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The Stock Price Impact of Domestic and Foreign Economic Policy Uncertainty: Evidence from China

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Abstract

Utilizing the nonlinear autoregressive distributed lag (NARDL) approach (Shin, Yu, & Greenwood-Nimmo, 2014), we compare Chinese stock price responses to movements in U.S. and Chinese economic policy uncertainty (EPU). We find that Chinese stock prices react countercyclically to movements in U.S. uncertainty, but not Chinese uncertainty. They exhibit negative long- and short-run asymmetry (overshooting) in response to U.S. EPU shocks, but not Chinese EPU shocks, reflecting the importance of U.S. consumption to the performance of Chinese exporters.

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1. Introduction

The U.S.-China trade war has led to controversy among policymakers in both countries and cast a spotlight on economic policy uncertainty (EPU) in the world's largest economies. Recent studies compare the reach of Chinese and U.S. uncertainty, e.g., spillovers to other economies (Zhang, et al. 2019, Tsai 2017) and to one another's markets (Huang, et al. 2018). We augment this literature by assessing the asymmetric impacts of domestic and U.S. EPU shocks on Chinese equity prices. We argue that under the theory of wait-and-see business cycles, asymmetry captures real economic forces that drive Chinese stock price responses to EPU fluctuations. Our chosen technique, the Nonlinear Autoregressive Distributed Lag (NARDL) model, is well suited for this analysis. Furthermore, Chinese stock-price sensitivity to own uncertainty provides a benchmark for understanding the impact of U.S. EPU movements, which can also influence Chinese stocks by stimulating or damping U.S. demand for Chinese exports.

Our study views Chinese stock price fluctuations as the outcome of real economic forces grounded in trade and domestic consumption. The theory of wait-and-see business cycles (Bloom 2009) states that movements in uncertainty are a major driver of the business cycle whose impacts differ from those of first-moment fluctuations. At the firm level, investment and hiring bring potentially irreversible costs (Antonakakis, Chatziantoniou and Filis 2013), and in times of uncertainty, waiting affords managers the opportunity to gather valuable information before making investment decisions (Bernanke 1983). Uncertainty shocks therefore increase the real-option value of waiting (Bloom 2009). Using a vector autoregressive (VAR) model, Bloom (2009) estimates the impact of time-varying uncertainty on a heterogeneous manufacturing economy. He finds that for firms, the optimal response to second-moment productivity and demand shocks is to defer investment and hiring actions. This is predicted to affect the business cycle in three ways. First, uncertainty should exert a countercyclic influence. During good times (bad times), large, positive shocks (large, negative shocks) will bring recessionary declines in spending (increased spending and recovery). Second, the long-run impacts of uncertainty should be asymmetric. Uncertainty-induced recessions will stall the efficient reallocation of resources across units, resulting in temporarily "flat" long-run aggregate productivity growth, while recoveries will allow the growth process to resume its upward climb. Third, the short-run impacts of uncertainty should be asymmetric. During a downturn, spending will rapidly sink to a lower baseline, while during a recovery, pent-up demand will trigger a spike in hiring and investment (overshooting) followed by an immediate decline to a new, higher equilibrium spending level. Of central importance to our study, the second and third assertions imply that the reaction to uncertainty movements will exhibit negative asymmetry in both the short and long run. The investment/hiring response following negative shocks will be opposite in sign to, but greater in magnitude than, that following positive shocks.

The present study compares the effects of domestic and U.S. uncertainty on Chinese stock prices. Under the premise that profitable investments boost firm value, the theory of wait-and-see business cycles has three testable implications for the long- and short-run effects of uncertainty on stock prices. First, positive (negative) EPU shocks should have negative (positive) long-run effects on purchases of goods and services, affecting the bottom-line performance of Chinese producers and their suppliers. Therefore, stock price responses to EPU shocks, like the underlying impacts on investment, should be countercyclical. Second, gradual growth in firm value should generate larger equilibrium stock price adjustments during upturns than during downturns. It follows that Chinese stock price reactions to EPU shocks should exhibit negative long-run asymmetry. Third, rebounds in consumption following negative EPU shocks (recoveries) should outpace declines in consumption following positive EPU shocks (recessions). Thus, Chinese stock price reactions to EPU shocks should exhibit negative short-run asymmetry.

Our chosen uncertainty measure, the monthly EPU index (Baker, Bloom and Davis 2016), is a proxy for unpredictability in a government's economic policies.[1] Within national borders, EPU is inversely related to public confidence in the government's handling of changing economic conditions (Dakhlaoui and Aloui 2016), and represents a non-diversifiable risk with serious implications for investors (Brogaard and Detzel 2015, Pástor and Veronesi 2013). Empirical studies find domestic EPU to be negatively associated with corporate investment (Kang, Lee and Ratti 2014, Baker, Bloom and Davis 2016, Wang, Chen and Huang 2014), employment (Baker, Bloom and Davis 2016, Caggiano, Castelnuovo and Figueres 2016), productivity (Kang, Ratti and Vespignani 2017), and productivity growth (Gupta, Lau and Wohar 2019, Pástor and Veronesi 2013). Consistent with the notion that firm value reflects the real economic impacts of uncertainty, a number of studies find that domestic EPU shocks reduce contemporaneous stock returns (Brogaard and Detzel 2015, Kang and Ratti 2013).

A sizeable literature suggests that domestic EPU shocks may propagate across national borders to countries with strong trade and investment links, evidence that the business cycle is international (Belke and Osowski 2018). In particular, U.S. EPU can depress stock indices in other countries. Sum (2013), using VAR and Granger causality techniques, finds that U.S. EPU is negatively associated with returns in ASEAN countries, and drives returns in Malaysia and Singapore. Dakhlaoui and Aloui (2016), using a dynamic correlation approach, find that U.S. EPU depresses BRIC country equity returns, while exerting an unpredictable impact on their volatility. Two studies (Kido 2018, Belke and Osowski 2018) employ factor-augmented VAR (FAVAR) to test the cross-border macroeconomic impacts of U.S. EPU shocks. Kido (2018) finds U.S. shocks to depress equity prices in China, India, Indonesia, Japan, and Korea, with the effect on China being much smaller. Likewise, Belke and Osowski (2018) find that U.S. shocks negatively impact GDP, consumer prices, interest rates, and stock prices.

Uncertainty's impact can be seen as a manifestation of source country influence. Several analyses adopt a specific outcome measure as a benchmark for comparing the external financial market impacts of EPU originating in two or more economies. Using time series techniques, Zhang, Lei, Ji and Kutan (2019) find that over time, Chinese EPU has exerted increasing influence on the Dow Jones Global stock index, but U.S. EPU still maintains a greater impact.[2] Belcaid and Ghini (2019) compare the Moroccan stock effects of seven country-level EPUs (China, France, Germany, Italy, Spain, U.K., and U.S.) and find U.S. uncertainty to be more influential than Chinese, though not as influential as some European indices. In contrast, a dynamic correlation study by Tsai (2017) finds Chinese EPU to have a greater impact on 22 stock indices than do U.S., European, or Japanese EPU.[3]

1 The main component of the EPU index is a count of newspaper articles containing keywords related to policy uncertainty.

2 Consistent with these results, the authors also find that U.S. EPU has a greater influence on the international credit, energy and commodities markets.

3 The prevalence of studies comparing uncertainty in China, the U.S., and other countries for their stock impacts appears to be unique to the EPU measure. Numerous country-specific EPU indices are available, and they are based on comparable formulae.

A related question is the relative impact of own country and external country uncertainty movements on a domestic macroeconomic outcome. Several studies have carried out such comparisons. Columbo (2013) finds that relative to domestic EPU shocks, U.S. EPU shocks cause steeper declines in European industrial production and prices. Likewise, Belke and Osowski (2018), in a Factor Augmented VAR (FAVAR) study of 18 OECD countries, find the recessionary impact of U.S. uncertainty shocks to outweigh those of Euro area shocks. Huang, Tong, Qiu, and Shen (2018), using an index based on Jurado, Ludvigson and Ng (2015), find the impact of uncertainty to be unidirectional: U.S. shocks affect Chinese macroeconomic variables, but the reverse impacts are insignificant.

Our study extends the Huang, Tong, Qiu, and Shen (2018) analysis by modeling the asymmetric effects of uncertainty and testing the three hypotheses under the wait-and-see framework. Our sample consists of Chinese stock prices and Chinese and US EPU readings over the 1995M1-2017M5 period. Our NARDL output is consistent with all three hypotheses regarding the impacts of U.S. EPU, but not those of Chinese EPU.

The remainder of the paper is organized as follows. Section 2 outlines the methodology used in the study. Section 3 presents the details of the data and empirical results. Section 4 provides our conclusions and policy implications.

2. Methodology

The general form of the NARDL model (Shin, Yu and Greenwood-Nimmo 2014) relating stock price SP_t to policy uncertainty EPU_t is given by

$$\begin{aligned}\Delta SP_t = cons + \rho SP_{t-1} + \theta^+ EPU_{t-1}^+ + \theta^- EPU_{t-1}^- \\ + \sum_{j=1}^{p-1} \gamma_j \Delta SP_{t-j} + \sum_{j=0}^{q-1} (\delta_j^+ \Delta EPU_{t-j}^+ + \delta_j^- \Delta EPU_{t-j}^-) + e_t\end{aligned} \tag{1}$$

where the orders $p = 12$ and $q = 5$ were chosen to optimize the Akaike and Schwarz Information Criterion, and EPU_t is given by the partial sum decomposition

$$EPU_t = EPU_0 + EPU_t^- + EPU_t^+ = EPU_0 + \sum_{j=1}^{t} \max(\Delta EPU_j, 0) + \sum_{j=1}^{t} \min(\Delta EPU_j, 0) \tag{2}$$

The NARDL estimates enable us to test our three hypotheses. If the long-run multipliers $L_{EPU^+} = -\theta^+/\rho$ and $L_{EPU^-} = -\theta^-/\rho$ are both negative and significant, it follows that EPU shocks have a countercyclic impact, and Hypothesis 1 is upheld. If the Wald Long-run Asymmetry statistic W_{LR} is significant, and $|L_{EPU^-}| > |L_{EPU^+}|$, then the stock price responses to EPU shocks exhibit negative long-run asymmetry, and Hypothesis 2 is supported. If the Wald Short-run Asymmetry statistic W_{SR} is significant, and the short-run response curve exhibits purely negative asymmetry, then the stock price impact of EPU shocks exhibits negative short-run asymmetry, consistent with Hypothesis 3. Further details of our testing procedure, including our criteria for "purely negative short-run asymmetry," are given in Liang, Troy, and Rouyer (2020).

In the literature, the NARDL model has been used extensively to capture complex, asymmetric interactions between stock performance and macroeconomic variables, particularly exchange rates (Aftab, Ahmad and Ismail 2018) and pricing of oil and precious metals (Kisswani and Elian 2017, Raza, et al. 2016).

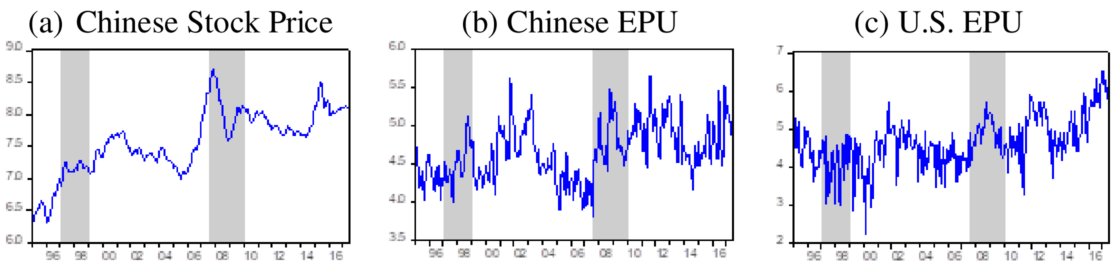
3. Empirical Results

We employ three monthly time series: the Chinese stock index and the US and Chinese EPU indices (Baker, Bloom and Davis 2016),[4] all expressed on a logarithmic scale. Our 1995M1-2017M5 sample period encompasses the Asian and Global Financial Crises. Table 1 describes our series, and Figure 1 depicts their behavior over the analysis period.

Table I Descriptive Statistics

Variable	Mean	Max.	Min.	Std. Dev.	Skewness	Kurtosis	Observations
CHNSP	7.571	8.708	6.317	0.492	-0.328	2.895	269
CHNEPU	4.639	6.544	2.205	0.685	-0.050	3.520	269
USEPU	4.653	5.648	3.802	0.371	0.328	2.646	269

Note: *CHNSP*, *CHNEPU*, and *USEPU* refer to Chinese Stock Price, Chinese EPU, and U.S. EPU.



Note: The shaded areas in each figure identify the Asian and subprime financial crises.

Figure 1 Stock Price and EPU Fluctuations, 1995M1 to 2017M5

Panels A and B of Table 2 present output of the Augmented Dickey-Fuller (1979) and Phillips–Perron (1988) unit root tests. The output reveals that the stock price series are stationary only when first-differenced, while the EPU series are stationary in level form.

Panel C shows output of the bounds test of non-cointegration (Banerjee, Dolado and Mestre 1998) and the long-run symmetry test (Pesaran, Shin and Smith 2001). Both suggest a nonlinear long-run relationship between Chinese stock prices and Chinese (U.S.) EPU.

Panel D displays results of the Wald Tests of long-run and short-run symmetry. Both tests reject the null hypotheses of symmetry between the positive and negative partial sum components.

Table 3 describes two NARDL models, relating Chinese stock prices to domestic and U.S. EPU. The Column 1 long-run multipliers are both negative ($L_{EPU^+} = -0.219$ and $L_{EPU^-} = -0.239$). This indicates that a positive (negative) Chinese EPU shock

[4] Our data come from Datastream (China SHANGHAI SE A SHARE - PRICE INDEX) and the Economic Policy Uncertainty website (http://www.policyuncertainty.com/).

Table II Post-Estimation Tests

	CHNSP	*CHNEPU*	*USEPU*
Panel A: Augmented Dickey-Fuller Root Test			
Level	-3.10 (0.11)	-4.07*** (0.00)	-6.86*** (0.00)
First Diff.	-10.99*** (0.00)		
Panel B: Phillips–Perron Root Test			
Level	-2.88 (0.17)	-15.45*** (0.00)	-6.70** (0.00)
First Diff.	-11.11*** (0.00)		
Panel C: Bounds Test of Asymmetric Cointegration			
t_{BDM}		-4.10***	-3.11***
F_{PSS}		6.89***	7.13***
Panel D: Wald Test of Long-run and Short-run Asymmetry			
W_{LR}		14.87*** (0.00)	9.72*** (0.00)
W_{SR}		13.78*** (0.00)	3.96** (0.048)

Note: 1. The 99%, 95%, and 90% upper (lower) bounds in the Bounds Test are 6.006 (5.020), 4.153 (3.145), and 3.342 (2.458), k=1.
2. The Wald statistics W_{LR} and W_{SR} test the null hypotheses of long- and short -run symmetry.
3. The p-values are shown in parentheses.
4. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

decreases (increases) stock price: a 1% increase in Chinese uncertainty (a 1% decrease in Chinese uncertainty) brings a 0.219% decline in Chinese stock price (a 0.239% rise in Chinese stock price). Both of these effects are statistically insignificant. The Column 2 long-run multipliers are likewise negative ($L_{EPU^+} = -0.761$ and $L_{EPU^-} = -0.805$). This indicates that a positive (negative) U.S. EPU shock decreases (increases) Chinese stock prices: a 1% increase in U.S. uncertainty (a 1% decrease in U.S. uncertainty) brings a 0.761% decline in Chinese stock price (a 0.805% rise in Chinese stock price). The effects are statistically significant, and they substantially outweigh those of domestic uncertainty.

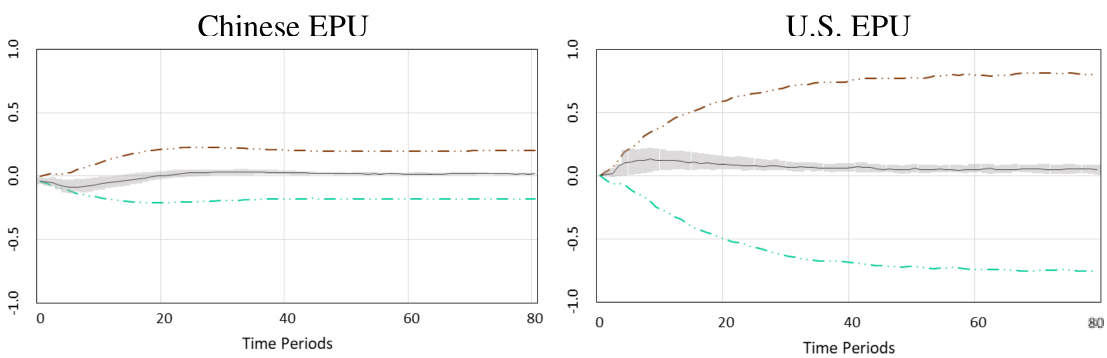
Though the Column 1 short-run coefficients suggest asymmetry in the initial Chinese stock price adjustments to Chinese EPU shocks, this asymmetry is not unidirectional. A positive Chinese EPU shock generates a concurrent decrease in Chinese stock price ($\Delta EPU_t^+ = -0.038$, corresponding to a 0.038% decline), while a negative Chinese EPU shock causes a three-period-delayed increase in Chinese stock price ($\Delta EPU_{t-3}^- = 0.031$, corresponding to a 0.031% rise). By contrast, the Column 2 short-run coefficients are additive and imply negative short-run asymmetry in the Chinese stock price adjustment to U.S. EPU shocks. A positive (negative) shock at time $t = 3$ generates a Chinese stock price decrease of 0.058%, corresponding to $\Delta EPU_{t-3}^- = -0.058$ (a Chinese stock price increase of 0.042%, corresponding to $\Delta EPU_{t-3}^+ - 0.042$). Although the short-run effects are significant in both models, U.S. EPU results in negative short-run asymmetry, and a Chinese stock price reaction of greater magnitude.

Figure 2 depicts the dynamic asymmetric adjustments of Chinese stock price from its initial equilibrium to a new long-run steady state following unit Chinese (U.S.) EPU shocks. Each diagram shows Chinese stock price adjustments in reaction to negative (red dotted) and positive (green dotted) EPU shocks at varying forecast horizons, with the asymmetry (blue) curve being the average of the two response lines. While the Chinese stock index exhibits strong short-run responses to cyclical transitions, the new equilibrium takes much longer to emerge.

Table III NARDL Estimation Results

	Country – China	
	Model 1: *CHNEPU*	Model 2: *USEPU*
SP_{t-1}	-0.053***	-0.043***
	(0.00)	(0.00)
EPU^{+}_{t-1}	-0.012	-0.033***
	(0.16)	(0.009)
EPU^{-}_{t-1}	-0.013	-0.035***
	(0.13)	(0.00)
ΔSP_{t-1}	0.396***	
	(0.00)	
ΔSP_{t-2}		0.101*
		(0.10)
ΔSP_{t-4}	0.195***	0.175***
	(0.00)	(0.00)
ΔEPU^{+}_{t}	-0.038***	
	(0.00)	
ΔEPU^{+}_{t-3}		0.042*
		(0.10)
ΔEPU^{-}_{t-3}	0.031***	-0.058*
	(0.00)	(0.08)
Constant	0.380***	0.294***
	(0.00)	(0.00)
L_{EPU+}	-0.219	-0.761*
L_{EPU-}	-0.239	-0.805*

Note: 1. Only significant short-run coefficients are reported in this table, with *p*-values stated in brackets.
2. L_{EPU}+ and L_{EPU}- indicate the positive and negative long-run coefficients, while ΔEPU^{+} and ΔEPU^{-} represent positive and negative short-run coefficients.
3. The optimal lag orders (P=12 and q=5 for the stock price and EPU models) were selected according to the Akaike and Schwarz information criteria.
4. ***, **, and * indicate rejection of the null hypothesis of symmetry at the 1%, 5%, and 10% levels.



Notes: 1. The top line (bottom line) represents the impact of a negative EPU shock (a positive EPU shock)
2. The middle line is the asymmetry line, and the shaded area represents the 95% confidence interval.

Figure 2 Long- and Short-run Asymmetries in Chinese Stock Price Adjustments following EPU Shocks

4. Conclusion

The theory of wait-and-see business cycles predicts that EPU movements will impact stock prices in three ways. First, positive shocks (negative shocks) will inhibit (encourage) hiring and investment, making the influence of EPU countercyclical. Second (third), this impact will exhibit negative long run (negative short run) asymmetry, with positive EPU shocks temporarily suppressing growth trends (producing gradually declining prices), and negative shocks causing resumption in growth trends (overshooting). Using the NARDL model, we tested these hypotheses on data describing the Chinese stock price response to domestic and U.S. EPU fluctuations. The analysis output revealed that while the impacts of U.S. EPU are consistent with all three conjectures, those of Chinese EPU agree with none of the them. The former finding implies that U.S. uncertainty has a real economic impact on the bottom line performance of Chinese exporters (and their suppliers), resulting from cyclical fluctuations in U.S. consumption.

These findings suggest that features specific to the Chinese market limit the equity price impact of domestic, but not U.S., EPU. Given the growing size and prominence of the Chinese market, this raises the question of why. Differences in market ownership structure offer a potential explanation. Domestic demand for Chinese stocks is dominated by retail stockholders who are less sophisticated than institutional buyers, and are widely believed to engage in herding (Li, Rhee and Wang 2017, Tan, et al. 2008). The behavioral biases of these investors may be amplified by the opacity of the Chinese market (Fahey and Chemi 2015), making stock prices insensitive to home market signals. This could explain why our Chinese EPU analyses do not indicate negative asymmetry, either in the long or short run. The null hypothesis of long-run symmetry cannot be rejected, since the long-run responses of Chinese stock prices to positive and negative domestic EPU shocks are each individually insignificant. Furthermore, the short-run asymmetry observed in the Chinese stock price responses to domestic EPU shocks is predominantly positive, a sign that Chinese investors who herd may act more quickly on bad news than on good news. The impact of herding, ownership structure, and other home market characteristics on the Chinese stock price reaction to domestic EPU movements remains a topic for future empirical research.

Our results imply that uncertainty, like other U.S. macroeconomic forces, have the potential to influence Chinese stock performance. Previous studies show that changes in U.S. tax policies (Gaertner, Hoopes and Williams 2020), dollar exchange rates (Aftab, Ahmad and Ismail 2015), and global commodity prices (Zhang and Liu 2019), likewise exert a cross-border influence on Chinese equities.

Since EPU represents the cumulative effect of unknown influences on future policy directions, its stock price effects may outweigh those of known macroeconomic policy shifts. Our results imply that the size of China’s market does not insulate its stocks from U.S. uncertainty. Therefore, investors should not expect the Chinese stock market to provide a haven from U.S. macroeconomic turbulence.

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