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KEY POINTS

- This policy brief examines the impact of monetary policy uncertainty in the United States on Asian exchange rates.
- The analysis reveals that monetary policy uncertainty tends to increase the variance of exchange rates, with heterogenous effects across Asian economies.
- Since fluctuations in exchange rates affect international trade and investment, the analysis strengthens the case for monitoring when there is less clarity about the Federal Reserve's course of action.
- A great deal of caution is needed when interpreting these results since monetary policy uncertainty in the United States is just one of many factors that affect exchange rates in other countries.

Impact of Monetary Policy Uncertainty on Asian Exchange Rates

Donghyun Park
Principal Economist
Macroeconomics Research Division (ERMR)
Economic Research and Regional Cooperation Department (ERCD)
Asian Development Bank (ADB)

Shu Tian
Economist
ERMR-ERCD
ADB

Irfan Qureshi
Young Professional
ERMR-ERCD
ADB

Mai Lin Villaruel
Economics Officer
ERMR-ERCD
ADB

INTRODUCTION

The interest rate hikes of the Federal Reserve System (the Fed) of the United States (US) adversely affected financial stability in emerging markets in 2018. In response to robust economic growth, tightening labor market conditions, and emerging inflationary pressures in the US, the Fed raised the federal funds rate four times by a combined 100 basis points in 2018. The concerted US monetary policy normalization contributed to a general strengthening of the US dollar and risk aversion toward emerging markets. As a result, vulnerable emerging markets such as Argentina and Turkey suffered sharp depreciations of their currencies, triggering concerns about widespread instability in emerging markets. Some Asian currencies, most notably the Indian rupee and rupiah, also fell. The currency depreciations underlined the large impact of US monetary policy on exchange rates of emerging markets.

US monetary policy is likely to ease in 2019 but will be subject to a lot of uncertainty. In light of slowing US growth, the Fed is expected to take a more cautious and gradual approach to monetary policy normalization. However, analysis of news suggests that the public remains unclear about the exact trajectory of US monetary policy. Recent research finds that searching for relevant text can deliver useful information on uncertainty about economic policy. In this context, Baker, Bloom, and Davis (2016)

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construct a news-based index of monetary policy uncertainty (MPU) that attempts to capture the degree of uncertainty that the public perceives about the Fed's actions and their effects. The MPU index remains elevated, most likely reflecting the uncertain effect of global trade tensions and global growth slowdown on the Fed's policy calculus.

While monetary policy has outsized economic repercussions, uncertainty about monetary policy matters too. The interest rate is one of the most important prices in the economy. It guides the consumption decisions of households and investment decisions of firms. At the same time, uncertainty about the trajectory of interest rates can influence key economic variables. For example, heightened uncertainty about future interest rates may encourage firms to delay large-scale investments. For Asian countries, exchange rates are a key economic variable that may be influenced by uncertainty about US interest rates. Uncertainty about US interest rates may create ambiguity about the relative attractiveness of US assets compared to the assets of Asian countries. This can influence investor sentiment and behavior, thereby affecting capital flows and exchange rates.

Empirically, uncertainty about US monetary policy affects the variance but not the level of exchange rates of Asian countries. The empirical analysis in section 3 investigates the relationship between the MPU index and the US dollar exchange rates of 10 Asian economies. The analysis fails to uncover any systematic link between MPU index and exchange rate levels. Intuitively, there is no reason why lack of clarity about US interest rates should systematically strengthen or weaken the US dollar. On the other hand, the analysis finds that greater uncertainty about US monetary policy significantly increases the volatility of US dollar exchange rates in some markets. Intuitively, more uncertainty about the path of US interest rates leads to greater diversity of beliefs about exchange rates among foreign exchange market participants. More diverse beliefs mean more diverse trading and hence more volatile exchange rates.

MEASURING MONETARY POLICY UNCERTAINTY

A significant number of empirical studies since the early 1990s have examined the effect of monetary policy on exchange rates. Furthermore, a growing number of studies examine the impact of monetary policy uncertainty or an unforeseen monetary policy shock on the exchange rate.[1] This burgeoning literature has also attempted to disentangle news about monetary policy from unexpected movements in interest rates. However, only a handful of studies empirically separate out these effects due to the difficulty in measuring monetary policy uncertainty as well as the news component of monetary policy. This literature has also highlighted the importance of the surprise component of monetary policy, attributing to it most of the explainable variation in exchange rate returns.

Primarily, measures of monetary policy uncertainty have focused on unsystematic interest rate fluctuations stemming from unexpected changes in US monetary policy.[2] However, more recent approaches have developed news-based indices of MPU to capture unsystematic and/or news about monetary policy. This news-based approach has been proposed to develop new measures for economic policy uncertainty (Baker, Bloom, and Davis 2016), cross-party conflict and tension (Azzimonti 2017), and regional political threats (Caldara and Iacoviello 2018). Several papers have also analyzed publicly released Federal Open Market Committee (FOMC) documents to study monetary policy communication, such as those by Boukus and Rosenberg (2006), Ehrmann and Fratzscher (2007), Meade and Stasavage (2008), Schonhardt-Bailey (2013), Acosta and Meade (2014), and Acosta (2015). Related literature suggest that text searches can deliver useful proxies of historical uncertainty. Importantly, this line of analysis suggests that there exists a significant degree of uncertainty about monetary policy beyond interest rate fluctuations, thus rendering this approach a useful tool to measure unsystematic monetary policy.

The monetary policy uncertainty index, which captures the degree of uncertainty in the public's perception of the Fed's actions and their effects, remains elevated, most likely reflecting the uncertain effect of global trade tensions and global growth slowdown on the Fed's policy calculus.

[1] The empirical approach of Andersen, Bollerslev, Diebold, and Vega (2003); Faust, Rogers, Swanson, and Wright (2003); Evans and Lyons (2005); and Simpson, Ramchander, and Chaudry (2005) detects that exchange rates are sensitive to the unsystematic component of changes in the monetary policy stance.

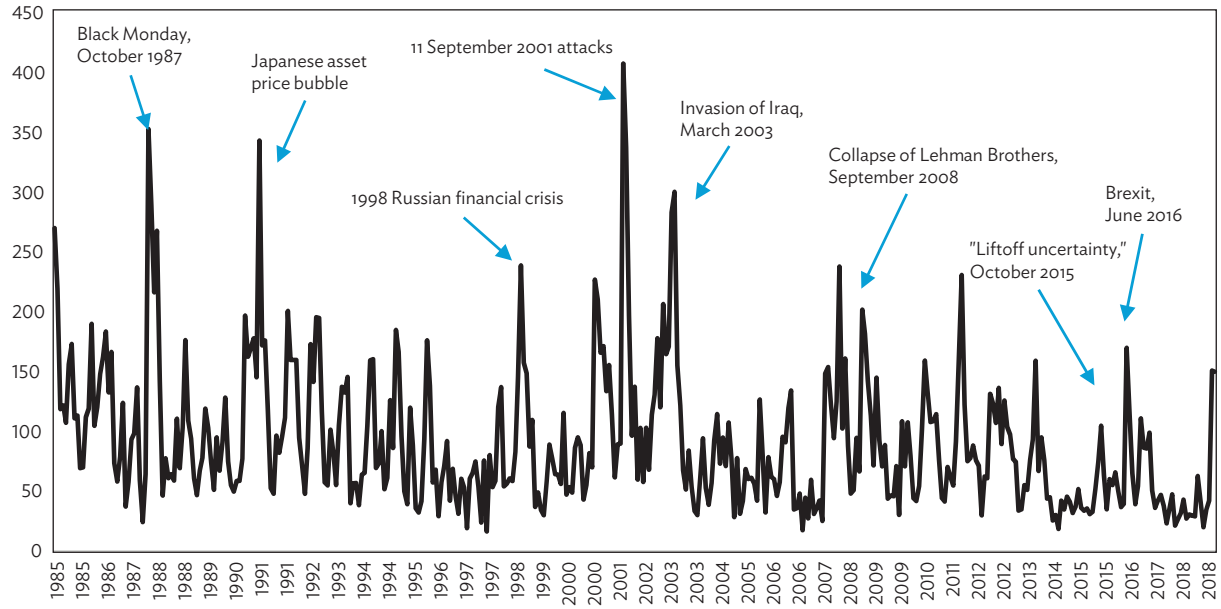
[2] See, for example, (Barro 1977, 1980]; Mishkin 1982; Andersen, Bollerslev, Diebold, and Vega 2003; Faust, Rogers, Swanson, and Wright 2003; Evans and Lyons 2005; and Simpson, Ramchander, and Chaudry 2005).

In line with related literature, this paper uses the MPU index developed by Baker, Bloom, and Davis (2016) to capture the degree of uncertainty the public perceives about Federal Reserve policy actions. Their news-based algorithm searches for terms such as "monetary policy(ies)", "interest rate(s)", "federal fund(s) rate", "fed fund(s) rate", "Federal Open Market Committee", or "FOMC" using results from the Access World News database of over 2,000 US newspapers.[3] Following Baker, Bloom, and Davis (2016), each categorical series is multiplicatively normalized to have a mean of 100 during 1985–2010.[4]

The figure plots data on monetary policy uncertainty based on Baker, Bloom, and Davis (2016) data ranging from January 1985 to January 2019. Large spikes occurred around times of uncertainty, such as Black Monday (October 1987), the 11 September 2001 attacks, the March 2003 invasion of Iraq, the collapse of Lehman Brothers in September 2008, the period prior to the October 2015 FOMC meeting when "liftoff uncertainty" seemed to have peaked, the Brexit-related uncertainty in 2016, and the November 2016 US elections. These spikes seem to have picked up recently given the issues surrounding trade uncertainty and the US federal government shutdown in January 2019.

These monthly data on Fed fund rate, exchange rate and policy rate in Asian economies are used in the algorithm. These variables are either key variables of interest or control variables. Due to data availability, the sample period is from February 2006 to

Monetary Policy Uncertainty, January 1985–January 2019



Source: Baker, Scott R., Nicholas Bloom, and Steven J. Davis. 2016. Measuring Economic Policy Uncertainty. *The Quarterly Journal of Economics*. 131 (4). pp. 1593–1636.

[3] The complete set of terms included in the algorithm is as follows: Federal Reserve, the Fed, money supply, open market operations, quantitative easing, monetary policy, fed funds rate, overnight lending rate, Bernanke, Volcker, Greenspan, central bank, interest rates, Fed chairman, Fed chair, lender of last resort, discount window, European Central Bank, ECB, Bank of England, Bank of Japan, BOJ, Bank of China, Bundesbank, Bank of France, and Bank of Italy. These terms are suggested in Baker, Bloom, and Davis (2016).

[4] As a robustness check, the baseline algorithm of Baker, Bloom, and Davis (2016) is extended to incorporate more recent data. The results remain unchanged when this series is used.

Table 1: Summary Statistics of the Sample, February 2006–January 2019

Variable	Number of Observations	Mean	Median	Standard Deviation	Minimum	Maximum
Exchange rate return (% change)	1,705	0.0003	(0.0002)	0.0215	(0.1537)	0.1505
Interest rate spread (basis points)	1,705	2.0919	1.7650	2.5318	(5.0000)	9.1100
US monetary policy uncertainty index (% change)	1,705	0.0059	(0.0120)	0.4944	(1.3451)	1.7674

( ) = negative, US = United States.
Source: Authors' computation.

January 2019, with 10 Asian economies included: India; Indonesia; Japan; Malaysia; the People's Republic of China; the Philippines; the Republic of Korea; Singapore; Taipei,China; and Thailand. In the following analysis, the monthly percentage changes in MPU and exchange rates are constructed using the log difference between the current and previous month levels. The interest rate spread is defined as the difference between individual countries' policy interest and the US federal funds rate. Table 1 reports the summary statistics of the sample.

KEY EMPIRICAL FINDINGS

To examine how MPU in the US affects return patterns in exchange rates in Asian economies in terms of both levels and variances, a generalized autoregressive conditional heteroskedasticity (GARCH) model is employed to describe the mean and variance of the return in exchange rates—depending on the contemporaneous information set on MPU. As a representative model of return dynamics, the GARCH (1,1) model has been widely used in the literature to capture time series dynamics where variance may be conditioned on past information rather than remaining constant. In GARCH (1,1), the conditional mean of return is a function of lagged return and error term and the variance of the error term is not assumed to be constant. The first "1" indicates the first lag of variance while the second "1" denotes the first lag of the error term. In the analysis, the reactions of return in exchange rate to US MPU (in terms of both levels and variances) are described using the following specification, with the parenthesis capturing the equation number:

$$(1) \qquad R_t = a_0 + a_1 R_{t-1} + a_2 MPU_{t-1} + a_3 Spread_{t-1} + \varepsilon_t$$

$$(2) \qquad h_t = \beta_0 + \beta_1 h_{t-1} + \beta_2 MPU_{t-1} + \beta_3 \varepsilon^2_{t-1}$$

In this specification, R_t in the mean equation (1) is the percentage change in actual exchange rate, defined as the log difference between the actual exchange rate between month t and month $t-1$, and the lagged term of R is included to account for possible first-order time serial correlation. MPU_t is the percentage change in the monetary policy uncertainty index of the US, defined as the log difference at month t and month $t-1$. The variable $Spread_{t-1}$ is the difference between policy interest of country i and the US federal funds rate at month t. ε_t is the residual in month t. h_t is the conditional variance of ε_t based on information set as of time $t-1$.

The inclusion of different variables pertaining to interest rates in the analysis makes it possible to assess the importance of news about MPU (as compared to actual movements in interest rates, which simply measure the monetary policy announcements themselves). Including the interest rate spread therefore facilitates a comparison of the results to the findings of studies that do not distinguish between monetary policy announcements and MPU-related news.

[5] See, for example, Bollerslev (1986) for a detailed description of the methodology.

The main hypothesis tested in this paper is whether the coefficient on monetary policy uncertainty on exchange rate returns (in terms of both levels and variances) is statistically different from zero. To tease out these effects separately, two versions of the equations are estimated (1 and 2). In the first version, β_2 is fixed to zero, and thus focuses only on the level effects of MPU, with $a_2 > 0$ implying that monetary policy uncertainty generates a depreciation of the domestic currency. In the second version, we fix a_2 to zero, thus focusing only on whether the variance of MPU drives the variance in exchange rates.

Table 2 describes the effect of uncertainty about US monetary policy on exchange rate return levels in the 10 Asian countries, estimated from the first version of the equation. The results suggest that that monetary policy uncertainty does not have any systematic effect on the level of exchange rates. The effect is positive in some countries but negative in other countries. One rationale for these findings is that central banks in these countries attempt to smooth out fluctuations in the exchange rate. Another is that perhaps news about monetary policy uncertainty is being absorbed by market participants in these countries. At the same time, the results may also depend on the measure of monetary policy uncertainty, which may not be capturing the pure unsystematic portion of monetary policy.

Furthermore, the results vary substantially across countries. Findings show that the rupiah depreciates when US monetary policy uncertainty increases. On the other hand, the won and the baht appreciate in response to greater US monetary policy uncertainty. Intuitively, there is no reason why lack of clarity about US interest rates should systematically strengthen or weaken the US dollar against other currencies. Therefore, some currencies may appreciate in relation to the US dollar, whereas other currencies may depreciate.

The main results indicate that greater uncertainty about US monetary policy significantly increases the volatility and levels of US dollar exchange rates in some Asian countries. These outcomes vary, in both magnitude and direction, across countries.

Table 2: Impact of Monetary Policy Uncertainty on the Levels of Exchange Rate Returns in 10 Asian Countries

Dependent Variable: Actual Exchange Rate	PRC	Indonesia	India	Japan	Republic of Korea	Malaysia	Philippines	Singapore	Thailand	Taipei,China
MPU	(0.000135)	0.00496[a]	(0.00265)	(0.00302)	(0.0123)[b]	0.00172	(0.00106)	0.000737	(0.00400)[a]	(0.000214)
	[0.0010]	[0.0030]	[0.0035]	[0.0047]	[0.0042]	[0.0040]	[0.0027]	[0.0027]	[0.0024]	[0.0027]
Observations	154	154	154	154	154	154	154	154	154	154
Chi-squared test statistic	32.49	2.929	3.916	2.338	11.35	2.596	0.253	1.882	11.30	4.925

( ) = negative, MPU = monetary policy uncertainty, PRC = People's Republic of China.

Notes:

1. Standard errors are in square brackets.

[a] Denotes level of significance of 0.1.

[b] Denotes level of significance of 0.01.

Source: Authors' computation.

Table 3: Impact of Monetary Policy Uncertainty on the Variance of Exchange Rate Returns in 10 Asian Countries

Dependent Variable: Actual Exchange Rate	PRC	Indonesia	India	Japan	Republic of Korea	Malaysia	Philippines	Singapore	Thailand	Taipei,China
MPU	0.261	2.039[a]	0.707	1.461[b]	0.479	1.079	3.531[b]	1.257[b]	0.0853	0.447
	[4.3760]	[0.4350]	[1.7380]	[0.6690]	[0.5560]	[1.2710]	[1.6020]	[0.5670]	[0.0896]	[0.4290]
Observations	154	154	154	154	154	154	154	154	154	154
Chi-squared test statistic	31.94	0.00842	2.603	1.353	1.925	1.948	0.321	0.473	8.836	4.318

PRC = People's Republic of China.

Notes:

1. For the Philippines and Taipei,China, GARCH (1, 2) is employed to fit particular time series attributes.
2. Standard errors are in square brackets.
3. Full empirical results are available from the authors.

[a] Denotes level of significance of 0.01.
[b] Denotes level of significance of 0.05.

Source: Authors' computation.

Table 3 describes the effect of uncertainty about US monetary policy on the variance of exchange rate return in the 10 Asian countries, estimated from the second version of the equation. Consistent with most of the existing empirical literature, the empirical findings of this paper suggest that increasing monetary policy uncertainty significantly increases volatility in exchange rates in some countries.

The results are consistent with the literature that has argued that the information component of monetary policy statements and announcements account for most of the explainable variation in exchange rate returns in response to monetary policy. However, the effects vary, in both magnitude and direction, across countries. For example, in practice, bond investors respond to communication from the Fed, often referred to as "forward guidance". When the Federal Reserve signals to the markets that it could raise interest rates if economic conditions improve, investors buy assets that are US dollar-denominated, causing the US dollar to appreciate. The stronger US dollar reduces domestic demand in countries outside the US, since imported goods become more expensive to buy. This encourages households and firms to cut back consumption spending. Through this channel, the Fed's forward guidance is priced into actual exchange rate movements. More generally, heightened uncertainty about US monetary policy may increase the volatility of US dollar exchange rates in a direction like that documented by the signaling channel of monetary policy.

CONCLUSION

This analysis examines the impact of US monetary policy on Asian exchange rates using the text-based monthly MPU of Baker, Bloom, and Davis (2016) in a GARCH model, spanning monthly periods during 2006–2019. The empirical analysis reveals several policy-relevant results: (i) MPU does not have any systematic effect on the level of exchange rate returns for most countries, (ii) MPU tends to increase the variance of exchange rates in some Asian countries, and (iii) these effects vary across countries. Exchange rate levels and fluctuations are key economic variables that affect international trade and investments. Overall, the analysis indicates that heightened uncertainty about US monetary policy can be an additional source of volatility in the exchange rates of Asian countries.

Although in and of itself the heightened volatility strengthens the case for exchange rate stabilization measures, a great deal of caution is needed when interpreting these results since US monetary policy uncertainty is just one of many factors that affect a country's exchange rate.

REFERENCES

Acosta, Miguel. FOMC Responses to Calls for Transparency. Unpublished, 10 July 2015.

Andersen, Torben G., Tim Bollerslev, Francis X. Diebold, and Clara Vega. 2003. Micro Effects of Macro Announcements: Real-Time Price Discovery in Foreign Exchange. *American Economic Review*. 93 (1). pp. 38–62.

Azzimonti, Marina. 2018. Partisan Conflict and Private Investment. *Journal of Monetary Economics*. 93 (C). pp. 114–131.

Baker, Scott R., Nicholas Bloom, and Steven J. Davis. 2016. Measuring Economic Policy Uncertainty. *The Quarterly Journal of Economics*. 131 (4). pp. 1593–1636.

Barro, Robert J. 1977. Unanticipated Money Growth and Unemployment in the United States. *The American Economic Review*. 67 (2). pp. 101–115.

Barro, Robert J., and Zvi Hercowitz. 1980. Money Stock Revisions and Unanticipated Money Growth. *Journal of Monetary Economics*. 6 (2). pp. 257–267.

Bollerslev, Tim. 1986. Generalized Autoregressive Conditional Heteroskedasticity. *Journal of Econometrics*. 31 (3). pp. 307–327.

Boukus, Ellyn, and Joshua V. Rosenberg. The Information Content of FOMC Minutes. Unpublished, July 2006.

Caldara, Dario, and Matteo Iacoviello. 2018. Measuring Geopolitical Risk. *International Finance Discussion Papers*. Board of Governors of the Federal Reserve System. (1222).

Ehrmann, Michael, and Marcel Fratzscher. 2007. Communication by Central Bank Committee Members: Different Strategies, Same Effectiveness?. *Journal of Money, Credit and Banking*. 39 (2–3). pp. 509–541.

Evans, Martin DD, and Richard K. Lyons. 2002. Order Flow and Exchange Rate Dynamics. *Journal of Political Economy*. 110 (1). pp. 170–180.

Faust, Jon, John H. Rogers, Eric Swanson, and Jonathan H. Wright. 2003. Identifying the Effects of Monetary Policy Shocks on Exchange Rates Using High Frequency Data. *Journal of the European Economic Association*. 1 (5). pp. 1031–1057.

Husted, Lucas, John H. Rogers, and Bo Sun. 2017. Monetary Policy Uncertainty. *International Finance Discussion Papers*. Board of Governors of the Federal Reserve System. (1215).

Meade, Ellen, and David Stasavage. 2006. Two Effects of Transparency on the Quality of Deliberation. *Swiss Political Science Review*. 12 (3). pp. 123–133.

Meade, Ellen E., and Miguel Acosta. 2015. Hanging on Every Word: Semantic Analysis of the FOMC's Postmeeting Statement. *FEDS Notes*. Board of Governors of the Federal Reserve System.

Mishkin, Frederic S. 1982. Does Anticipated Monetary Policy Matter? An Econometric Investigation. *Journal of Political Economy*. 90 (1). pp. 22–51.

Schonhardt-Bailey, Cheryl. 2013. *Deliberating American Monetary Policy: A Textual Analysis*. Cambridge: MIT Press.

Simpson, Marc W., Sanjay Ramchander, and Mukesh Chaudhry. 2005. The Impact of Macroeconomic Surprises on Spot and Forward Foreign Exchange Markets. *Journal of International Money and Finance*. 24 (5). pp. 693–718.

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Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
Tel +63 2 632 4444
Fax +63 2 636 2444

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