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Is There Any Impact of the World Uncertainty Spillover Index (WUSI) on Firm Investment? Evidence from Turkey

Dünya Belirsizlik Yayılma Endeksi'nin (WUSI) Firma Yatırımları Üzerinde Herhangi Bir Etkisi Var mı? Türkiye'den Kanıtlar

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Abstract

This paper examines the impact of the World Uncertainty Spillover Index-United States (WUSI-USA) on the corporate investment policy of 164 Turkish manufacturing firms between 2005 and 2019. According to the findings, the WUSI-USA has a negative impact on the investment policy of firms. Based on the real options theory, firms prefer to postpone their investments under uncertain conditions. The use of alternative measurements of investment confirms the validity of our results. Overall, this study reveals that uncertainty coming from the US affects the investment decisions of firms in Turkey. Therefore, Turkish firms should include uncertainty spillovers in their financial decisions and adjust their strategies based on firm-specific factors in times of uncertainty spillovers. Furthermore, policymakers and firm managers should consider the US uncertainty spillover effects while generating their investment strategies.

Keywords: Uncertainty spillovers, firm performance, corporate investment, Turkey

JEL Codes: D89; B23

Öz

Bu makale, Dünya Belirsizlik Yayılma Endeksi-Amerika Birleşik Devletleri'nin (WUSI-USA) 164 Türk imalat firmasının 2005 ve 2019 yılları arasındaki yatırım politikası üzerindeki etkisini incelemektedir. Bulgulara göre, WUSI-USA'nin firmaların yatırım politikası üzerinde olumsuz bir etkisi vardır. Reel opsiyon teorisine göre firmalar belirsiz koşullar altında yatırımlarını ertelemeyi tercih etmektedirler. Alternatif yatırım ölçümlerinin kullanılması, sonuçlarımızın geçerliliğini doğrulamaktadır. Genel olarak, bu çalışma ABD'den gelen belirsizliğin firmaların yatırım kararlarını etkilediğini ortaya koymaktadır. Türk firmaları finansal kararlarına belirsizlik yayılmalarını dahil etmeli ve stratejilerini belirsizliğin yayıldığı zamanlarda firmaya özgü faktörlere göre ayarlamalıdır. Politika yapıcılar ve firma yöneticileri, yatırım stratejilerini oluştururken ABD'deki belirsizlik yayılma etkilerini dikkate almalıdır.

Anahtar Kelimeler: Belirsizlik yayılmaları, firma performansı, kurumsal yatırım, Türkiye

JEL Kodları: D89; B23

1. INTRODUCTION

Uncertainty affects the economy, and consequently firms, through different channels and primarily results in canceling or postponing investments and recruitment activities (Bendall and Stent, 2003; Bloom et al., 2013; United Nations, 2019). As theoretical analyses show, it potentially affects hiring, consumption, financing costs, asset prices and other

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economic outcomes (Davis, 2016). Based on the assumption in economic theory, more uncertainty tends to reduce investment spending, and the reversal of capital expenditures is costly (Abberger et al., 2016; Broadbent, 2019; Carruth et al., 2000). The results of some studies, albeit in small numbers, reveal that uncertainty may increase in the investment of firms with certain characteristics (Glover and Levine, 2015). Beyond the effects of uncertainty, the impact of domestic policies, especially that of the United States and developed European Union (EU) member countries, on other economies -spillover effect- has received increased attention recently. The discussion is whether the risk caused by uncertainty is country-specific or not. More specifically, can an uncertainty related to developed countries possibly affect Emerging Market Economies (EMEs)? Studies assume that uncertainty may spread from one country to another and affect financial results in other countries (Brogaard et al., 2020). The main findings have shown that in times of uncertainty caused by major economic or political events, stock market volatility increases dramatically, spreading to the markets and causing financial instability. It is also seen that EMEs experienced a greater decline in consumption and investment as uncertainty spread globally (Carrière-Swallow and Céspedes, 2013; Chiang, 2020; Choudhry et al., 2020; Christou et al., 2019; Claeys, 2017; Li, 2020; Liu et al., 2020; Luk et al., 2020; Rapach et al., 2013; Trung, 2019a).

Uncertainty in developed economies matters for uncertainty around the world. The fact that the relevant countries (the US and the EU members) are the main driving force of the economic activities in the rest of the world and the direct and indirect spread of the uncertainty to other countries with which they interact is effective (Ahir et al., 2021). What are the international spillover effects of uncertainty fluctuations in the US? Given the increasing integration of emerging market economies (EMEs) into the world financial market, how is the US financial uncertainty transferred to these countries? These questions have been receiving increased attention recently. Considering the answers to these questions, the general opinion is that unexpected changes in the US uncertainty have significant financial and macroeconomic impacts on EMEs (Bhattarai et al., 2020). Research shows that firms in emerging markets experience decreases in investment and private consumption after external uncertainty shocks (Carrière-Swallow and Céspedes, 2013).

The World Uncertainty Spillovers Index (WUSI) created by Ahir et al. (2021) reveals two essential facts. First, the uncertainty in systemic economies is crucial for the uncertainty in the world. Second, only the US and the UK have significant uncertainty spillover effects, while other systemic economies play a minor role on average. In addition, uncertainty in the US has been a significant source of uncertainty worldwide for the last few decades (Ahir et al., 2021).

The existing literature explores the impact of economic policy uncertainty on corporate investment holdings in some countries, such as the U.S., EU countries, and BRIC countries. However, none of them investigates the impact of world uncertainty spillover effects on corporate investment. We fill this gap in the literature by investigating whether the World Uncertainty Spillover Index affects firms' corporate investment in Turkey as an emerging market.

Turkey is a different country from other traditional economies in many aspects because it is strategically located between Eastern Europe and the Middle East. Turkey has tremendous trade and investment links with each of these regions. In response to the global financial crisis in 2008, the Federal Reserve System (the Fed) implemented a quantitative easing strategy, which resulted in a capital inflow from developed to emerging markets. Once the quantitative easing program ended, the Fed began raising gradually raised interest rates, placing downward pressure on emerging markets. The 2016 election environment, and Trump's

triumph, increased uncertainty, and the US economy has taken a more cautious stance. Furthermore, the trade battles with China impacted the global economy negatively. When the political and economic links between Turkey and the US are considered together, the uncertainty in the US has an impact on Turkey's economy. From an economic perspective, the US and Turkey have experienced a long-standing trade partnership. The US is one of Turkey's top exporting countries. The quantitative easing policy after the global financial crisis contributed to the inflow of foreign direct investment (FDI) into Turkey. The Fed's tapering policy, on the other hand, had a negative impact on FDI inflows and currency rates in Turkey. Pastor Brunson's case heightened tensions between the two countries. The Turkish lira collapsed, as a result of which Turkey faced a currency crisis in August 2018.

All these difficulties led to the conclusion that uncertainty spillovers originating from the US have an impact on the management policies of firms operating in Turkey. In this study, based on the information above, we try to analyze the influence of uncertainty spillovers on Turkish firms' investments from 2005 to 2019. The U.S. World Uncertainty Spillover Index (WUSI-USA) is considered as the uncertainty spillover proxy. We want to fill this gap in our study, which is, to the best of our knowledge, the first to analyze the influence of the WUSI-USA on corporate investment policy. Our key results are as follows: The uncertainty spillovers have a negative effect on corporate investment. Regarding the real options perspective, the US uncertainty spillovers cause Turkish firms to postpone their corporate investments. Our results are align with the previous literature (Akron et al., 2020; X. Chen et al., 2020; Gulen and Ion, 2016; Kang et al., 2014; Madanoglu and Ozdemir, 2019; Yizhong Wang et al., 2014). The remainder of this paper is organized as follows: Section 2 reviews the related literature and presents the hypotheses. Section 3 explains the data and research methodology. Section 4 indicates the empirical results. Finally, section 5 is the conclusion part.

2. LITERATURE REVIEW AND HYPOTHESIS

Using the policy uncertainty index, Klößner and Sekkel (2014) estimate the spillover effects of policy uncertainty. They find that slightly more than a quarter of the dynamics of policy uncertainty causes spillovers, and this share increases to half during the financial crisis. Examining the spillover effects of economic policy uncertainty on macroeconomic indicators, Trung (2019a, 2019b) measures the spillover effects of US uncertainty shocks on other economies. They suggest that the US uncertainty shocks reduce capital inflows, investment, consumption, exports, and production of emerging economies and have a significant impact on guiding the business cycle fluctuations in the world economy. While Yin and Han (2014) do not find any trend regarding the spillover effects of economic policy uncertainty on advanced economies. Huang et al. (2018), on the other hand, determine that economic policy uncertainty spreads unidirectionally from the USA to China. Accordingly, Feng and Li (2020) determine that this spread puts real economic activities under pressure. Antonakakis et al. (2018) find a significant spread of uncertainty from the EU to the USA. Caggiano et al. (2019) confirm that the uncertainties in the US economic policy feed the economic policy uncertainty in Canada and lead to a temporary increase in unemployment.

Gupta et al., (2020) analyze the spillover effects of US uncertainty on the Gross Domestic Product (GDP) of 50 developed and emerging economies. They find large heterogeneity in the response of developed and emerging economies to US uncertainty shocks. The increase the in US uncertainty reduces GDP in other economies slightly more, as in the US. They also identify that the exchange rate regime and financial fragility accounted for a large part of the contraction in activity for developed markets rather than for emerging markets.. S. Lee (2018)

investigates the impact of the US economic policy uncertainty on the Korea-US exchange rate risk and finds a strong and consistent spillover. Han et al. (2019) analyze the relationship between uncertainty and currency performance of advanced and emerging countries and detect that the government-induced spillover effect of the US uncertainty due to the state creates shocks on exchange rates. Kido (2016) studies the spillover effects of the US economic policy uncertainty shocks on real effective exchange rates. While the correlation between high-yielding currencies is negative, it is positive for the US, EPU and the Japanese yen. Studies on the spillover effect of economic policy uncertainty on asset prices are as follows. E.Wang and Lee (2020) determine a net spillover effect of economic policy uncertainty on WTI crude oil returns.

Bhattarai et al. (2020); Brogaard et al. (2020); Istiak and Alam, (2020); Nguyen et al. (2020); Škrinjarić and Orloví, (2020) prove that the spread of economic policy uncertainty significantly affects stock returns. Zhang et al., (2019) investigate the effects of economic policy uncertainty on stock, credit, energy and commodity markets in the US and China, and deal with those concerns about the competition between the two countries stemming from political reasons rather than economic ones. Biljanovska et al. (2017) suggest that economic policy uncertainty reduces growth in private investment and that nearly two-thirds of the negative impact is due to other countries. Moreover, they observe that uncertainty in the US, Europe and China reduce economic activity in the rest of the world. Luk et al. (2020) examine the extent to which economic policy uncertainty shocks in advanced economies affect real economic activity in small open economies. Using Hong Kong as a case study, they identify large uncertainty spreads from advanced economies to Hong Kong. They also observe that an increase in domestic economic policy uncertainty reduces domestic production growth, leading to tighter financial conditions, lower investment and vacancy postings. K. Lee et al. (2020) determine that when Chinese economic policy uncertainty increases, corporate investments of the US firms also decrease, and this situation is more effective for firms located in the US with more exports to China. From this point of view, they reveal the importance of the global supply chain connection in understanding the companies' investment decisions. Based on the literature, we create the following hypothesis:

Hypothesis: There is a negative relationship between WUSI-USA and corporate investment in Turkey.

3. DATA AND METHODOLOGY

In this study, listed manufacturing firms in the Borsa Istanbul (BIST) are analyzed for the period between 2005 and 2019. All firm-level data and macroeconomic variables are obtained from Thomson Reuters DataStream. If there is a missing value in the firm-level data, it is taken from the firms' annual reports. The World Uncertainty Index data is obtained from its website. The age of the firm data is manually gathered from Google Search. The original sample is subjected to several sample selection parameters. Firms are contained in or omitted from the sample based on the following factors: (a) manufacturing firms are analyzed because their physical capital investment intensity is high; (b) firms with missing data are excluded from the sample; (c) firms are included if they have at least four consecutive years of data available to implement panel data methodology; (d) all variables are winsorized at 1% and 99% percentiles to reduce the effect of outliers. All firm-level variables are denominated in US Dollars. After data processing, we have unbalanced data from 164 manufacturing firms, representing 2127 firm-year observations. Because the listed firms' initial public offerings

vary, an unbalanced panel regression method is used to test the hypotheses (Ozlem and Tan, 2022; Tan et al. 2022).

The study is started by estimating the effects using an initial model. In equation (1), it does not include any control variables to examine the potential impact of uncertainty spillovers on corporate investment behavior. In the augmented equation (2), it contains firm-specific control variables, namely, the natural logarithm of total assets, cash flow, market-to-book ratio, tangibility, leverage, and age of the firm. Also, the macroeconomic variable, which is the annual growth rate of Gross Domestic Product (GDP) is added. Our baseline regression model as follows:

$$INV_{i,t} = \beta_0 + \beta_1 WUSI - USA_{i,t} + \ni_{,it} \quad (1)$$

$$INV_{i,t} = \beta_0 + \beta_1 WUSI - USA_{i,t} + + \beta_2 SIZE_{i,t} + \beta_3 CF_{i,t} + \beta_4 M/B_{i,t} + \beta_5 TANG_{i,t} + \beta_6 LEV_{i,t} + \beta_7 AGE_{i,t} + \beta_6 GDP_{i,t} + \ni_{,it} \quad (2)$$

In this model, the *WUSI_USA* is our main independent variable, the natural logarithm of the annual average of quarterly data for the World Spillovers Index-USA (Ahir et al., 2021). INV is the ratio of the capital expenditure to total assets and is a dependent variable in the model. In addition, we include five control variables for firm-level characteristics. SIZE is the natural logarithm of total assets. M/B is the ratio of the market value of a firm to its book value. TANG is the ratio of the net fixed asset to total assets. LEV is the ratio of the total debt to total assets. AGE is the logarithm of the foundation year of the firm. Finally, GDP is the annual growth rate of Turkey. Table 1 presents the definition of each variable. In addition, the descriptive statistics of variables are given in the appendix.

Table 1: Definition of Variables

Explanatory Variables	Definitions	Source
INV	Ratio of capital expenditure to total assets	Thomson Reuters
CF	Pretax income + depreciation/amortization to total assets	As Above
TANG	The ratio of the net fixed assets to total assets	As Above
SIZE	Natural logarithm of total assets in current USD	As Above
M/B	Market-to-book ratio	As Above
LEV	The ratio of the total debt to total assets	As Above
GDP Growth	Growth rate of gross domestic product (%)	As Above
WUI_USA	Natural logarithm of the annual average of quarterly data for the World Uncertainty Spillovers Index-United States	https://worlduncertaintyindex.com/data/
AGE	The foundation year of the firm	Google Search

4. EMPIRICAL RESULTS AND DISCUSSIONS

We initially examine whether our model is suitable for pooled OLS (POLS), fixed effects (FE) or random effects (RE), respectively. First, it is analyzed whether FE, RE or pooled OLS would be appropriate. According to the F-test and the Breusch-Pagan LM test, the FE and the RE models are more suitable than the POLS. Then, according to both the Hausman and cluster-robust Hausman test results (p-value is not statistically significant), RE is suitable for our model. Due to the presence of autocorrelation and heteroscedasticity problems based on diagnostic tests, we cluster the standard errors by the firm to address the lack of independence of observations because the same firm can enter the regression multiple times (Rogers, 1993). All standard errors are corrected for heteroscedasticity (White, 1980). Year dummies are included (Servaes and Tamayo, 2013). The findings are displayed in Table 2, where column (1) reports the results of the initial model. Column (2) shows the results of the extended equation.

The results denote that the relationship between corporate investment and WUSI-USA is statistically negative and significant at the 1% level for both initial and extended versions. In other words, a higher degree of uncertainty spillover is associated with less investment. According to the real options and investment irreversibility theory, firms reduce investment and are unwilling to invest, preferring to wait until uncertainty disappears (Bernanke, 1983; McDonald and Siegel, 1986; Pindyck, 1988). Our result confirms our *Hypothesis* and is consistent with the previous findings (Akron et al., 2020; X. Chen et al., 2020; Gulen and Ion, 2016; Kang et al., 2014; Madanoglu and Ozdemir, 2019; Yizhong Wang et al., 2014). SIZE indicates positive and significant results at the 10% level for the control variables of firm characteristics. The increase in total assets of firms has a positive effect on investment (Abdoh and Maghyereh, 2020; George et al., 2011; Yong Wang et al., 2020). The TANG can be used to indicate financial distress. Greater fixed assets indicate less financial distress. We find a positive relationship between fixed assets and corporate investment. A positive coefficient indicates that firms invest more when they are in less financial trouble. We include the market-to-book assets ratio (M/B) to capture the growth opportunities of the firm. Hence, firms with a high M/B ratio is expected to have higher growth opportunities. Based on the analysis, a high M/B ratio positively and significantly affects corporate investment. Firms realize their growth opportunities through investing (Akron et al., 2020; Kogan and Papanikolaou, 2014). AGE has a negative and significant effect on corporate investment. As firms mature, they complete most of their investment, so there is a negative relationship between a firm's age and corporate investment. Finally, GDP growth has a positive and significant impact on investment. Under better (worse) economic conditions, firms prefer to increase (decrease) their investments (An et al., 2016; Guizani, 2020).

Table 2: Regression Results

Variables	**1**	**2**
WUSI_USA	-0.0258***	-0.0171***
	(0.009)	(0.006)
SIZE		0.0093***
		(0.003)
M/B		0.0059*
		(0.003)
CF		0.0056
		(0.005)
LEV		0.0033
		(0.009)
TANG		0.0757***
		(0.017)
AGE		-0.0122**
		(0.005)
GDP		0.0021**
		(0.001)
Constant	0.3476***	0.1554**
	(0.100)	(0.069)
Year Fixed Effects	YES	YES
Firm Fixed Effects	YES	YES
Prob>chi2	0.000	0.000
Cluster-Robust Hausman Test (p-value)	0.3463	0.133
R-square	0.0240	0.058
Observations	2127	2127
Number of Firms	164	164

Note: t-statistics, based on robust standard errors clustered by firms, are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3 indicates the alternative measurements of corporate investment. Our baseline model uses the ratio of the capital expenditure to total assets. For robustness check, the natural logarithm of capital expenditure, the ratio of the capital expenditure to the net fixed assets and the ratio of the capital expenditure to the total annual sales are used as dependent variables, respectively. Finally, the augmented equation model is repeated, and the results are presented in Table 3. The results remain unchanged and statistically significant, showing that uncertainty spillovers decrease the corporate investment of firms in Turkey.

Table 3: Alternative Measurement of Corporate Investment

Variables	log (CAPEX)	CAPEX/PPE	CAPEX/SALES
WUSI_USA	-0.6435***	-0.1546***	-0.0329*
	(0.188)	(0.059)	(0.018)
Constant	15.0844***	1.9651***	0.4445**
	(2.143)	(0.692)	(0.212)
Year Fixed Effects	YES	YES	YES
Firm Fixed Effects	YES	YES	YES
Prob>chi2	0.000	0.000	0.000
Cluster-Robust Hausman Test (p-value)	0.3463	0.8285	0.3950
R-square	0.0240	0.0137	0.0128
Observations	2093	2127	2127
Number of Firms	164	164	164

Note: t-statistics, based on robust standard errors clustered by firms, are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

5. EMPIRICAL RESULTS AND DISCUSSIONS

Uncertainty can be caused by factors (social, political, economic, etc.) within the countries themselves or in the surrounding countries, as well as by the situations in developed markets, such as the U.S., U.K., China, and Germany, with which they have commercial and political relations. Political, economic, and social events in these developed countries can lead to economic consequences at both macro and micro levels in many parts of the world, especially in emerging markets, by showing a spillover effect. As it is also stated in the literature, the general opinion is that firms reduce their investment in an environment of uncertainty or postpone their investment until the uncertainty disappears. This study analyzes the influence of uncertainty spillovers on 164 Turkish manufacturing firms' investments from 2005 to 2019. The World Uncertainty Spillovers Index-USA (WUSI-USA) created by Ahir et al. (2021) is used as a proxy for uncertainty. The political and economic conditions in the US have a direct influence on the economic policies of Turkey. As Ahir et al., (2021) mention "*only the U.S. and the U.K have a significant uncertainty spillover effect, while other economic systems have little effect*". It is found that uncertainty spillovers have a negative effect on corporate investment in Turkey. Based on the real options theory, firms postpone their investments during uncertain times and prefer to wait for uncertainty to disappear. Our findings provide several insights that are relevant to policymakers and practitioners. First, in times of uncertainty spillovers, Turkish firms should include uncertainty spillovers in their financial decisions and alter their strategies based on the firm-specific characteristics. Second, Turkish policymakers should strive to devise strategies to limit the harmful consequences of the US uncertainty spillovers. Third, in an unpredictable economy, regulators should offer more favorable policies to corporations. This study has some limitations, which only considers firms in listed in the Borsa Istanbul. In future studies, firms in the emerging markets can be added to the analysis. Furthermore, future studies can use the spillover index of the UK as an uncertainty proxy.

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Appendix

Table: Descriptive statistics

Variables	bs.	Mean	Std. Dev.	Min	Max	p1	p99
INV	2127	0.054	0.078	0	10.21	0	0.296
log (WUSI USA)	2127	10.423	1.388	6.977	12.191	6.977	12.191
SIZE	2127	11.696	1.601	7.061	16.16	8.34	15.813
CF	2127	0.119	0.484	-1.369	9.376	-0.376	1.651
M/B	2127	0.031	0.355	-.178	7.098	-0.002	0.043
TANG	2127	0.367	0.181	0.002	1.479	0.029	0.804
LEV	2127	0.25	0.32	0	7.237	0	0.911
log (AGE)	2127	3.656	0.402	1.099	4.691	2.303	4.357
GDP	2127	5.078	3.753	-4.9	11.Şub	-4.9	11.2