, the DSEX and DS30. We modify the panel regression in equation 3.1 into the following time series regression:

$$\Delta S_t^j = \alpha^j + \beta^j mp_t^j + \epsilon_t^j \tag{3.2}$$

where ΔS_t^j is the two-day return on either the DSEX or DS30 around central bank j's time t monetary policy decision.

Table 4 presents the response of the DSEX and DS30 indexes to international monetary shocks, with heteroskedasticity-robust standard errors in brackets. The first three columns indicate that responses to US, euro area, and Chinese monetary shocks are statistically indistinguish-

able from zero. Given that our 2013-2019 sample period is relatively short for time series data, with a maximum of 55 observations for ECB policy decisions and a minimum of 34 observations for PBC decisions, the lack of precision relative to the firm-level results is unsurprising. Notably, however, the relative magnitudes of the index responses are consistent with the notion that Bangladeshi stocks respond more strongly to Chinese monetary policy than to US or euro area policy. Despite the small sample, the fourth column once again shows a positive and statistically significant response to a contractionary Indian monetary shock. This offers further evidence of an asymmetric, positive stock price reaction to an unexpected tightening of Indian monetary policy. We check for robustness by re-estimating equation 3.2 with a one-day event window and with futures and swap-derived monetary policy surprises serving as the shock measure. Results, presented in Table 5 are consistent with those in Table 4.[8] Overall, the equity index results support two of the major findings from our firm-level estimation: Chinese monetary shocks have a larger impact on the Bangladeshi stock market than US and euro area shocks, and, surprisingly, contractionary Indian monetary shocks lead to an increase in Bangladeshi stock prices.

3.3 Persistence We can check the persistence of the spillover effects by estimating the following local projection specification:

$$S^j_{i,t+h} - S^j_{i,t-1} = \alpha^j_h + \beta^j_h mp^j_t + \phi^j_i + \epsilon^j_{it} \tag{3.3}$$

where the h-day change in firm-level stock prices (relative to the policy event window t) is regressed on the international monetary shocks. While other events may influence stock prices in the h-day interval, the coefficients will be estimated without bias so long as the extraneous events do not systematically push the market in one direction or the other. Results from this exercise are presented in Figure 2 with confidence intervals constructed from Driscoll-Kraay standard errors.

As in Table 2, one can observe an initial decline in Bangladeshi stock prices following contractionary US, euro area, and Chinese monetary shocks. Chinese monetary shocks not only have the

largest effect on impact, but they also have the most persistent effect, as firm-level stock returns remain significantly lower on average over a week after a PBC policy decision. In contrast, the impact of a US monetary shock recedes within a week of a Fed decision, while the effect of a euro area shock fades within a few days of an ECB decision. While Bangladeshi stock prices increase immediately following a contractionary Indian monetary shock, the effect becomes somewhat noisy and statistically indistinguishable from zero shortly after a RBI decision. The impulse response analysis is therefore consistent with the main findings from our baseline results: Chinese monetary policy generates the largest and most persistent spillovers, while Indian monetary policy shocks counterintuitively have a positive initial effect on Bangladeshi stock returns.

3.4 Understanding the Differential Spillover Effects

For a sample excluding Bangladesh, Beirne et al. (2021) report that Chinese monetary shocks have a larger effect on emerging Asian stock markets than US shocks do. They argue the relatively larger Chinese monetary spillovers can be attributed to closer trade integration and financial linkages in recent decades. This argument is consistent with our finding that Chinese monetary policy has a larger impact on Bangladeshi equities than US or euro area policy. Most pertinently, China is Bangladesh's largest trading partner, with over $10 billion in trade a year. The economic integration between the two countries is further highlighted in the following section's sectoral analysis, as a majority of Bangladesh's industries show a statistically significant stock price response to Chinese monetary shocks. Beirne et al. (2021) interpret increasing correlations between equity returns in China and other Asian markets as evidence of tighter direct financial linkages. Similarly, we observe a rising correlation between the DSEX and the Shanghai Stock Exchange (SSE) Composite Index through 2017, although the correlation reverses in 2018-2019. Altogether, given the close economic ties between China and Bangladesh, it is not entirely surprising that Chinese monetary policy has larger spillovers to the Bangladeshi stock market than the advanced Western economies.

The positive response to contractionary Indian monetary policy is rather unexpected, however, and calls for further investigation. Of the 41 RBI policy decisions in our sample five stand

out as driving this counterintuitive result. The five outlier dates are listed in Table 6 along with a description of the associated policy decision. On three of them a surprise policy tightening was followed by an increase in stock prices, and on two, a surprise policy easing was followed by a decrease. Stock prices in India, as captured by the Nifty 50 index, moved in the same direction as their Bangladeshi counterparts on four of the five days suggesting that the "information effect" of the policy decisions may have dominated.

A monetary policy decision may signal new information about the state of the economy, which can lead to counterintuitive outcomes. For instance, if the central bank cuts interest rates due to fears of weakening growth, markets may have a negative response to the expansionary policy decision if investors revise their expectations about future economic activity downwards. This reaction to the new macroeconomic information revealed by the policy decision is the so-called "information effect." Jarociński and Karadi (2020) identify information effects around central bank decisions by analyzing the co-movement of interest rates and stock prices. Policy decisions accompanied by a positive co-movement are considered information shocks that primarily reveal news about the central bank's assessment of economic fundamentals. Under this view, the handful of dates driving the positive response of Bangladeshi stock prices to Indian monetary shocks are likely capturing the information component of RBI policy decisions. In other words, Bangladeshi stock prices may have reacted to news about the state of the Indian economy rather than to news about the expected path of Indian interest rates.

If we remove the five dates listed in Table 6 from the sample of Indian monetary policy decisions and re-estimate equations 3.1 and 3.2, we obtain a statistically significant *decline* in firm-level stock prices and an insignificant effect on the DSEX and DS30 indexes, as shown in Table 7. According to these estimates, for roughly 80% of our sample period, a unit standard deviation contractionary Indian monetary shock leads to a 0.11% average decline in firm-level stock prices. This is in line with the estimated effect of US monetary policy reported in Table 2. Overall, while the Bangladeshi stock market may be more strongly influenced by the information component of Indian monetary policy, it appears that the majority of RBI decisions result in

similar spillover effects as the other central banks.

3.5 Sectoral Heterogeneity Lastly, we explore how different sectors within the Bangladeshi stock market drive the overall spillover effects. Publicly traded firms are grouped into 22 sectors according to the DSE's classification system.[9] Table 8 lists the different sectors, along with the number of firms in each over our sample. Insurance and textile are the most widely represented, with 49 and 48 firms, respectively. The corporate bond, paper and printing, telecommunication, travel and leisure, jute, and services and real estate sectors, on the other hand, are all represented by less than five firms.

We re-estimate equation 3.1 by sector with results presented in Table 9. Spillovers from US monetary policy appear to be driven by firms in the information technology and textile sectors. The latter sector is especially notable, as textiles are the largest export from Bangladesh to the US. Textile stock prices also react strongly to euro area and Chinese monetary shocks, as textiles are major exports to those regions as well. Firms in the broad financial sectors, including banks, other financial institutions, and mutual funds respond strongly to euro area and Chinese monetary policy but appear to be unaffected by shocks emanating from the US. More sectors have a statistically significant response to Chinese monetary shocks than to euro area or US shocks, highlighting the relatively tighter economic integration between Bangladesh and China.

The positive baseline response of Bangladeshi stocks to a contractionary Indian monetary shock is driven by the insurance, food and allied, and fuel and power sectors. The insurance sector, which is the most widely represented in our sample, has been noted in the Bangladeshi press for being particularly prone to speculation. The Daily Star newspaper published articles on April 30, 2021 with the headline "Insurance stocks a double-edged sword for investors" and on June 10, 2021 with the headline "High-flying insurance stocks may put market in trouble."[10] The latter begins by noting "The stock price of almost all general insurance companies has more than doubled over the past year riding on speculation, putting the whole market at risk." Given our data limitations, it is impossible to quantify the degree to which speculation in insurance stocks may have contributed to the positive coefficient in our baseline results (column four of Table 2).

However, it is noteworthy that the coefficient becomes statistically insignificant if *only* insurance firms are excluded from the sample on the five outlier dates listed in Table 6.[11] This suggests "information effects" stemming from RBI policy decisions may influence the Bangladeshi stock market through its relatively more speculative sectors.

4 Conclusion

This study sheds new light on how international monetary policy impacts frontier financial markets. In contrast to the previous literature, our results highlight the importance of spillovers from large emerging economies like China and India. Compared to spillovers from the US and euro area, emerging economy monetary policy can not only generate larger and more persistent spillovers, in the case of China, but can also generate asymmetric spillovers, as contractionary Indian shocks positively impact Bangladeshi stock prices in our baseline estimation.

As major emerging economies like China and India continue to play an increasing role in the global economy, their policy actions will undoubtedly have a greater influence on macroeconomic and financial conditions in smaller trading partners like Bangladesh. Monetary decisions are a uniquely important source of policy spillovers, as they are conducted on a regular and increasingly systematic basis. Quantifying these spillovers and clarifying their underlying mechanisms is an essential task for all parties interested in understanding the dynamics of the global financial system. It is particularly important for central bankers in frontier economies who must maintain the smooth functioning of domestic monetary policy while external influences emanate from multiple directions. Further analysis, particularly with regards to monetary spillovers to real macroeconomic variables, is an important area for future investigation.

Notes

[1]Equity index providers S&P, MSCI, and FTSE all include Bangladesh in their frontier classification. A country's classification is determined by market size, liquidity, and accessibility criteria.

[2]https://content.ftserussell.com/sites/default/files/research/frontier_marketsaccessing_the_next_frontier_final.pdf

[3]According to World Bank data.

[4]The DSE, originally called the East Pakistan Stock Exchange, began trading in 1956 and, according to its official website, has a market capitalization of $65.7 billion USD as of January 2022. The newer Chittagong Stock Exchange (CSE) began trading in 1995 and has a market capitalization of $57.5 billion USD as of January 2022.

[5]See Saha (2012) for details on this period.

[6]According to World Bank data, in 2015, the United States and Germany were Bangladesh's largest export partners at $6.1 billion and $4.7 billion (USD), respectively, while China and India were Bangladesh's largest import partners at $10.3 billion and $5.9 billion.

[7]The dates provided by Kamber and Mohanty (2018) run through August 2016. We extend the date series through December 2019 using information available on the PBC's official website.

[8]Chinese shocks are again omitted from this robustness check due to a lack of publicly available data on Chinese monetary policy surprises.

[9]20 of the 22 sectors are present in our data, as we have no firm-level stock price information for firms in the Debenture or Treasury Bond sectors.

[10]The articles are available online at https://www.thedailystar.net/business/news/insurance-stocks-double-edged-sword-investors-2086153 and https://www.thedailystar.net/business/news/high-flying-insurance-stocks-may-put-market-trouble-2108073.

[11]Results available upon request.

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Table 1: Summary Statistics

	Mean	Median	Std Dev	Min	Max	Observations
Panel A: Bangladesh stock returns						
FOMC Days						
Firm-level	-0.37	-0.26	3.94	-53.79	69.31	14,535
DSEX	-0.33	-0.31	1.21	-3.96	2.22	47
DS30	-0.29	-0.27	1.13	-3.55	2.18	47
ECB Days						
Firm-level	-0.05	-0.27	4.00	-35.99	58.37	16,672
DSEX	-0.19	-0.16	1.28	-4.17	3.45	55
DS30	-0.34	-0.32	1.26	-3.74	2.14	54
PBC Days						
Firm-level	0.18	0.00	3.97	-45.58	37.24	10,520
DSEX	0.10	-0.19	1.47	-2.70	5.36	34
DS30	-0.02	-0.36	1.52	-3.46	4.18	34
RBI Days						
Firm-level	0.08	0.00	3.83	-83.71	105.89	12,850
DSEX	0.23	0.07	1.07	-2.34	2.50	41
DS30	0.19	-0.04	1.20	-3.25	2.99	41
All Days						
Firm-level	-0.03	0.00	3.94	-91.02	226.33	491,673
DSEX	0.03	0.00	1.21	-6.26	5.36	1,582
DS30	0.03	-0.02	1.26	-7.68	4.74	1,562
Panel B: International monetary shocks						
US	-0.21	-0.16	1.00	-2.59	1.93	47
euro area	0.05	-0.03	1.00	-1.64	4.28	55
China	0.02	-0.06	1.00	-2.70	2.51	34
India	-0.08	-0.11	1.00	-3.22	2.16	41

Panel A shows summary statistics for firm-level stock returns, DSE Broad Index (DSEX) returns, and DSE 30 Index (DS30) returns calculated in a two-day window around international monetary policy decisions. Panel B shows summary statistics for US, euro area, Chinese, and Indian monetary policy shocks calculated in an analogous two-day window around a country's monetary policy decision. The sample period is January 2013 through December 2019.

Table 2: Response of firm-level stock prices to international monetary shocks

	(1)	(2)	(3)	(4)
US MP Shock	-0.071**			
	[0.033]			
Euro area MP Shock		-0.271***		
		[0.036]		
Chinese MP Shock			-0.588***	
			[0.041]	
Indian MP Shock				0.083**
				[0.035]
Constant	-0.385***	-0.037***	0.190***	0.090***
	[0.007]	[0.002]	[0.001]	[0.004]
Observations	14,531	16,671	10,517	12,579
R-squared	0.053	0.044	0.073	0.065

The table shows the response of firm-level Bangladeshi stock returns to US, euro area, Chinese, and Indian monetary policy shocks. The panel includes 357 stocks traded on the DSE from January 2013 to December 2019. Monetary shocks have been normalized to have unit standard deviation for each country. Stock returns and monetary shocks have been calculated in a two-day window around a central bank's monetary policy decision. Robust standard errors clustered at the firm-level are in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Robustness. Response of firm-level stock prices to international monetary shocks

	(1)	(2)	(3)	(4)
US MP Shock	-0.254***			
	[0.056]			
Euro area MP Shock		-0.073***		
		[0.009]		
Chinese MP Shock			——	
Indian MP Shock				0.651***
				[0.113]
Constant	-0.220***	-0.208***		0.100***
	[0.003]	[0.001]		[0.002]
Observations	14,273	16,675		12,579
R-squared	0.045	0.048		0.043

The table shows the response of firm-level Bangladeshi stock returns to alternative constructions of US, euro area, and Indian monetary policy shocks. The monetary shocks in this table are calculated using changes in short-run interest rate futures and derivatives prices around policy decisions. See section 3.1 for details. Both the monetary shocks and firm-level stock returns are calculated in a one-day event window. Robust standard errors clustered at the firm-level are in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Response of stock indexes to international monetary shocks

	DSEX Index			
	(1)	(2)	(3)	(4)
US MP Shock	0.106			
	[0.146]			
Euro area MP Shock		-0.140		
		[0.198]		
Chinese MP Shock			-0.459	
			[0.394]	
Indian MP Shock				0.217*
				[0.124]
Constant	-0.305	-0.178	0.105	0.246
	[0.192]	[0.173]	[0.244]	[0.168]
Observations	47	55	34	41
R-squared	0.008	0.012	0.098	0.041
	DS30 Index			
	(1)	(2)	(3)	(4)
US MP Shock	0.107			
	[0.149]			
Euro area MP Shock		0.059		
		[0.176]		
Chinese MP Shock			-0.370	
			[0.365]	
Indian MP Shock				0.343**
				[0.146]
Constant	-0.266	-0.341*	-0.011	0.219
	[0.178]	[0.171]	[0.258]	[0.183]
Observations	47	54	34	41
R-squared	0.009	0.002	0.059	0.083

The table shows the response of DSEX and DS30 Index returns to US, euro area, Chinese, and Indian monetary policy shocks. Stock returns and monetary shocks have been calculated in a two-day window around a central bank's monetary policy decision. Heteroskedasticity-robust standard errors are in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Robustness. Response of stock indexes to international monetary shocks

	DSEX Index			
	(1)	(2)	(3)	(4)
US MP Shock	0.088			
	[0.169]			
Euro area MP Shock		-0.061		
		[0.060]		
Chinese MP Shock			———	
Indian MP Shock				0.923*
				[0.531]
Constant	-0.145	-0.307**		0.240**
	[0.109]	[0.123]		[0.115]
Observations	46	55		41
R-squared	0.003	0.033		0.062
	DS30 Index			
	(1)	(2)	(3)	(4)
US MP Shock	0.073			
	[0.181]			
Euro area MP Shock		-0.028		
		[0.061]		
Chinese MP Shock			———	
Indian MP Shock				1.297**
				[0.554]
Constant	-0.154	-0.392***		0.241*
	[0.107]	[0.141]		[0.133]
Observations	46	54		41
R-squared	0.002	0.006		0.088

The table shows the response of DSEX and DS30 Index returns to alternative constructions of US, euro area, and Indian monetary policy shocks. The monetary shocks in this table are calculated using changes in short-run interest rate future and derivative prices around policy decisions. See section 3.1 for details. Both the monetary shocks and stock returns are calculated in a one-day event window. Heteroskedasticity-robust standard errors are in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Outlier RBI Monetary Policy Dates

Date	RBI Policy Decision	MP Shock	DSEX	Nifty 50
7/15/2013	RBI announces measures to address exchange rate volatility. The Marginal Standing Facility rate and Bank Rate are increased to 10.25%.	1.81	2.1	0.66
8/5/2014	RBI releases third bi-monthly monetary policy statement of 2014-15. The repo rate, reverse repo rate, Cash Reserve Ratio, Marginal Standing Facility rate, and Bank rate are unchanged. The Statutory Liquidity Ratio is decreased by 50 basis points.	1.03	0.4	0.52
9/30/2014	RBI releases fourth bi-monthly monetary policy statement of 2014-15. The repo rate, reverse repo rate, Cash Reserve Ratio, Marginal Standing Facility rate, and Bank rate are unchanged.	0.59	2.02	0.20
9/29/2015	RBI releases fourth bi-monthly monetary policy statement of 2015-16. The repo rate is reduced by 50 basis points to 6.75% (a 25 basis point cut was expected). The reverse repo rate is adjusted to 5.75%. The Marginal Standing Facility rate and Bank rate are adjusted to 7.75%. The Cash Reserve Ratio is unchanged.	-3.22	-0.3	1.52
2/7/2019	RBI releases sixth bi-monthly monetary policy statement of 2018-19. The repo rate is reduced by 25 basis points to 6.25%. The reverse repo rate is adjusted to 6%. The Marginal Standing Facility rate and Bank rate are adjusted to 6.5%. The monetary policy stance is changed from calibrated tightening to neutral.	-1.67	-0.39	-0.01

The table lists five outlier RBI policy decisions driving the positive Bangladeshi stock response to a contractionary Indian monetary shock. Details on the policy decisions are from the official RBI website. Data on the Nifty 50, a major Indian equity index, is from Yahoo Finance.

Table 7: Response to Indian monetary shocks excluding outlier dates

	Firm-level	DSEX	DS30
Indian MP Shock	-0.103***	0.055	0.221
	[0.039]	[0.165]	[0.168]
Constant	0.024***	0.156	0.137
	[0.002]	[0.174]	[0.190]
Observations	11,069	36	36
R-squared	0.070	0.002	0.024

The table shows the response of firm-level stock prices, the DSEX index, and the DS30 Index to Indian monetary policy shocks excluding 5 RBI decision dates: July 15, 2013; August 5, 2014; September 30, 2014; September 29, 2015; February 7, 2019. Stock returns and monetary shocks have been calculated in a two-day window around a central bank's monetary policy decision. Robust standard errors clustered at the firm-level are in brackets in the first column. Heteroskedasticity-robust standard errors are in brackets in the second and third columns. *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Sector Classifications

Sector	No. Firms
Bank	29
Cement	7
Ceramics	5
Corporate Bond	1
Engineering	33
Financial Institutions	23
Food & Allied	16
Fuel & Power	17
Insurance	49
IT Sector	9
Jute	3
Miscellaneous	12
Mutual Funds	34
Paper & Printing	2
Pharmaceuticals & Chemicals	27
Services and Real Estate	4
Tannery Industries	6
Telecommunication	2
Textiles	48
Travel & Leisure	2
Total	329

The table lists the number of firms within the 20 DSE sector categories in our sample. Two other sectors, Debenture and Treasury Bond, are not present in our data. 28 firms from the full sample are not classified into any sector.

Table 9: Response of firm-level stock prices by sector to international monetary shocks

	US	Euro area	China	India
	(1)	(2)	(3)	(4)
Bank	0.019	**-0.573*** **	**-0.902*** **	**-0.219***
	[0.067]	[0.058]	[0.068]	[0.111]
Financial Institutions	-0.029	**-0.861*** **	**-0.687*** **	-0.111
	[0.112]	[0.111]	[0.161]	[0.104]
Corporate Bond	-0.033	0.196	0.002	-0.172
	[0.000]	[0.000]	[0.000]	[0.000]
Mutual Funds	-0.062	**-0.528*** **	**-0.954*** **	**-0.172** **
	[0.062]	[0.119]	[0.095]	[0.084]
Insurance	-0.082	-0.058	**-0.899*** **	**0.463*** **
	[0.090]	[0.062]	[0.101]	[0.075]
Cement	-0.164	**0.619** **	**-0.493** **	0.200
	[0.329]	[0.242]	[0.200]	[0.174]
Ceramic Sector	0.115	-0.261	0.464	-0.156
	[0.135]	[0.260]	[0.359]	[0.229]
Engineering	0.045	**-0.268** **	**-0.434*** **	-0.042
	[0.131]	[0.116]	[0.146]	[0.126]
Food & Allied	0.316	**-0.519** **	**-0.461***	**0.388***
	[0.197]	[0.192]	[0.255]	[0.208]
Fuel & Power	0.053	0.047	**-0.566*** **	**0.383** **
	[0.107]	[0.095]	[0.156]	[0.160]
IT Sector	**-0.323*** **	-0.024	**-0.610***	0.257
	[0.090]	[0.161]	[0.315]	[0.244]
Jute	**0.883** **	-0.313	-0.754	0.108
	[0.139]	[0.660]	[0.805]	[0.428]
Miscellaneous	-0.234	-0.180	**-0.335***	-0.301
	[0.150]	[0.191]	[0.157]	[0.250]
Paper & Printing	-0.610	0.709	-0.457	-0.450
	[0.352]	[0.626]	[0.832]	[0.610]
Pharmaceuticals & Chemicals	-0.184	0.062	**-0.382*** **	0.171
	[0.129]	[0.102]	[0.093]	[0.111]
Services and Real Estate	0.256	-0.101	-0.452	-0.160
	[0.342]	[0.084]	[0.222]	[0.198]
Tannery Industries	-0.514	0.347	-0.415	0.287
	[0.401]	[0.189]	[0.496]	[0.251]
Telecommunication	0.070	0.092	0.118	0.909
	[0.143]	[0.248]	[0.186]	[0.289]
Textile	**-0.260*** **	**-0.512*** **	**-0.341*** **	-0.041
	[0.084]	[0.116]	[0.122]	[0.077]
Travel and Leisure	-0.383	1.076	-1.128	-0.222
	[0.276]	[0.950]	[1.353]	[0.822]

The table shows the response of firm-level Bangladeshi stock returns, by sector, to US, euro area, Chinese, and Indian monetary policy shocks. Stock returns and monetary shocks have been calculated in a two-day window around a central bank's monetary policy decision. Robust standard errors clustered at the firm-level are in brackets. *** p<0.01, ** p<0.05, * p<0.1.

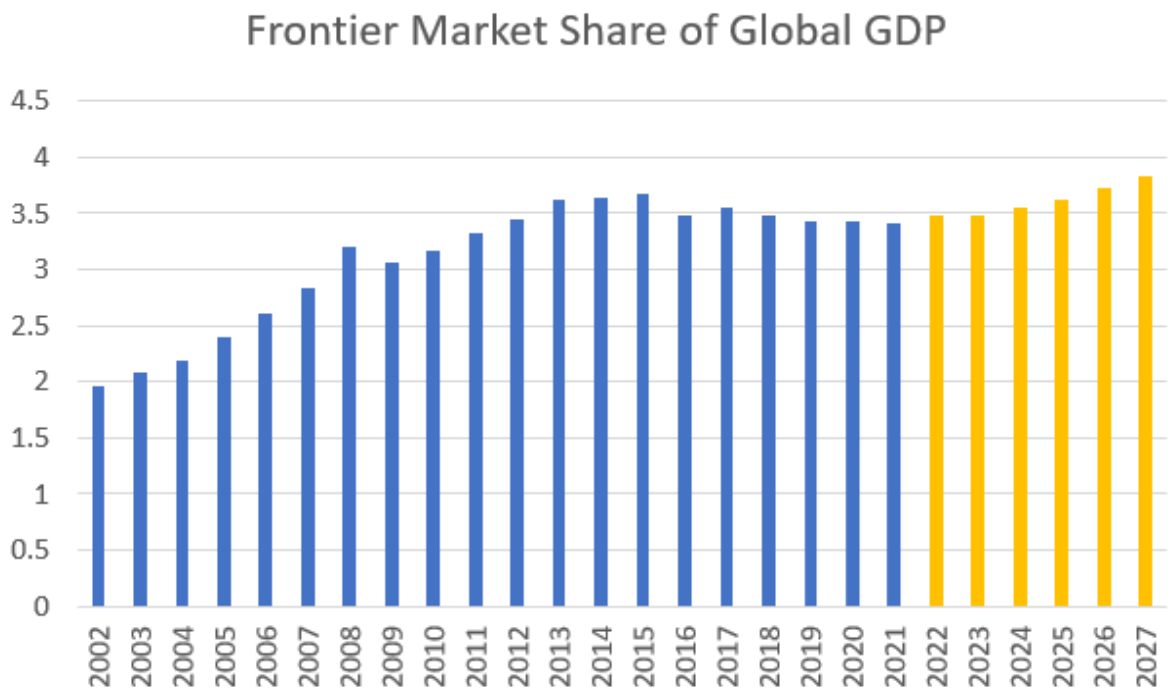

Figure 1: This figure shows the annual share of global GDP from 2002-2027 attributable to 26 economies included in FTSE's Frontier Market classification. The 26 countries include Argentina, Bahrain, Bangladesh, Botswana, Bulgaria, Croatia, Cyprus, Côte d'Ivoire, Estonia, Ghana, Jordan, Kenya, Lithuania, Malta, Mauritius, Nigeria, Macedonia, Oman, Qatar, Romania, Serbia, Slovak Republic, Slovenia, Sri Lanka, Tunisia, and Vietnam. GDP data is from the IMF 2022 World Economic Outlook. Orange bars represent forecasted values.

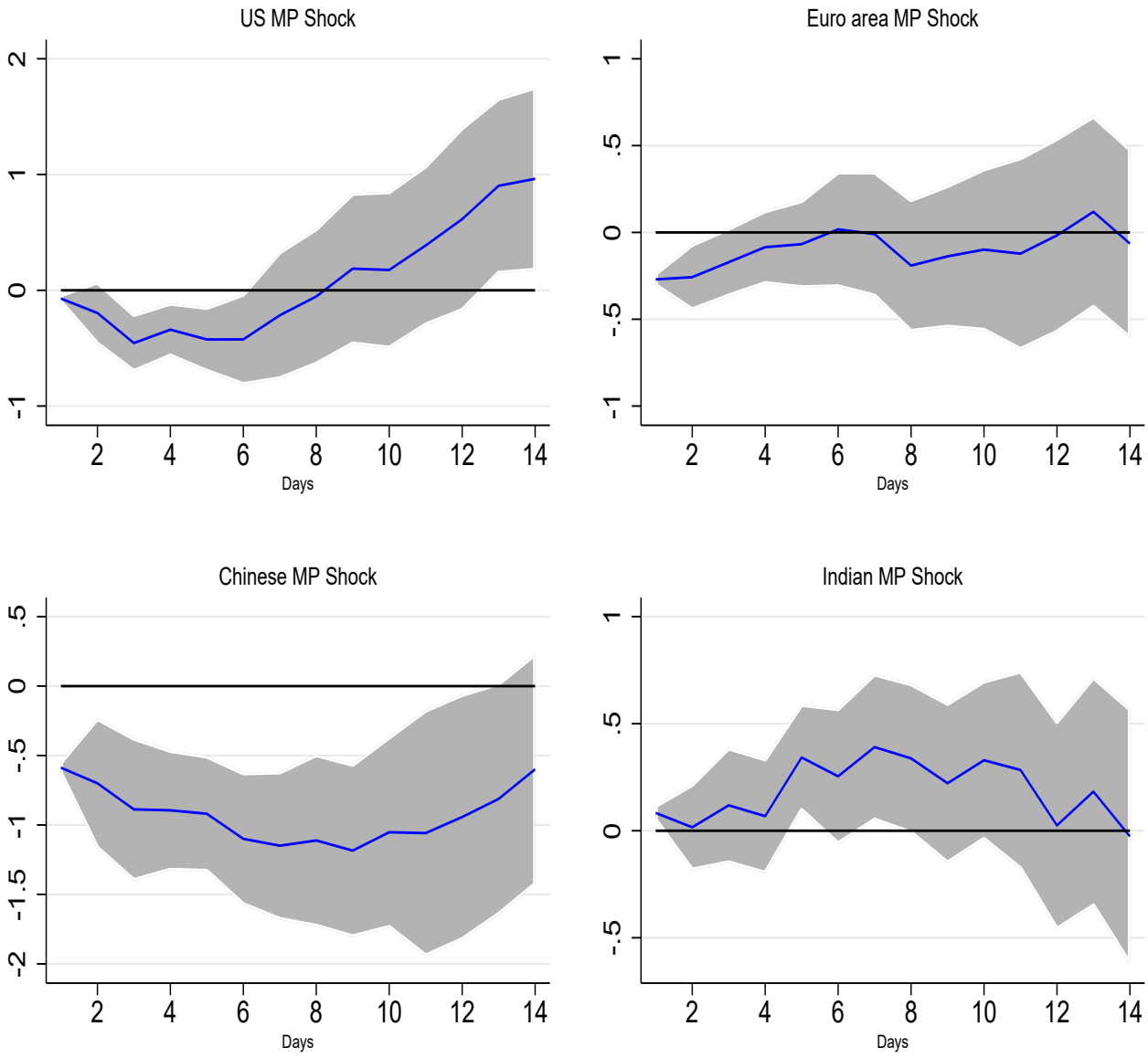

Figure 2: This figure plots the dynamic responses of firm-level stock prices to international monetary shocks from the local projection estimation. 68% confidence bands are constructed from Driscoll and Kraay standard errors.