Trade uncertainty and investments in an emerging country: a Fourier VAR approach

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Abstract

Purpose – This investigation aims to determine the effect of trade uncertainty on domestic investment (DI) and foreign direct investment (FDI) for the Turkish economy from the first quarter of 2005 to the first quarter of 2020.

Design/methodology/approach – The authors adopt the vector autoregression (VAR) model augmented with Fourier terms. Using this methodology, the authors obtain the empirical results of the impulse-response functions and the variance decomposition analysis.

Findings – The empirical results demonstrate that a shock to trade uncertainty has a slight negative impact on DI for up to approximately 1.5 years, whereas its impact on FDI is negative but long-lasting. Moreover, the contribution of trade uncertainty to FDI is relatively higher than to DI in the error variance decomposition for the investigated period. These empirical results can be beneficial for shaping the Turkish authorities' trade policies in the following periods.

Research limitations/implications – These findings have implications within the macroeconomic setting. Government authorities can provide tax exemptions for specified sectors and debureaucratize investment processes for both domestic and foreign entrepreneurs. Additionally, institutional quality and property rights should be protected strictly and developed gradually.

Originality/value – This study is the first to examine the impact of world trade uncertainty on Türkiye's DI and FDI. Because trade uncertainty might act as fixed costs, this creates the option value of waiting and seeing the market, and firms hesitate to incur investment.

Keywords Domestic investment, Foreign direct investment, Fourier VAR, Trade uncertainty, Türkiye

Paper type Research paper

1. Introduction

The role of uncertainty and risk in economic activities is a key topic in economic theory. Uncertainty is a natural part of decision-making because people often have incomplete information about the future. Mainstream economics tends to overlook uncertainty and instead focuses on risk (Dow, 2015). However, it is necessary to distinguish between the two. Risk can be measured, whereas uncertainty cannot be easily quantified and tested (Knight, 1921). The rational expectations hypothesis suggests that individuals and firms make rational decisions in uncertain situations based on imperfect information. When faced with uncertainty, economic actors will gather as much information as possible to make the best decision if the expected benefits outweigh the costs (Lucas and Sargent, 1981; Lucas and Prescott, 1971). Additionally, news- (Baker *et al.*, 2016), volatility (Grier and Perry, 1996) and prediction discrepancy-based (Rich *et al.*, 2012) economic uncertainties are calculated.

JEL Classification — C22, E22, F13

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Theoretically, different perspectives have been used to explain the effect of uncertainty on firms' investment. On the one hand, Bernanke's (1983) real options theory claims that the real option value of waiting for investment and penetration into the market emerges from policy uncertainty. When uncertainty increases, firms postpone their investment and recruitment processes because of the increased hiring and firing costs. The greater the value of the investment decision and export than that of the option, the more likely firms are to implement the option and penetrate the export market (Dixit and Pindyck, 1994). This suggests that firms postpone their investment decision when the value of the option to invest rises. Accordingly, firms' investment and market entry decisions have irreversible costs. "Wait and see" becomes the option for firms in an environment of higher uncertainty. Briefly, when uncertainty increases, the value of the option to invest in the long term increases and causes a delay in the decision to invest.

On the other hand, Oi (1961), Hartman (1972) and Abel (1983) make counterarguments about uncertainty's positive impact on trade and investment. If firms can increase their output against positive news and reduce their output against negative news, they take more risks. Oi (1961) proposes that firms consider product price volatility as a measure of demand uncertainty and argues that returns will rise as demand uncertainty rises. Thus, higher uncertainty leads risk-taker firms to incur higher risk and to increase their investment or to accelerate their entry into the export market (Bloom, 2014).

Beyond real options theory (Bernanke, 1983) and the Oi (1961)–Hartman (1972)–Abel (1983) effect, Handley and Limao (2017) propose that higher trade uncertainty leads to a decrease in investment because the penetration of firms into the export market increases sunk cost. Furthermore, uncertainty about trade laws and agreements by government agencies or unexpected changes in countries' trade policies sends out a signal to countries' trade partners that there might be a sunk cost and irrevocable investment for the penetration of foreign markets by firms. For this reason, trade volume decreases among countries and investment reduces across firms (Bernanke, 1983; Stokey, 2016).

Ahir *et al.* (2018) significantly contribute to quantifying trade uncertainty in the literature with an index based on keywords appearing in economist intelligence unit reports. The world trade uncertainty (WTU) index was created using this method and global data. Although the WTU followed a stable course between 1996 and 2018, it increased significantly between 2018 and 2020. This rise showed that the trade wars between the United States and China were effective in the index value. As of 2020, aggressive commercial relations have weakened, and the index score has stagnated. Unexpected shocks in the WTU are expected to affect various countries' economies around the world. Türkiye is viewed as the bridge between Asia and Europe, and its economy has been classified as an upper-middle-income economy with outstanding economic performance since 2000 (WB, 2022a). The structure of its economy was transformed from import-substitution to export-led growth in the 1980s (Pamuk, 2007; Onis, 2010). With trade and financial market liberalization policies, Türkiye's gross domestic product (GDP) increased from nearly US$69 billion in 1980 to US$761 billion in 2019. In the same period, openness to international trade increased from 17.9% to 62.61% (WB, 2022b). During the 2000–2012 period, the Turkish economy considerably opened up to portfolio and direct investments. However, Türkiye's economic growth is considered fragile and foreign investment dependent. Foreign investment in the Turkish economy means short-term capital flows (Öniş, 2019). A researcher at Morgan Stanley proposed the term "Fragile Five" in August 2013 to describe developing economies that rely excessively on unsteady portfolio investments (short-term capital flows) to finance their economic growth. The initial five members of this group are Brazil, India, Indonesia, South Africa and Türkiye (Chadwick, 2019). Savings is less than investment in Türkiye, so foreign investment is very important in maintaining higher economic growth and current account deficit. Thus, because of the greater trade openness of the Turkish economy, uncertainty in world trade is expected to

affect domestic investment (DI) and foreign direct investment (FDI). The primary objective of this paper is to investigate the effect of trade uncertainty on both DI and FDI levels of the Turkish economy for 2005Q1–2020Q1. This research employs the vector autoregression (VAR) model augmented with Fourier terms (hereafter, Fourier VAR) that Enders and Jones (2016) proposed and presents the empirical results of the impulse-response function and variance decomposition. The remainder of this paper consists of four main sections. Section 2 reviews the empirical literature on the relationship between trade and uncertainty. Section 3 presents the data and methodology. Section 4 presents the empirical results and their discussion. Section 5 concludes the paper.

2. Literature review

To formulate our arguments, the empirical literature was divided into two parts: in the first part, studies examining the association between economic uncertainty and investment were covered; in the second part, research on trade uncertainty and investment was analyzed. Furthermore, we reviewed economic uncertainty's influence on investment from two different perspectives: general investment and FDI. The literature about the uncertainty-general investment nexus was classified into macro and micro levels.

First, much discussion about the relationship between investment and economic uncertainty was found to be centered on the macro level. Aizenman and Marion (1993), Bahmani-Oskooee and Maki-Nayeri (2019), Baker *et al.* (2016), Carriere-Swallow and Cespedes (2013), Sahinoz and Cosar (2018) and Greg *et al.* (2018) are among the authors that inspect the association between investment and uncertainty from the macro-level perspective. Their results demonstrate an adverse relationship between uncertainty and investment, indicating that reduced economic uncertainty causes an increase in investment.

Another strand of literature provided a brief overview of the nexus between economic uncertainty and investment at the corporate-firm level. For instance, Akron *et al.* (2020), Chen *et al.* (2019), Chen and Chiang (2020), Gulen and Ion (2016), Panagiotidis and Printzis (2020), Suh and Yang (2021) and Wang *et al.* (2014) examine the relationship between uncertainty and investment for different countries and country groups. The main findings indicated that economic uncertainty is inversely associated with corporate-firm level investment. In contrast, Wu *et al.* (2020) prove that a positive relationship exists between uncertainty and firm-level investment.

Various studies have explored the effect of economic uncertainty on FDI recently (Avom *et al.*, 2020; Choi *et al.*, 2021; Hsieh *et al.*, 2019). While Avom *et al.* (2020) and Choi *et al.* (2021) find a negative relationship between economic policy uncertainty (EPU) and FDI inflows, Hsieh *et al.* (2019) find a positive relationship between uncertainty and FDI outflows. Additionally, Krol (2018) and Borojo *et al.* (2022) inspect the effect of uncertainty on trade levels and report a negative effect. Similarly, Schmidt and Zwick (2015) and Kirchner (2019) analyze the relationship between portfolio investment and uncertainty and find a negative relationship between capital flows and uncertainty.

The second part of the empirical literature covered the impact of trade uncertainty on investment. Handley and Limao (2015), Caldara *et al.* (2020), Cebreros *et al.* (2020), Ebeke and Siminitz (2018), Sudsawasd and Moore (2006) and Shaikh (2021) examine this impact. Their results suggest that heightened trade uncertainty reduces the share of investment.

Recent studies on Türkiye have explored the relationship between trade uncertainty and stock market performance (Akdag *et al.*, 2023), economic uncertainty and investment (Sahinoz and Cosar, 2020), trade uncertainty and international trade (Nuroglu and Cekin, 2020), macroeconomic uncertainty and private investment (Demir, 2009), trade policy uncertainty (TPU) and country risk (Eryılmaz and Yılmaz, 2020), trade uncertainty and exchange rate (Özkan, 2020), EPU and investment (Sahinoz and Cosar, 2018), TPU and

consumer prices (Sakalak and Simsek, 2021), EPU and import (Songur, 2022), and TPU and financial market indicators (Yıldırım, 2021). However, to the best of our knowledge, no study has focused on the impact of WTU on DI and FDI in Türkiye. Hence, to fill this gap, our research examines this impact. Trade uncertainty might act as fixed costs, leading firms to hesitate to incur investment and create the option value of waiting and seeing the market.

3. Data and methodology

To examine the effect of trade uncertainty on investments in the Turkish setting, we employed quarterly data from 2005Q1 to 2020Q1, including 61 observations. FDI data were obtained from the Central Bank of the Republic of Türkiye, whereas DI data were obtained from the Turkish Statistical Institute database. Both were divided by the total GDP of Türkiye to obtain its share of the whole economy. Additionally, we constructed a per capita GDP series by using quarterly data of the GDP of the World Bank and dividing it by the whole year's population. Then, all the nominal series were deflated according to the consumer price index of the Turkish economy. We also used short-term interest rates (overnight rates) of Eurostat for Türkiye and the WTU ($lnWTU$) index of Ahir *et al.* (2018) to measure trade uncertainty. We used TPU indices for the United States ($lnTPU_{USA}$), China (TPU_{China}) and Japan ($lnTPU_{Japan}$). We chose these three countries' uncertainty by following Shaikh's (2021) argument that the countries are major world economies whose trade policies may affect other nations' economies significantly. Baker *et al.* (2016), Davis *et al.* (2019) and Arbatli Saxegaard *et al.* (2022), respectively, constructed the abovementioned series. All the series were seasonally adjusted and, except for TPU_{China}, they took the form of the natural logarithm.

In this study, similar to Bahmani-Oskooee and Maki-Nayeri (2019), we constructed two different models by considering domestic and foreign investments. Additionally, we substituted country-specific TPU indices instead of the WTU index.

$$lnDI = f(lnWTU, lnR, lnGDPpc) \quad \text{(Model 1)}$$

$$lnFDI = f(lnWTU, lnR, lnGDPpc) \quad \text{(Model 2)}$$

where *DI* and *FDI* represent the shares of DI to GDP and FDI to GDP, respectively. *WTU* is the value of trade uncertainty, whereas *GDPpc* refers to the per capita income. Last, *R* is the overnight interest rate in the Turkish economy. The data on trade uncertainty available at the global and country-specific levels limit the analysis of the relationship between investment and trade uncertainty. Data on trade uncertainty that are comparable across countries have recently become quite difficult to obtain. Therefore, we used WTU in our analysis. In Türkiye, overnight interest rates fluctuate within a wide margin and have higher volatility. Additionally, the overnight interest rate affects the level of investment and bank-lending channels (Gayeker *et al.*, 2020). Thus, it represents the short-term interest rate. "*ln*" denotes the natural logarithm of the corresponding series. Table 1 [1] presents the descriptive statistics of the series.

According to table 1, volatility was relatively low in the *lnDI*, *lnGDPpc* and *lnWTU* series; the differences between their maximum and minimum values were low. In contrast, the differences between the maximum and minimum values of the uncertainty indexes were very high. Jarque-Bera test statistics showed that *lnDI*, *lnGDPpc*, $lnTPU_{USA}$ and $ln\ TPU_{China}$ had non-normal distribution.

Regarding our methodology, we conducted Enders and Lee's (2012) Fourier augmented Dickey–Fuller (ADF) test and Enders and Jones's (2016) VAR model augmented with Fourier terms. Fourier terms were used to capture gradual smooth breaks. This study employed the Fourier ADF test rather than traditional unit root tests because this test might be helpful when there are several unknown breaks that occur nonlinearly (Enders and Lee, 2012).

Additionally, we chose the Fourier VAR method instead of traditional VAR model because our methodology allowed smooth structural breaks and provided more reasonable results. The modified VAR model is represented as follows (Solarin *et al.*, 2022):

$$Y_t = \gamma_0 + \gamma_1 sin\left(\frac{2\pi kt}{T}\right) + \gamma_2 cos\left(\frac{2\pi kt}{T}\right) + \sum_{i=1}^{p} \eta_i Y_{t-i} + \sum_{i=1}^{p} \zeta_i X_{t-i} + \varepsilon_i \quad (1)$$

$$X_t = \theta_0 + \theta_1 sin\left(\frac{2\pi kt}{T}\right) + \theta_2 cos\left(\frac{2\pi kt}{T}\right) + \sum_{i=1}^{p} \phi_i Y_{t-i} + \sum_{i=1}^{p} \varpi_i X_{t-i} + \upsilon_t \quad (2)$$

Here, p refers to the optimal lag length chosen by the Schwarz information criterion (SIC), whereas X_t and Y_t are stationary series. In the above equations, π denotes the Pi number, k is the number of the frequency [1, 2, . . ., 5], t is the time trend, and T is the sample size.

In the following sections, this study presents the impulse-response functions and the variance decomposition based on the VAR model extended with Fourier terms. Further, this investigation chooses "Generalized Impulses" rather than "Cholesky" as a decomposition method because the former is not sensitive to the order of the variables in the VAR model, whereas the latter can produce different results for each sorting.

4. Empirical results and discussion

Before conducting analyses, first, the unit root properties of the series had to be examined. We employed a Fourier ADF test to determine the stationarity degree of the variables. Table 2 [2] shows the relevant results and indicates that all the series were stationary except for *lnFDI* and TPU_{China}. This meant that shocks to these series were not long-lasting; they were temporary rather than permanent.

Before constructing the Fourier VAR model, one needs to take the first difference of all the nonstationary series. This is because the model requires such a series. We took the first difference of *lnFDI* and TPU_{China}.

4.1 Empirical results

This study set up the Fourier VAR model for both DI (Model 1) and FDI (Model 2) and chose the number of frequencies for the Fourier terms (k) based on the minimum SIC statistics where the model passed the diagnostics tests. For Model 1, k (number of the frequency) and p (lag length) were set as 2 and 5, respectively, whereas for Model 2, they were selected as 1 and 6, respectively. The online appendix shows the impulse-response functions [3] and the variance decomposition based on the Fourier VAR for both models.

According to Figure 1 [4], which displays the impulse-response functions for DI, a one standard deviation shock to the per capita income causes a rise in DI in Türkiye for approximately 10 quarters (2.5 years). Thus, an increase in the prosperity of Turkish citizens leads to advancement in economic activities, including a new demand for goods and services in the country. DI increases to meet this new demand. Additionally, the figure shows that a one standard deviation shock to interest rate causes a decrease in DI. The main reason behind this is that an increase in interest rate leads to a rise in the cost of borrowing for firms. A higher cost of borrowing than before canalizes investors to alternative investment areas such as the stock market, bond market and commodity market. A shock to the WTU has a slightly negative impact on DI for up to approximately six-quarters (1.5 years); then, its impact turns positive but minor.

Figure 2 [5] shows the impulse-response functions for FDI in the Turkish economy. A one standard deviation shock to per capita income increases FDI for up to eight-quarters. This

empirical finding can be attributed to the fact that foreign investors invest more because they want to try to obtain high revenues from their market-oriented investments (Bevan and Estrin, 2004; Economou *et al.*, 2017). Last, a shock to the WTU leads to a decrease in FDI inflows because rising uncertainty causes precautionary behavior among foreign investors. They tend to invest in safe havens like gold, bonds and real estate in periods of high economic uncertainty.

Table 3 [6] presents the variance decomposition in the Fourier system for DI for 12 periods. According to the table, approximately 87.15% of the one-step forecast error variance of DI is accounted for by its innovations. However, its own impact decreases over time as the significance of macroeconomic variables increases in time. Over longer periods, 25 and 20% of the error variances are explained by short-term interest rates and per capita incomes, respectively. Actually, their shares vary across periods. For instance, per capita income peaks at 26.08% in the fifth period, and short-term interest rate peaks at 25.05% in the twelfth period. These results can be attributed to domestic investors' investment behaviors. Throughout the initial periods, WTU innovations contributed less than 6% to DI's forecast error variance. In the longer run, this contribution decreases below 1%. Therefore, DI is sensitive to changes in per capita income and interest rates, and the contribution of WTU to DI is relatively small.

Table 4 [7] shows the variance decomposition in the Fourier system for FDI covering 12 periods. The table indicates that approximately 93.38% of the one-step forecast error variance of FDI is accounted for by its innovations. In the longer term, the contributions of per capita income and short-term interest rates to the forecast error variance of FDI are about 13 and 7.7%, respectively. In contrast, their impacts remain low in the initial periods, that is, from the first to the third period. These results can be attributed to the fact that foreign investors invest in Türkiye because of low production costs (i.e., wage rates), geographical advantages, low corporate tax rates, lax environmental regulations and so on, not per capita income or interest rate. Further, the contribution of WTU is relatively higher in the error variance of FDI compared to DI; it starts with a small impact in the first periods, whereas it is around 22.05% in the 12th period. Therefore, trade uncertainty can significantly affect international investment flows.

Overall, the results show that per capita income level [8] positively affects both DI and FDI. Short-term interest rates have a higher and negative impact on DI rather than FDI. Moreover, WTU is more closely related to FDI because an increase in uncertainty can lead to postponement in FDI flows from home countries to host countries. Foreign investors may prefer more cautious investment opportunities such as portfolio investments because of risk aversion.

4.2 Robustness check

This study also reports on the traditional VAR analysis results in the Online Appendix [9]. Incorporating Fourier terms significantly affects the empirical results. In other words, considering smooth structural breaks provides more reasonable results compared to conducting a traditional VAR analysis.

Regarding country specific uncertainties, the effects of TPUs in the United States, China, and Japan on the Turkish economy differ [10]. Even though their impacts on both DI and FDI are negative, their magnitudes vary. Thus, one can infer that the Turkish economy has a close relationship with the major economies of the world such as the United States, China and Japan. Therefore, if trade uncertainty arises in these countries, the Turkish economy will be adversely affected.

Tables 5 and 6 exhibit variance decomposition in the Fourier system for DI and FDI in terms of country-specific TPUs covering 12 periods [11]. According to the tables, in the long

term, the contributions of countries' TPUs to the forecast error variance of DI and FDI are very high. In particular, the contribution of ΔTPU_{China} is the highest in the error variance of DI; it is around 34.61% in the 12th period, and it is also a significant contributor considering FDI with 17.52%. Overall, the empirical results of country-specific TPUs mostly support our baseline findings.

This investigation also used the structural VAR (SVAR) model to carry out methodological robustness checks. For this purpose, we imposed several long-term restrictions on our models as follows: cumulative effects of interest rate, DIs (FDIs) and per capita income on the WTU index were zero. Additionally, cumulative effects of interest rate and per capita income on interest rate were zero. Last, cumulative effects of per capita income on DIs (FDIs) were zero in the long run.

Figures 5 and 6 exhibit the impulse-response functions for DI and FDI based on the SVAR models [12]. The empirical findings mostly support our baseline results; income shock has a positive impact but not a long-lasting one on both DIs and FDIs, whereas an interest rate shock causes a decline in investments. Further, trade uncertainty shock decreases both DIs and FDIs in Türkiye.

4.3 Discussion

The empirical results of this study indicate a negative relationship between trade uncertainty and DI: an increase in trade uncertainty causes a decrease in DI in Türkiye. This finding is consistent with those of Caldara *et al.* (2020), Ebeke and Siminitz (2018), Handley and Limao (2015) and Novy and Taylor (2020). According to this finding, the impact of trade uncertainty on investment is negative. The finding also confirms the adverse effect of uncertainty on investment, found in the studies of Aizenman and Marion (1993), Bahmani-Oskooee and Maki-Nayeri (2019), Carriere-Swallow and Cespedes (2013) and Greg *et al.* (2018). Our finding about the negative impact of uncertainty on investment aligns with those of Akron *et al.* (2020), Chen *et al.* (2019), Chen and Chiang (2020), Gulen and Ion (2016), Panagiotidis and Printzis (2020), Suh and Yang (2021) and Wang *et al.* (2014). These authors suggest that firms are less likely to incur investment when uncertainty is high. When trade uncertainty increases, the cost of irreversible investment rises and firms choose the wait-and-see option. They postpone their investment with sunk costs for the foreseeable future.

Our empirical evidence demonstrates a negative relationship between trade uncertainty and FDI, indicating that an increase in trade uncertainty leads to a decrease in FDI. This result confirms those of Avom *et al.* (2020), Cebreros *et al.* (2020), Choi *et al.* (2021), Krol (2018) and Kirchner (2019). These authors prove that the impact of economic uncertainty on FDI inflows is negative. Furthermore, our result shows the severe and persistent impact of uncertainty on FDI in Türkiye, a developing country. According to our variance decomposition results obtained through Fourier VAR, the contribution of trade uncertainty is more persistent and higher in the error variance of FDI, in line with Carriere-Swallow and Cespedes (2013). These findings indicate that when trade uncertainty increases, FDI inflows decrease and foreign firms are less enthusiastic about bringing investment into Türkiye.

In sum, global shocks and country-specific trade uncertainties play an important role in Türkiye's DI and FDI in the covered period. These results indicate that a severe fall in Türkiye's FDI and DI is associated with a sharp rise in global and country-specific trade uncertainties. Moreover, the adverse impact of trade uncertainty on FDI in Türkiye is more persistent compared with DI. The empirical results of country-specific TPUs mostly support our baseline findings. In particular, trade uncertainty in the Chinese economy has a negative impact on both DI and FDI in the Turkish setting. Because China is a significant trade partner for Türkiye, its economic problems hurt the Turkish economy through the spillover effect.

5. Conclusion

This study aims to examine the effect of trade uncertainty on both DI and FDI for Türkiye during the 2005Q1–2020Q1 period. Additionally, we use per capita income and short-term interest rate as control variables. We employ Enders and Jones's (2016) Fourier VAR model. The empirical findings obtained from the impulse-response functions indicate that, for up to six-quarters, a shock to the WTU has a minor negative effect on DI. Then, its cumulative impacts on DI gradually turn positive. A shock to the WTU causes a slowdown in FDI inflows because foreign investors become more cautious in periods of increased uncertainty. According to the results of the variance decomposition analyses, the forecast error variation of DI is less than 6% during the initial periods because of WTU advances. Its contribution falls below 1% over time. Further, WTU makes a comparatively larger contribution to the error variance of FDI, especially in the latter periods; its initial contribution is around 1% in the first period, whereas it reaches 22.05% in the 12th period. Moreover, our findings reveal that the empirical results of country-specific TPUs mostly support our baseline models' findings.

These findings have implications within the macroeconomic setting. A key policy priority should be to sustain a sound investment environment to mitigate trade uncertainty's negative impacts. For this purpose, government authorities can provide tax exemptions for specified sectors. They can also de-bureaucratize investment processes for both domestic and foreign entrepreneurs. The infrastructural quality can be enhanced to attract foreign investors. Institutional quality should be developed, and property rights should be protected. Greater efforts are needed to ensure macroeconomic stability, such as high economic growth, low inflation, a less volatile exchange rate and so on. Trade uncertainties in the United States, China and Japan have negatively affected the Turkish economy. To mitigate these economic impacts, policymakers should enhance economic and financial cooperation between other countries and regions.

This study has limitations due to the small sample size of around 60 observations, which can affect the results' accuracy and reliability. Larger samples would provide more reliable results. Another limitation is the failure to consider trade uncertainty's impact on sector-specific investment. To further investigate this topic, researchers can explore trade uncertainty's asymmetric impact on investment with larger samples.

Notes

1. Please see Table 1 in the online appendix.
2. Please see Table 2 in the online appendix.
3. This study used 95% confidence intervals and Monte Carlo standard errors with 1,000 replications.
4. Please see Figure 1 in the online appendix.
5. Please see Figure 2 in the online appendix.
6. Please see Table 3 in the online appendix.
7. Please see Table 4 in the online appendix.
8. For the robustness check, instead of GDP, we use the industrial production index (year-to-year percentage change) as a proxy for economic activity. The empirical results support our baseline findings. The authors can provide the impulse-response functions and variance decomposition results with industrial production index upon request.
9. Please see Table A1, Table A2, Figure A1 and Figure A2 in the online appendix.
10. Please see Figures 3 and 4 in the online appendix.
11. Please see Table 5 and Table 6 in the online appendix.
12. Please see Figures 5 and 6 in the online appendix.

References

Abel, A.B. (1983), "Optimal investment under uncertainty", *American Economic Review*, Vol. 73 No. 1, pp. 228-233.

Ahir, H., Bloom, N. and Furceri, D. (2018), "World uncertainty index", available at: https://policyuncertainty.com/media/WUI_mimeo_10_29.pdf (accessed 16 August 2022).

Aizenman, J. and Marion, N.P. (1993), "Macroeconomic uncertainty and private investment", *Economics Letters*, Vol. 41 No. 2, pp. 207-210, doi: 10.1016/0165-1765(93)90198-l.

Akdag, S., Yildirim, H. and Alola, A.A. (2023), "The USA–China trade policy uncertainty and inference for the major global south indexes", *Journal of Economic and Administrative Sciences*, Vol. 39 No. 1, pp. 60-77, doi: 10.1108/jeas-05-2020-0077.

Akron, S., Demir, E., Díez-Esteban, J.M. and García-Gómez, C.D. (2020), "Economic policy uncertainty and corporate investment: evidence from the US hospitality industry", *Tourism Management*, Vol. 77, 104019, doi: 10.1016/j.tourman.2019.104019.

Arbatli Saxegaard, E.C., Davis, S.J., Ito, A. and Miake, N. (2022), "Policy uncertainty in Japan", *Journal of the Japanese and International Economies*, Vol. 64, 101192, doi: 10.1016/j.jjie.2022.101192.

Avom, D., Njangang, H. and Nawo, L. (2020), "World economic policy uncertainty and foreign direct investment", *Economics Bulletin*, Vol. 40 No. 2, pp. 1457-1464.

Bahmani-Oskooee, M. and Maki-Nayeri, M. (2019), "Asymmetric effects of policy uncertainty on domestic investment in G7 countries", *Open Economies Review*, Vol. 30 No. 4, pp. 675-693, doi: 10.1007/s11079-019-09523-z.

Baker, S.R., Bloom, N. and Davis, S.J. (2016), "Measuring economic policy uncertainty", *Quarterly Journal of Economics*, Vol. 131 No. 4, pp. 1593-1636, doi: 10.1093/qje/qjw024.

Bernanke, B.S. (1983), "Irreversibility, uncertainty, and cyclical investment", *Quarterly Journal of Economics*, Vol. 98 No. 1, pp. 85-106, doi: 10.2307/1885568.

Bevan, A.A. and Estrin, S. (2004), "The determinants of foreign direct investment into European transition economies", *Journal of Comparative Economics*, Vol. 32 No. 4, pp. 775-787, doi: 10.1016/j.jce.2004.08.006.

Bloom, N. (2014), "Fluctuations in uncertainty", *Journal of Economic Perspectives*, Vol. 28 No. 2, pp. 153-176, doi: 10.1257/jep.28.2.153.

Borojo, D.G., Yushi, J. and Miao, M. (2022), "The impacts of economic policy uncertainty on trade flow", *Emerging Markets Finance and Trade*, Vol. 58 No. 8, pp. 2258-2272, doi: 10.1080/1540496x.2021.1971075.

Caldara, D., Iacoviello, M., Molligo, P., Prestipino, A. and Raffo, A. (2020), "The economic effects of trade policy uncertainty", *Journal of Monetary Economics*, Vol. 109, pp. 38-59, doi: 10.1016/j.jmoneco.2019.11.002.

Carrière-Swallow, Y. and Céspedes, L.F. (2013), "The impact of uncertainty shocks in emerging economies", *Journal of International Economics*, Vol. 90 No. 2, pp. 316-325, doi: 10.1016/j.jinteco.2013.03.003.

Cebreros, A., Salcedo, A., Chiquiar, D. and Heffner-Rodríguez, A. (2020), "Trade policy uncertainty and its effect on foreign direct investment: evidence from Mexico", Working Paper (2020-14), Banco de Mexico December, 2020.

Chadwick, M.G. (2019), "Dependence of the 'Fragile Five' and 'Troubled Ten' emerging market financial systems on US monetary policy and monetary policy uncertainty", *Research in International Business and Finance*, Vol. 49, pp. 251-268, doi: 10.1016/j.ribaf.2019.04.002.

Chen, X. and Chiang, T.C. (2020), "Empirical investigation of changes in policy uncertainty on stock returns—evidence from China's market", *Research in International Business and Finance*, Vol. 53, 101183, doi: 10.1016/j.ribaf.2020.101183.

Chen, P.F., Lee, C.C. and Zeng, J.H. (2019), "Economic policy uncertainty and firm investment: evidence from the US market", *Applied Economics*, Vol. 51 No. 31, pp. 3423-3435, doi: 10.1080/00036846.2019.1581909.

Choi, S., Furceri, D. and Yoon, C. (2021), "Policy uncertainty and foreign direct investment", *Review of International Economics*, Vol. 29 No. 2, pp. 195-227, doi: 10.1111/roie.12495.

Davis, S.J., Liu, D. and Sheng, X.S. (2019), "Economic policy uncertainty in China since 1949: the view from mainland newspapers", *Fourth Annual IMF-Atlanta Fed Research Workshop on China's Economy Atlanta*, Vol. 19, pp. 1-37.

Demir, F. (2009), "Macroeconomic uncertainty and private investment in Argentina, Mexico and Turkey", *Applied Economics Letters*, Vol. 16 No. 6, pp. 567-571, doi: 10.1080/13504850701206528.

Dixit, R.K., Dixit, A.K. and Pindyck, R.S. (1994), *Investment under Uncertainty*, Princeton University Press, Princeton, NJ.

Dow, S.C. (2015), "Addressing uncertainty in economics and the economy", *Cambridge Journal of Economics*, Vol. 39 No. 1, pp. 33-47, doi: 10.1093/cje/beu022.

Ebeke, C.H., Siminitz, J., Franks, J.R. and Aiyar, S. (2018), "Trade uncertainty and investment in the euro area", *IMF Working Papers*, WP/18/281, pp. 1-18.

Economou, F., Hassapis, C., Philippas, N. and Tsionas, M. (2017), "Foreign direct investment determinants in OECD and developing countries", *Review of Development Economics*, Vol. 21 No. 3, pp. 527-542, doi: 10.1111/rode.12269.

Enders, W. and Jones, P. (2016), "Grain prices, oil prices, and multiple smooth breaks in a VAR", *Studies in Nonlinear Dynamics and Econometrics*, Vol. 20 No. 4, pp. 399-419, doi: 10.1515/snde-2014-0101.

Enders, W. and Lee, J. (2012), "The flexible Fourier form and Dickey–Fuller type unit root tests", *Economics Letters*, Vol. 117 No. 1, pp. 196-199, doi: 10.1016/j.econlet.2012.04.081.

Eryılmaz, F. and Yılmaz, D. (2020), "Effect of trade policy uncertainty on the risk of developing countries: an empirical analysis", *Turkish Journal of TESAM Academy*, Vol. 7 No. 1, pp. 91-112, doi: 10.30626/tesamakademi.696190.

Gayaker, S., Yalcin, Y. and Berument, M.H. (2020), "The day of the week effect and interest rates", *Borsa Istanbul Review*, Vol. 20 No. 1, pp. 55-63, doi: 10.1016/j.bir.2019.07.010.

Greig, L., Rice, A., Vehbi, T. and Wong, B. (2018), "Measuring uncertainty and its impact on a small open economy", *Australian Economic Review*, Vol. 51 No. 1, pp. 87-98, doi: 10.1111/1467-8462.12255.

Grier, K.B. and Perry, M.J. (1996), "Inflation, inflation uncertainty, and relative price dispersion: evidence from bivariate GARCH-M models", *Journal of Monetary Economics*, Vol. 38 No. 2, pp. 391-405, doi: 10.1016/s0304-3932(96)01280-9.

Gulen, H. and Ion, M. (2016), "Policy uncertainty and corporate investment", *Review of Financial Studies*, Vol. 29 No. 3, pp. 523-564.

Handley, K. and Limão, N. (2015), "Trade and investment under policy uncertainty: theory and firm evidence", *American Economic Journal: Economic Policy*, Vol. 7 No. 4, pp. 189-222, doi: 10.1257/pol.20140068.

Handley, K. and Limão, N. (2017), "Policy uncertainty, trade, and welfare: theory and evidence for China and the United States", *American Economic Review*, Vol. 107 No. 9, pp. 2731-2783, doi: 10.1257/aer.20141419.

Hartman, R. (1972), "The effects of price and cost uncertainty on investment", *Journal of Economic Theory*, Vol. 5 No. 2, pp. 258-266, doi: 10.1016/0022-0531(72)90105-6.

Hsieh, H.C., Boarelli, S. and Vu, T.H.C. (2019), "The effects of economic policy uncertainty on outward foreign direct investment", *International Review of Economics and Finance*, Vol. 64, pp. 377-392, doi: 10.1016/j.iref.2019.08.004.

Kirchner, S. (2019), "State of confusion: economic policy uncertainty and international trade and Investment", *Australian Economic Review*, Vol. 52 No. 2, pp. 178-199, doi: 10.1111/1467-8462.12319.

Knight, F.H. (1921), *Risk, Uncertainty and Profit*, Houghton Mifflin Company, Boston.

Krol, R. (2018), "Does uncertainty over economic policy harm trade, foreign investment, and prosperity?", *Mercatus Research*, Mercatus Center, George Mason University.

Lucas, R.E. and Prescott, E.C. (1971), "Investment under uncertainty", *Econometrica: Journal of the Econometric Society*, Vol. 39 No. 5, pp. 659-681, doi: 10.2307/1909571.

Lucas, R.E. and Sargent, T.J. (1981), *Rational Expectations and Econometric Practice*, Vol. 2, University of Minnesota Press, Minneapolis, MN.

Novy, D. and Taylor, A.M. (2020), "Trade and uncertainty", *Review of Economics and Statistics*, Vol. 102 No. 4, pp. 749-765, doi: 10.1162/rest_a_00885.

Nuroglu, E. and Çekin, S.E. (2020), "The effect of trade wars on international trade and the real economy", *International Journal of Economics and Administrative Studies*, Vol. 27, pp. 73-90.

Oi, W.Y. (1961), "The desirability of price instability under perfect competition", *Econometrica: Journal of the Econometric Society*, Vol. 29 No. 1, pp. 58-64, doi: 10.2307/1907687.

Onis, Z. (2010), "Crises and transformations in Turkish political economy", *Turkish Policy Quarterly*, Vol. 9 No. 3, pp. 45-61.

Öniş, Z. (2019), "Turkey under the challenge of state capitalism: the political economy of the late AKP era", *Southeast European and Black Sea Studies*, Vol. 19 No. 2, pp. 201-225, doi: 10.1080/14683857.2019.1594856.

Özkan, O. (2020), "Causality relationship between USA's economic and trade policy uncertainties and Dollar-TL exchange rate", in Akdoğan, A.A. (Eds), *19th International Business Congress*, Erciyes University, Kayseri, pp. 851-861.

Pamuk, Ş. (2007), "Economic change in twentieth century Turkey: is the glass more than half full?", *The Cambridge History of Turkey*, Vol. 4, pp. 266-300, doi: 10.1017/chol9780521620963.011.

Panagiotidis, T. and Printzis, P. (2020), "What is the investment loss due to uncertainty?", *Global Finance Journal*, Vol. 45, Article 100476, doi: 10.1016/j.gfj.2019.100476.

Rich, R., Song, J. and Tracy, J. (2012), "The measurement and behavior of uncertainty: evidence from the ECB survey of professional forecasters", in *Staff Report No. 588*, Federal Reserve Bank of New York, New York.

Sahinoz, S. and Erdogan Cosar, E. (2018), "Economic policy uncertainty and economic activity in Turkey", *Applied Economics Letters*, Vol. 25 No. 21, pp. 1517-1520, doi: 10.1080/13504851.2018.1430321.

Sahinoz, S. and Erdogan Cosar, E. (2020), "Quantifying uncertainty and identifying its impacts on the Turkish economy", *Empirica*, Vol. 47 No. 2, pp. 365-387, doi: 10.1007/s10663-018-9424-8.

Sakalak, A. and Simsek, T. (2021), "Trade policy uncertainty and inflation nexus in China and USA: bootsrapt rolling window approach", *Cumhuriyet University Journal of Economics and Administrative Sciences*, Vol. 22 No. 2, pp. 103-122, doi: 10.37880/cumuiibf.913823.

Schmidt, T. and Zwick, L. (2015), "Uncertainty and episodes of extreme capital flows in the Euro Area", *Economic Modelling*, Vol. 48, pp. 343-356, doi: 10.1016/j.econmod.2014.10.047.

Shaikh, I. (2021), "On the relation between purchasing manager's index and trade policy uncertainty: evidence from China, Japan and the USA", *Journal of Chinese Economic and Foreign Trade Studies*, Vol. 14 No. 2, pp. 202-223, doi: 10.1108/jcefts-10-2020-0068.

Solarin, S.A., Gorus, M.S. and Yilanci, V. (2022), "Feverish sentiment, lockdown stringency, oil volatility, and clean energy stocks during COVID-19 pandemic", *International Journal of Managerial Finance*, Vol. ahead-of-print No. ahead-of-print, doi: 10.1108/ijmf-09-2021-0457.

Songur, D.Y. (2022), "Does economic policy uncertainty affect import? Evidence from panel data analysis", *Journal of Management and Economics*, Vol. 29 No. 2, pp. 281-295, doi: 10.18657/yonveek.1053116.

Stokey, N.L. (2016), "Wait-and-see: investment options under policy uncertainty", *Review of Economic Dynamics*, Vol. 21, pp. 246-265, doi: 10.1016/j.red.2015.06.001.

Sudsawasd, S. and Moore, R.E. (2006), "Investment under trade policy uncertainty: an empirical investigation", *Review of International Economics*, Vol. 14 No. 2, pp. 316-329, doi: 10.1111/j.1467-9396.2006.00578.x.

Suh, H. and Yang, J.Y. (2021), "Global uncertainty and global economic policy uncertainty: different implications for firm investment", *Economics Letters*, Vol. 200, Article 109767, doi: 10.1016/j.econlet.2021.109767.

Wang, Y., Chen, C.R. and Huang, Y.S. (2014), "Economic policy uncertainty and corporate investment: evidence from China", *Pacific-Basin Finance Journal*, Vol. 26, pp. 227-243, doi: 10.1016/j.pacfin.2013.12.008.

World Bank (WB) (2022a), "The World Bank in Türkiye", available at: https://www.worldbank.org/en/country/turkey (accessed 1 September 2022).

World Bank (WB) (2022b), "World development indicators, World Bank world development indicators database", available at: https://databank.worldbank.org/source/world-development-indicators (accessed 1 September 2022).

Wu, J., Zhang, J., Zhang, S. and Zou, L. (2020), "The economic policy uncertainty and firm investment in Australia", *Applied Economics*, Vol. 52 No. 31, pp. 3354-3378, doi: 10.1080/00036846.2019.1710454.

Yıldırım, E.U. (2021), "Effects of the US trade policy uncertainty on the Turkish financial markets and bank loans", *Sosyoekonomi*, Vol. 29 No. 50, pp. 11-33, doi: 10.17233/sosyoekonomi.2021.04.01.

Online Appendix

The supplementary material for this article can be found online.

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