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# NONLINEAR DEPENDENCE BETWEEN ECONOMIC POLICY UNCERTAINTY AND FDI INFLOWS IN CHINA

***Abstract***. *Foreign direct investment (FDI) is the most reliable form of international capital flows, and it may be notably prone to increased uncertainty because of its high fixed costs. In this paper, we use the rolling window causality and the quantile-based Granger causality method to investigate the nonlinear dependence between economic policy uncertainty (EPU) and foreign direct investment (FDI) inflows in China for the period between 1999:M06 to 2021:M12. The empirical findings of the study show that EPU exerts a negative impact on FDI inflows during the majority of the time periods that have been studied. However, during the U.S subprime crisis in US, the effect was positive. That is, it can be inferred that the FDI inflows are not always hampered by the Chinese government's economic policy uncertainty. We enlarged our study with the quantile-based Granger causality method to assess robustness. In view of the recent dynamic economic condition and COVID-19 pandemic, the results suggest China's government should focus on more openness and improving its domestic business environment to enhance foreign investors' trust and avoid a possible drop-off in FDI inflows.*

***Keywords***: *Causality, China, Economic policy uncertainty, FDI, Inflows, Investors, Nonlinear.*

**JEL Classification: B17, D53, F16, G01, P45**

## 1. Introduction

Policy uncertainty is one of the primary concerns that may impede worldwide flows of foreign direct investment, according to the United Nations



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Conference on Trade and Development's world investment report. High policy uncertainty has an effect on businesses, as such policies tend to have a significant impact on their costs and profitability (Su et al., 2022). Aside from that, a high EPU dampens investor confidence, and generates a factor of unpredictability when it comes to investment profitability, which causes them to wait rather than invest. When compared to domestic investment, actively engaging in activities abroad poses more risks and less protection, thus making the FDI inflows more vulnerable to EPU. Furthermore, this increasingly vulnerable relationship with FDI, in contrast to domestic investment, is mostly due the greater fixed costs, which are primarily due to the issues linked with specific national limits.

Taking China as an example, it often updates and revises its economic policies, mostly to standardize and regulate its economy, which is mainly dependent on the government's desired rubrics. Furthermore, among all the countries that can be considered as developing markets, China has been observed to have the highest level of government intervention (Wang et al., 2017). Although it is the world's second largest economy, China has been a continuously changing economy since the 1980s, specifically from a centrally planned one to a market one . During this time of transition, the Chinese government has continued to face novel and unfamiliar economic policy concerns. In terms of the policies that it adheres to, the Chinese government's many economic reforms are vulnerable to a significant degree of uncertainty. These policies are believed to have long-term consequences for the economy, thus resulting in a shift in the FDI factor (Chen et al. 2019). Since the economic reforms of the late 1970s, China's government has focused its energies on attracting foreign direct investment, as it is the world's largest developing economy. It is worth noting that they have been the primary sources of external financing in the past as well.

Foreign events, such as the economic crisis and trade wars, have previously had an impact on the Chinese EPU, in addition to the internal uncertainty-related stocks that have also been experienced. During the subprime mortgage crisis, the EPU was at an all-time high, yet the rising domestic market continued to entice FDI inflows. Nonetheless, when the crisis accrued into the global financial crisis (GFC), the FDI inflows fell substantially, which was an unintended consequence of the lower investment demand. Furthermore, the Sino-US trade war also caused the EPU to spike, but the FDI continued to rise as the Chinese government continued to develop, grow and open up, while also effectively implementing massive tax cuts. In comparison to most other developing countries, the FDI inflows in China has thus far resulted in more favorable economic spillovers, and it is affirmed that there would continue to be a high demand (Zheng, 2020). The EPU tends to influence the FDI inflows, which is then capable of leaving a favorable impact on the developing markets' government policies which are ultimately aimed towards attracting foreign investment, thereby also increasing the economic uncertainty. In short, our review of the literature indicates that China, as the world's second-biggest economy, and the world's largest developing country, will continue to have a high need for FDI inflows in order to continue the pace of its growth.

Furthermore, due to the larger local markets, stronger human capital availability, higher levels of openness, and an increased level of government participation, China has managed to attract an increasing amount of attention from overseas investors. Whereas, on the other hand, it is still in the process of transitioning from a centrally planned to a market economy. Furthermore, there is a degree of uncertainty concerning government policy. As a result, when it comes to China, the debate over EPU and FDI is more crucial to address.

Our study has a manifold contribution to the existing literature. To begin with, while the literature that discusses the influence of EPU on the FDI inflows is extensively found, but only a limited number of studies have actually shed light on EPU as a paramount factor of FDI inflows in China, specifically. Second, we have also added to the research by resorting to the analysis of how EPU and FDI 's mutual influence changes over time. It is also worth noting that the previous research efforts have thus far neglected the interactions that occur between the EPU and the FDI , instead solely relying on the full-sample causality test. In addition to this, we have also taken into account the fact that a full-sample test tends to ignore the structural changes in the relevant parameters, which could eventually lead to a time-varying causation between the EPU and FDI inflows. Therefore, we proposed the use of the bootstrap rolling window causality test in order to study the nonlinear linkages between the EPU and the FDI inflows.

The purpose of this was to fill the gaps that reveal a dynamic causal relationship, and confirm the presence of structural changes in the series. Also, based on the actual on - ground reality in China, an attempt has been made to account for this particular metric. The Granger rolling window test was used in this study to confirm the results' robustness, as it has the capacity to observe time-varying causal links between the two variables. The test has the ability to discriminate between the full- and sub-sample linkages between the time series, therefore making it a better measure than the other standard approaches, such as the impulse response and correlation analysis, as well as the Granger. Furthermore, we have resorted to the use of the monthly data from the EPU index (Baker, Bloom, and Davis, 2016), and the foreign direct investment absorption data from China, so as to reflect policy uncertainty and the FDI inflows, respectively. The data was chosen to cover the time period pertaining to 1999M01 to 2021M12, in order to undertake a thorough empirical analysis.

The empirical data were found to be compatible with the general equilibrium model, implying that the EPU influences FDI inflows in some way. Furthermore, the result shows that the EPU can, in the majority of cases, hinder FDI inflows, notably in China, however this opinion is not applicable or agreed upon in the case of the US subprime mortgage crisis. The FDI inflows, on the other hand, have led to the boost of the EPU, particularly during the subprime mortgage crisis in the United States and the Sino-US trade war. In order to avoid the impeditive effect of EPU on the FDI, it has been advised that the Chinese government must devote itself to preserving the economic policy consistency, in order to reduce the EPU in the majority of instances that have been encountered.

Also, the government should preferably take concrete steps to reduce policy uncertainty, which is frequently a result of abrupt increases in the FDI inflows. The findings of this study suggest that, in light of the global trade tensions and a complex economic climate, the Chinese government should maintain a consistent policy, and also work towards strengthening its domestic business environment, so as to boost the foreign investors' level of confidence.

This paper follows the following pattern for a more in-depth investigation: The literature review is presented in Part 2; Part 3 introduces the data and research methodology that has been used in the paper. Moving on, Part 4 gives an overview of the findings. Finally, Part 5 concludes this paper.

**2. Literature review**

Currently As the discipline of FDI inflows plays a crucial role in domestic growth, especially in the incipient and developing nations, policymakers and researchers are drawn towards the subject of policy uncertainty and FDI inflows. In this regard, Chen et al. (2019) conveyed a comparable level of results. The study revealed that policy uncertainty that is primarily caused by domestic elections has a significant and adverse impact on FDI inflows, which typically tends to go down during election years, before rebounding again. At another instance, White III et al. (2015) contended that the FDI inflows related interest would fall in Southeast Asia, primarily due to the highly unsettled legal conditions. However, the increase in the uncertainty revolving around the legal system (particularly when the legal system uncertainty is very high) will attract more FDI inflows after a certain point in time.

According to Asamoah et al. (2016), eminent organizations positively influence the FDI inflows, primarily by minimizing the negative impact of economic uncertainty on the FDI inflows. Bashir et al. (2014) also claimed FDI inflows may result in the monopolization of local industries, a situation which tends to raise unemployment and create economic uncertainty. However, the host economy tends to possess weak utilitarian and agrarian work opportunities , which essentially means that as economic uncertainty rises, the FDI inflows to the continent would be restricted (Aziz, 2018). As a result, countries with inferior institutional quality must improve economic stability and sustain effective institutions (Su et al., 2021). However, the problem that implies that the Chinese EPU has a negative influence on FDI inflows is not always considered to be true, and it relies a lot on the nature of the company. Taking into account enterprises' strong confidence in the face of policy uncertainty as a result of government subsidies, Wang et al. (2017) discovered that while the negative outcome is not clear for those firms with more subsidies, it is considerable for those with fewer. According to Liu and Zhang (2020), EPU has a particularly large negative impact on investment for businesses with greater external financing costs. In contrast to these two points of view, Zheng (2020) stated that foreign investors who continue to invest in China frequently come face to face with a high EPU, thus implying that FDI does not have any substantial influence. Conversely Zhou et al. (2002) pointed that the FDI inflows are capable of leaving an impact on the Chinese government policy that essentially emphasizes on the foreign direct investment, resulting in a

higher level of EPU. At another time, a study by Simons (2009) claimed that the government of an emerging market has an incentive to change policy, especially once the foreign investors have made their investments, which could potentially could cause the EPU to grow.

The existing literature focuses mostly on the EPU's unidirectional impact on the FDI inflows. However, only a few studies have looked into the precise interplay that exists between the EPU and the FDI inflows. Following the same context, Simons (2009) developed a model that showed how private investor uncertainty regarding the government future policy influences foreign investment flows, which in turn influence the policy-making process, in order to support the FDI . In general, these investigations have not been able to elucidate the mechanism of interrelatedness between the EPU and the FDI inflows. They've also ignored structural and operational changes in the full-sample time series, which are renowned for obfuscating the dynamic relationship between the EPU and FDI inflows. In more specific terms regarding the same, Su, et al. (2022) pointed out that the traditional Granger causality test, which is based on the assumption of a standard normal distribution, is frequently unavailable in practice. Furthermore, the external factors that contribute to policy uncertainty fluctuations may also alter over time. The causation between the two variables may alter as the economic environment changes. Hence, we have resorted to the use of the sub-sample Granger causality method, specifically between the two variables that have been taken into account in the context of China, so as to try to bridge the gap that exists in the earlier studies. For this purpose, we have investigated the association between EPU and FDI inflows, in order to determine whether the Chinese economic policy uncertainty impedes the FDI inflows. Aside from that, the impact of the FDI on EPU may also be seen.

## 3. Data and Methodology

### 3.1 Data

For the purpose of this study, we have resorted to the use of monthly data from January 1999 to December 2021, in order to examine the relationships between EPU and FDI, specifically in China. Baker et al. (2016) created the EPU index to quantify economic policy uncertainty at that particular period in time and FDI data taken from the Ministry of Commerce People’s Republic Of China (http://www.mofcom.gov.cn/) and the inflows of FDI are in 100 million dollars. Economic policy uncertainty is a significant factor of FDI in general. During the GFC and stock market volatility, EPU was observed to be greater, whereas the FDI inflows fell dramatically in China. The uncertainties surrounding China's economic policy may have had an effect on the FDI inflows.

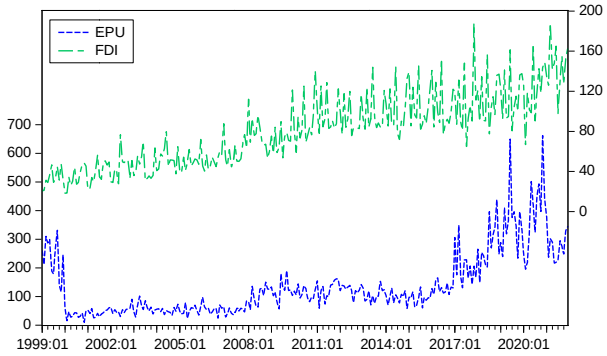


**Figure 1. The trends of EPU and FDI**

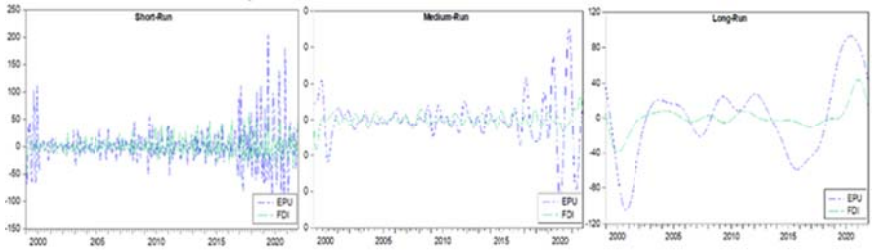


**Figure 2. Transform series of variables**

Figure 1 and Figure 2 demonstrates that the FDI declines during periods when the EPU increases, most notably following economic or financial crises. It is noteworthy here that the FDI inflows began to grow in popularity following WTO's membership in the year 2001, although the economic situation was still relatively stable at the time. The EPU then grew dramatically between 2002 and 2003, partly as a result of the development of severe acute respiratory syndrome (SARS), during which time the government slashed deposit and lending interest rates, instituted tax cuts, and increased treasury bond issuance. FDI inflows, on the other hand, fell dramatically between 2002 and 2003, owing mostly to the outbreak of the Iraq War and the SARS epidemic, both of which stifled international capital inflows into China. The government boosted the reserve requirement ratio (RRR) to stimulate the implementation of the interest rate marketization reform, and as a result, the rate in the monetary market was frequently changed, causing the EPU to rise again in 2004. Meanwhile, the FDI inflows fell abruptly at the same time. Not only did the GFC boost the EPU in 2008-2009, but it also reduced the foreign enterprises' profit margins in the host nation, resulting in a rapid decline in the FDI inflows since the second half of the year 2008. Following a similar tendency, and exacerbated by the European debt crisis that erupted in 2011, the global economy slowed down in its trends, and the level of uncertainty appeared to have increased following the crisis. Following the crisis, the EPU increased as a result of interest rate decreases and an RRR that was used several times in 2015 to encourage consumption and economic growth. However, the FDI was showing a downward

trend at the time. Fast forward to the present day, the Coronavirus illness (COVID-19) consequently increased the economic uncertainty, the FDI was noted to be at a low level, due to the global economy's slowdown. In most of the uncertain situations, we can deduce from these observations that the two variables fluctuate in opposite directions.

**Table 1. Descriptive statistics**

| | EPU | PCI |
|---|---|---|
| Mean | 137.86 | 80.34 |
| Median | 103.21 | 80.22 |
| Maximum | 661.83 | 187.90 |
| Minimum | 10.11 | 18.32 |
| Std. Dev. | 112.31 | 36.56 |
| Skewness | 1.73 | 0.50 |
| Kurtosis | 6.29 | 2.59 |
| Jarque-Bera | 262.21*** | 13.57*** |
| Observations | 276 | 276 |

The descriptive data in this regard are presented in Table 1. Due to the element of positive skewness, the EPU and FDI both are observed to have right-skewed distributions. At a 1% significance level, the Jarque-Bera test reveals that the EPU and FDI have non-normal distributions. The variables that were considered underwent a natural logarithm transformation, largely to eliminate the possibility of heteroscedasticity in the time series (Su et al., 2022).

### 3.2 Methodology

3.2.1 Bootstrap full-sample causality test

The Granger causality test statistics are developed on the basis of the vector auto regression (VAR) model, and do not typically adhere to the traditional asymptotic distributions.According to Shukur and Mantalos (2000), the results fail to produce effective and reliable results, especially when the RB approach is not eligible to be applied. Furthermore, the likelihood ratio (LR) test tends to be completely applicable in small samples. As a result, to evaluate the causality between FDI inflows and EPU, this study used modified LR tests based on the RB approach. Equation (1) can thus be used to build the VAR (p) model, with a lag value of p calculated using the Schwarz Information Criterion (SIC):

$$x_t = \varphi_0 + \varphi_1 x_{t-1} + \ldots + \varphi_p x_{t-p} + \varepsilon_t \; \mathrm{t} = 1,2,\ldots\ldots \mathrm{T} \qquad (1)$$

Here, the function, $\varepsilon_t = (\varepsilon_{1t}, \varepsilon_{2t})'$ is a white noise process. The primary goal of this paper is to closely investigate the interactions that occur between the

EPU and the FDI inflows. Hence, Equation (1) can thus be expressed as Equation (2), by translating the variable x to EPU and FDI:

$$\begin{bmatrix} EPU_{1t} \\ EPU_{1t} \end{bmatrix} = \begin{bmatrix} \varphi_{10} \\ \varphi_{20} \end{bmatrix} + \begin{bmatrix} \varphi_{11}(L) & \varphi_{12}(L) & \varphi_{13}(L) \\ \varphi_{21}(L) & \varphi_{22}(L) & \varphi_{23}(L) \end{bmatrix} \begin{bmatrix} EPU_{1t} \\ FDI_{2t} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \quad (2)$$

3.2.2 Parameter stability test

One of the assumptions that has been designed for the full-sample test is that the parameters in the VAR model are constant. As a result, the outcomes will be zero, and the causality will be unstable, particularly if the time series structure tends to shift (Balcilar and Ozdemir, 2013). As a result, it's critical to double-check that the settings are stable. On the one hand, we used the $\mathrm{Sup}-\mathrm{F}$, $\mathrm{Mean}-\mathrm{F}$ and $\mathrm{Exp}-\mathrm{F}$ tests to ensure that the short-run parameters were stable. These tests can be used to see if the parameters are stable in the near term. On the other side, the $L_c$ statistic has been employed to examine the parameters' long-term stability (Nyblom 1989).

3.2.3 Bootstrap sub-sample rolling-window causality test

When considering the Bootstrap sub-sample rolling-window causality test, it is worth noting that (Balcilar et al., 2010) introduced this method for the purpose of dividing the entire sample into sub-samples. They also used a bootstrap version of causality tests, which has proved to extend various advantages. The test is applicable to all I(1) variables, whether cointegrated or non-cointegrated. In order to achieve the main goal of this study, we used this strategy, so as to investigate the interactions between EPU and FDI. The width selection was more precarious, as the test tends to be more accurate with a larger width, even though the scrolling times with a larger width tend to decrease. On the other hand, when the width is narrow, it can diminish the element of heterogeneity, which can then lead to biased test findings. Moving on, the width is limited to 20 interval window or more, especially if the parameters taken into account contain a sequence of breaks (Su et al., 2022). The sub-sample rolling window test, when compared to the usual technique, provides a unique perspective on the causality between EPU and FDI. On one hand, this method allows for the time-varying causation between two variables. Whereas, On the other hand, it can detect an element of unpredictability between sub-samples, owing to the presence of structural breakdowns (Su et al. 2022). In more concrete terms, we can use this method to determine whether the influence is negative or positive at different times, as the assessment is primarily based on the actual scenario that may continue during each era that is taken into account (Su et al, 2021). Because of its advantages, we believe that the rolling window test can fully capture the dynamic causal linkages between economic policy uncertainty and FDI inflows in China.

3.2.4 Quantile-Based Granger Causality Test

Our analysis based on the Wavelet based Quantile on the Quantile analysis has been further complimented by taking into account the quantile-based granger causality. Based on the (Granger, 1996), if a series $Z_t$ does not make a viable

contribution towards predicting another series $Y_t$, then it is affirmed that $Z_t$ does not granger-cause $Y_t$. In more mathematical terms, let there be an explanatory vector $I_t \stackrel{def}{=} \left(I_t^Y, I_t^Z\right)' \in \mathbb{R}^d$, where $d = s + q$, and $I_t^Z$, which is the prior information set of $Z_t, I_t^Z \coloneqq (Z_{t-1}, \ldots., Z_{t-q})' \in \mathbb{R}^q$. The mathematical equation for the null hypothesis of granger non-causality from $Z_t$ to $Y_t$ is therefore given as follows:

$$H_0: F_Y(y|I_t^Y, I_t^Z) = F_Y(y|I_t^Y), for\ all\ y \in \mathbb{R} \quad (3)$$

**4. Empirical results**

As previously understood, the causality between the two variables can change over time as a result of the structural changes in the series. Therefore, we used the global maximization test developed by Bai and Perron, in order to test the structural breaks in EPU and FDI in this case (Bai and Perron 1998). Table 2 displays the findings, which show that both the EPU and the FDI are prone to structural breaks. More specifically, EPU experienced structural breaks in October 2007, December 2012, and January 2017, according to the findings. Furthermore, the FDI inflows experienced these breaks in December 2007 and January 2017. It's worth noting that these two series share a significant break in the month of January in h the year 2017. As a result of the structural changes, the relationship between the two variables may change over time.

**Table 2. Bai-Perron test of L+1 vs. L sequentially determined breaks**

| | | EPU | | FDI | |
|---|---|---|---|---|---|
| Break test | | F-statistic | Critical Value** | F-statistic | Critical Value** |
| | 0 vs. 1 | 188.832** | 8.58 | 241.1078** | 8.58 |
| | 1 vs. 2 | 29.771** | 10.13 | 19.87271** | 10.13 |
| | 2 vs. 3 | 26.601** | 11.14 | 5.465310 | 11.14 |
| | 3 vs. 4 | 1.745 | 11.83 | | |
| Break data | | 2007M10<br>2012M12<br>2017M01 | | 2007M12<br>2017M01 | |

Notes: ** denote the significance at 5% percent.

We explored the causality of the EPU and FDI in a large sample, focusing on the first discrepancies between the three variables, taking these factors into consideration. The ideal lag order for this agreement, according to SIC, is 4. We can see that the EPU has an impact on FDI inflows from Table 3 using the modified LR tests based on the RB approach in Equation (1). As a result, FDI inflows have no effect on EPU, contradicting earlier findings (Su et al., 2022) .

**Table 3. Full-Sample Granger Causality Test**

| Tests | $H_0$: EPU does not Granger cause FDI | | $H_0$: FDI does not Granger cause EPU | |
|---|---|---|---|---|
| | Statistics | *p*-values | Statistics | *p*-values |
| Bootstrap *LR* Test | 12.698*** | 0.000 | 2.653 | 0.320 |

Notes: *** denote the significance at 1% percent, respectively.

Full-sample estimate in the bivariate VAR system means that the parameters are constant and that just one causality persists across the time span, as shown in the table. Furthermore, because of the non-constant parameters, the causal relationship between the two variables is expected to change over time. The stability of the parameters must be examined closely, as well as the presence of any structural changes in the full-sample time series. Sup − F, Mean − F and Exp − F tests are applied to assess the parameters' short-run stability. In addition to this, we also used the $L_c$ statistics test to determine the long-term stability of the considered parameters. Table 4 shows the relevant outcomes in this regard.

**Table 4. Parameter Stability Test**

| | EPU | | FDI | | *VAR* (3) System | |
|---|---|---|---|---|---|---|
| | Statistics | Bootstrap p-value | Statistics | Bootstrap p-value | Statistics | Bootstrap p-value |
| *Sup-F* | 22.02** | <0.05 | 63.70*** | <0.01 | 93.98*** | <0.01 |
| *Mean-F* | 12.03** | <0.05 | 45.53*** | <0.01 | 51.27** | <0.01 |
| *Exp-F* | 7.55** | <0.05 | 28.99*** | <0.01 | 41.77*** | <0.01 |
| $L^c_b$ | 1.64** | <0.05 | 3.19*** | <0.01 | 4.82*** | <0.01 |

Notes: This study calculates p-values using 10,000 bootstrap repetitions.

** and *** denote the significance at 5 and 1 percent, respectively.

According to Table 4, all null hypotheses that imply that the parameters are constant are not acceptable at a 1% significance level, even when analyzed using the Sup − F, Mean − F and Exp − F measures. The EPU, FDI, and VAR models all feature abrupt structural changes, according to the Sup − F test. Furthermore, assuming that the parameters follow a martingale process, both the Mean − F and the Exp − F critically analyze the model's gradual stabilization over time, exposing the parameters' non-stability. The parameters follow a random walk process, indicating that the VAR process is non-constant, according to the $L_c$ statistics. The

parameters are also found to be unstable, making the traditional full-sample causality test ineffective. In order to capture the element of dynamic causality, this work used rolling-window bootstrap estimation to remove the effects of structural changes. In this scenario, the rolling sub-sample data, which contains the 24-month observations that have been accounted for, is appropriate for observing the bootstrap p-values from the VAR process.

Figure 3 shows that the null hypothesis, propagating that EPU is not a Granger cause of FDI, is unacceptable at a 10% significance level for the time periods 2008M01 to 2008:M06, 2011M01 to 2011:M05, 2016M06 to 2016M10, and 2020M02 to 2020M06. The coefficient estimates for the effect of EPU on FDI inflows are also shown in Fig. 2. According to the data, the EPU has both negative and positive effects on foreign direct investment in these sub-samples. The EPU has had a negative influence on FDI with the exception of the months of April and June 2008. We discovered that the EPU had a detrimental influence on FDI in this aspect.

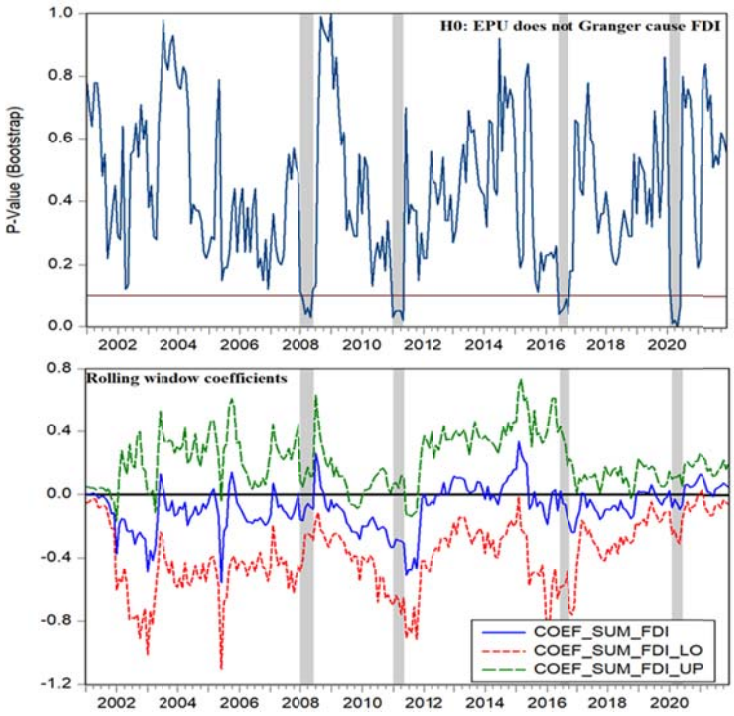


**Figure 3. Impact of EPU on FDI sub-sample bootstrap rolling-window Granger causality**

First and foremost, we must evaluate the negative consequences. The Chinese economy began to recover from the Great Recession at the end of the year 2009, and it reached its full capacity in the year 2010. From 2011M01 to 2011M05, there was generally a steady economic climate as the crisis gradually subsided. In

order to avoid any inflationary pressure, the government utilized a high-interest rate and RRR during this time period. Simultaneously, the EPU also fell during this time. The low level of EPU thus had the potential to boost foreign investors' trust, making the country more appealing to the investors, resulting in an increase in the FDI inflows. EPU has had a negative impact on the FDI between the time period pertaining to 2020M02 to 2020M06. The current Sino-US trade war and the outbreak of the novel COVID-19 virus are two unknown influencing elements in the Chinese economy in this period. The pandemic is still active, and the global economy is in a state of flux, creating fears about personal safety as well as the global and national economies' long-term prospects. It was noted that the epidemic has had a beneficial effect on the Chinese EPU, which has notably experienced an increase during this time period. The rising EPU has thus shaken the investors' trust in the Chinese economy, leading them to take a wait-and-see approach, rather than investing into the Chinese economy.

Fig. 4 shows that the FDI has an impact on the EPU between 2006M08 to 2006M12, 2008M03 to 2008M10 and 2018M07 to 2018M08, as well as in the time period from and 2020M06 to 2020M10. The orientation of the effects of FDI on EPU is therefore positive.

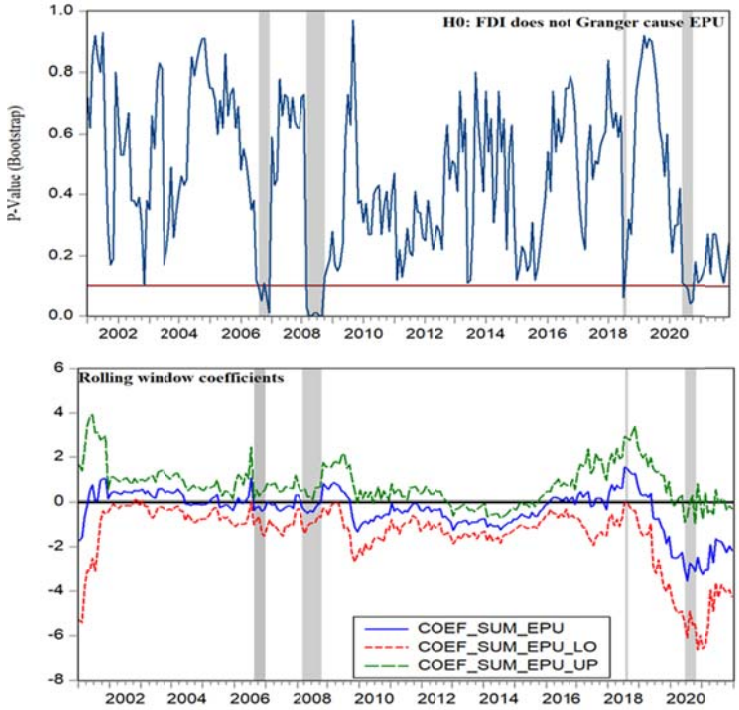


**Figure 4. Impact of FDI on EPU and sub-sample bootstrap rolling-window Granger causality**

It was also noted that the FDI inflows increased dramatically from 2006M08 to 2006M12 and 2008M03 to 2008M10, owing to the exponential growth of the Chinese economy. In the middle of the global economic downturn, China's GDP growth rate improved to a staggering 11.4 percent in the year 2007, and the positive trend continued in the first quarter of 2008 as well. According to the Chinese government, economic growth has had a favorable impact on luring FDI inflows. As a result, it can be stated that increased FDI inflows will aid China's economy in growing even quicker in the future. Global investors, on the other hand, have lost faith in the United States and have changed their investment strategies, particularly since the start of the subprime mortgage crisis, potentially causing them to shift their assets to China. When there was an external financial crisis, the rapid change in FDI inflows had a negative influence on the developing countries' economic and political uncertainty.

In the year 2018, the Chinese FDI inflows was ranked at the second position in the world, trailing only the United States. Furthermore, FDI was at a high level from September 2018 to January 2019, owing mostly to the government's continued opening-up of the banking sector and hosting an attractive investment environment. The Chinese government responded by establishing pilot free trade zones in Hainan Province and lowering market entry requirements for international investors. Despite the trade wars between China and the United States, international corporations have continued to invest in China, mainly because of the relatively easy access and attractive investment environment that China offered. As a result, the government has proceeded to undertake a tax-cut scheme for foreign enterprises in order to avoid FDI from collapsing as a result of trade tensions with the United States. As the Sino-US trade battle heated up, the Chinese government announced that tariffs would be raised to 10% on September 24, 2018, and 25% on January 1, 2019, respectively, causing the EPU to surge. As a result, the beneficial benefits of this measure could be demonstrated, implying that a sudden change in FDI could contribute to an increased level of policy uncertainty in China, particularly amid the current economic crisis and trade war. These findings are in line with the affirmations made by (Lensink and Morrissey 2006), which state that rapid fluctuations in FDI can cause the economy to become unstable.

This research analyzes the two-way causal link with the two variables that are taken into account throughout time using rolling-window bootstrap estimation. The results suggest that the EPU has a negative impact on the FDI in the majority of the notable intervals that have been identified. In other words, the EPU can obstruct the FDI inflows. However, there has been a positive relationship reported between EPU and FDI, particularly during the subprime mortgage crisis in the United States, owing to the implementation of expansive economic opening-up, high-interest rates, and tax concessions, which have increased the foreign investors' confidence in China. As a result, we can assert that the Chinese economy's policy uncertainty is associated with the FDI inflows. As a government-oriented country, there will always be epochs of uncertainty shocks that will apprise the Chinese

government, allowing them to take the appropriate counteractive measures when the FDI may decline due to the high EPU.

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**Table 6. Quantile causality test: EPU and FDI**

| Quantile interval | lag Order | FDI ≠ EPU | lag Order | EPU ≠ FDI |
|---|---|---|---|---|
| [0.05~0.95] | 1 | 13.416*** | 1 | 9.303** |
| [0.05~0.20] | 1 | 18.496*** | 1 | 1.206 |
| [0.20~0.40] | 1 | 8.400** | 1 | 9.309** |
| [0.40~0.60] | 2 | 7.044 | 2 | 8.322* |
| [0.60~0.80] | 2 | 7.953* | 2 | 8.618* |
| [0.80~0.95] | 1 | 1.779 | 1 | 2.384 |

Note: ***, ** and * denote significance at 1%, 5% and 10% level.

In order to ensure robustness, this study uses the quantile-based Granger causality approach to assess the causation between the variables. This technique enables us to analyze data for causality measures evaluated on multiple quantiles. Tables 6 describe the findings of the joint significance test in this respect. According to the test data, the 5 percent non-causal association is rejected by most of the quantiles, demonstrating that EPU and FDI can have an impact on one another.

**5. Conclusion**

Foreign direct investment (FDI) is the most reliable form of international capital flows, and it may be notably prone to increased uncertainty because of its high fixed costs. In this paper, we use the rolling window causality and the quantile-based Granger causality method to investigate the nonlinear dependence between economic policy uncertainty (EPU) and foreign direct investment (FDI) inflows in China for the period between 1999:M06 to 2021:M12. As a result, this article examines the linkages that exist between EPU and FDI across time, focusing particularly on China, and finds that in most cases, the EPU experiences an inverse relationship with FDI. To put it another way, a high EPU can stymie FDI inflows.

With these developments, the foreign investors' trust may be impaired due to an increase in the EPU, and as a result, they may wait for more information regarding the government's legislative decisions, ultimately resulting in a fall in the FDI inflows. However, during the subprime mortgage crisis, when the EPU had a beneficial impact on FDI, this viewpoint stood indefensible.

The Chinese government can learn a lot by studying the interaction between the EPU and the FDI. To begin with, because China is a government-oriented country, the adoption of economic policies is unavoidable, which may result in an elevated level of EPU. When it comes to FDI, the government can try to set up a monitoring system, and then take pre-emptive actions if it starts to fall due to a disproportionate level of EPU. Furthermore, the government should make it a priority to keep the economic factors consistent and coherent (e.g., interest rate, tax burden and deficit ratio). Aside from that, they can provide essential information that is based on legislative changes ahead of time, so as to prevent and future uncertainty. Second, controlling and implementing high interest rates, the economy's expanded opening, and tax cuts, may boost foreign investors' confidence, especially in the face of an external financial crisis, which will be helpful for the Chinese government. Furthermore, to avoid a drop in the FDI inflows during the downturn, the government must continue to open up the economy, and offer appropriate incentives to foreign investors. In order to build a community of interests in the face of Sino-US trade wars, and the global complex economy, state-owned and local firms should aim to boost their cooperation with foreign-owned enterprises in China.

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