경영학 석사 학위논문

Economic Policy Uncertainty and Corporate Investment Around the World

경제정책 불확실성과 기업투자의 국제적 관계에 대한 연구

2019 년 2 월

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지도교수 김 우 진

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Abstract

Economic Policy Uncertainty and Corporate Investment Around the World

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Using a recently developed news-based index of economic policy uncertainty in 23 countries, I show that corporate investments are negatively correlated with such uncertainty in a global context. 14 out of 23 countries show a negative and statistically significant relationship in country-by-country analyses. Such relationship is not affected by differences in legal origins, cultures, or the level of government spending. More importantly, I find that economic policy uncertainty in the US is negatively associated with investment of firms in non-US countries especially when those countries exhibit more economic ties with the US. My findings suggest that economic policy uncertainty can affect corporate investment around the world, both locally and even across borders.

Keywords: corporate investment, economic policy uncertainty

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Table of Content

Figures and Tables

1 Introduction

The rise in uncertainty can reduce corporate investments for two reasons. First, the higher the uncertainty, the greater the value of waiting for information (Bernanke, 1983). Executives are more likely to delay investments timing to collect more information as uncertainty rises, especially when investments are irreversible. Second, increasing uncertainty leads to higher required rate of returns (Pastor and Veronesi (2012, 2013); Kelly, Pastor, and Veronesi (2016)). As the required rate of return increased, firms reduce their investments.

Despite of the established theoretical guidance, the relationship between uncertainty and corporate investment has been empirically tested only recently. The main reason is the lack of appropriate measure for uncertainty. To overcome this issue, previous studies have focused on measuring uncertainty. One group of studies exploits an exogenous event as a source of uncertainty. For example, Bloom (2009) defines 17 uncertainty shocks including assassination of President Kennedy and the Cuban missile crisis. Julio and Yook (2012, 2016) argues that political uncertainty increases when there is an election. They show firms decrease investment by an average of 4.8 percent during election years between 1980 and 2005 in 48 countries. Similarly, Jens (2017) exploits US gubernatorial elections as a source of uncertainty and finds a reduction in corporate investment in election periods.

Even though this branch of researches has an advantage on establishing causality, they also share a weakness that such an event can be

associated with not only uncertainty but also other unintended factors. For example, elections can also strengthen the incentive of incumbent politicians to boost corporate investment and economy to be re-elected (Bertrand, Kramarz, Schoar, & Thesmar, 2006). As a result, election timing may not be an appropriate instrument to study the impact of uncertainty, especially when political connection between executives and politicians is high (Julio & Yook, 2012).

Another group of studies employs a designed uncertainty index, especially the *Economic Policy Uncertainty Index* (hereafter EPU index) developed by Baker, Bloom, and Davis (2016).[1] They construct the measure by automatically counting news articles whose content is about economic policy uncertainty. Several types of test including human readings indicate the validity of the index, thus recent studies increasingly use the index as a proxy for economic policy uncertainty (e.g., Brogaard and Detzel (2015); Gulen and Ion (2016); Kim and Kung (2016); Bonaime, Gulen, and Ion (2018)).

Among those studies, Gulen and Ion (2016) first investigate the relationship between EPU index and corporate investment in the US firms. They find the relationship is negative with statistical significance. In this paper, I extend Gulen and Ion's finding in three ways. First, I test this relationship internationally. Second, I investigate what drives cross-country

[1] Jurado, Ludvigson, and Ng (2015) can be another example for a designed uncertainty index.

variations in the effect of economic policy uncertainty on investment. Third, I examine the spillover effect of economic policy uncertainty across borders.

Using about 400,000 firm-year observations in 23 countries between 1985 and 2015, I find the negative relationship between EPU index and corporate investment holds around the world. Specifically, firms reduce their investment level about 1 standard deviation when EPU index doubles. Consistent with the prediction of Bernanke (1983), investment sensitivity to EPU index is greater for firms which have higher investment irreversibility. I also explicitly address other potential omitted variables, but the relationship is robust.

My findings are not driven by few countries. In my preferred specification, 14 out of 23 countries present the negative relationship with statistical significance at 5 percent level when I run regressions by countries. It also holds for 14 countries when addressing investment irreversibility.

To investigate cross-country variations, I consider legal origins, individualism, uncertainty avoidance, and the level of government spending. However, I find no evidence that listed country characteristics explain variations in the effect of economic policy uncertainty on investments.

Further, I provide suggestive evidence that uncertainty can cross the border between economically connected countries. I focus on the effect of economic policy uncertainty in the US to other countries. I find firms in countries with more imports from and exports to the US display higher investment sensitivity to economic policy uncertainty of the US.

This paper is related to recent studies on the cross-border effect of uncertainty. Julio and Yook (2016) show that US firms reduce foreign direct investment when political uncertainties in foreign countries increase. My findings suggest the other way: firms in foreign countries decrease their investment when economic policy uncertainty increases in the US. Without accompanying fund flow, I show uncertainty can cross the border.

This paper has a number of policy implications. Since previous studies have focused on the US firms, there is a limited evidence that shows whether Bernanke (1983)'s prediction also holds in other countries, especially in developing countries. My findings supplement existing literature by showing that the prediction holds around the world. Further, my results suggest that uncertainty in foreign countries can also effects investment level of firms if those countries are economically important. Thus, policy makers should be aware of not only domestic uncertainty level, but also uncertainty levels in other countries.

The remainder of the paper is organized as follows. In Section 2 we introduce the data used in our analysis. Section 3 presents evidence that the negative relationship between EPU index and corporate investment is a global phenomenon and investigates cross-country variation in the relationship and the spillover effect across the border. Section 4 concludes.

2 Data and Methodology

2.1 The economic policy uncertainty index

In their seminal paper, Baker et al. (2016) develop an index of economic policy uncertainty based on newspaper coverage frequency. To construct EPU index for the US, they count the frequency of articles in major US newspapers that include "economic" or "economy"; "uncertain" or "uncertainty"; and one or more of "Congress," "deficit," "Federal Reserve," "legislation," "regulation," or "White House". Trio of terms are respectively designed to capture economic, uncertainty, and policy component of the index. They aggregate the frequency by month and scale it by the total number of articles in the same newspaper and month. Each monthly news-level series are normalized to have standard deviation one. Then, they calculate the mean over newspaper in each month, and normalize EPU time-series index to have 100 on average. Similarly, researchers around the world have calculated monthly EPU indexes for each country. To date, constructed indexes cover 23 countries.[2]

Even though EPU index may seem too simple at first sight, it passes several audits to test its validity. First, they find EPU index tends to rise when there is a war, economic crisis, or a terror. Second, they audit the index based on human reading of 12,000 articles. In short, they assign selected articles to human coders and have coders judge whether the article is about economic policy uncertainty. Then, they construct an index based on human classification and find the human and computer EPU indexes have a

[2] See http://www.policyuncertainty.com for more details. I thank Scott R. Baker, Nicholas Bloom, and Steven J. Davis for making EPU indexes publicly available.

correlation between 0.86 and 0.93. Third, they compare the index with other measures of uncertainty including the VIX (an index of 30-day option-implied volatility in the S&P 500 index. Two measures present correlation of 0.58. When they replace the policy term set with "stock price," "equity price," or "stock market," the resulting index correlates with the VIX at 0.73. Based on the validity from these results, EPU index is increasingly employed in recent papers as a proxy for uncertainty (e.g., Brogaard and Detzel (2015); Gulen and Ion (2016); Kim and Kung (2016); Bonaime et al. (2018)).

Figure 1 shows a time-series of EPU indexes in 23 countries. There are two patterns to emphasize. First, fluctuations in uncertainty are different across countries. First, fluctuations in uncertainty are different across countries. Developed countries such as Sweden and the US show weaker fluctuations, while developing countries such as Brazil, China, and Columbia present stronger fluctuation. Second, EPU index tends to be higher in election period (green horizontal line). For existing EPU indexes, the arithmetic mean of indexes in election periods is 127.08, while 114.86 in non-election periods (p-value 0.064). Considering rises in political uncertainty around election periods (Julio and Yook (2012, 2016); Jens (2017)), this fact also suggests validity of EPU index.

2.2 Empirical model

I obtain annual firm-level data from Thomson Financial's *Worldscope* database. The sample period and countries are chosen according to available EPU indexes. My baseline regression model is

$$\frac{CAPX_{i,j,t}}{TA_{i,j,t-1}} = \alpha_i + \beta \log EPU_{i,j,t} + \delta_1 Tobin's\ Q_{i,j,t} + \delta_2 \frac{OCF_{i,j,t}}{TA_{i,j,t-1}}$$

$$+ \delta_3 Sales\ growth_{i,j,t} + X_{j,t}\gamma + \lambda_t + \epsilon_{i,j,t}$$

where i indexes firms, j indexes countries, t indexes years. Accounting variables are treated as the previous year's one if their fiscal year ends between January to May. For example, if an accounting variable $y_{i,j,t}$ has a fiscal year ending at March 2013, t is 2012. α_i are dummy variables for firm fixed effects to control omitted variables which are firm-specific and time-invariant. This model is standard in the corporate investment literature.

To match monthly EPU index series with firm-year observations, the arithmetic average of EPU index for 12 months in fiscal years is measured. For example, if a fiscal year ends at March 2013 for an observation of firm i in country j, I calculate the arithmetic average of EPU index for country j from April 2012 to March 2013. This measure allows me to capture an average economic policy uncertainty level for firms at the given fiscal year end and country. Hence, the value of corresponding $\log EPU_{i,j,t}$ can be different between firms at the same t and in the same country j depending on which month the fiscal year ends. Moreover, since there are also cross-country variations in $logEPU_{i,j,t}$ for each t, I can include unobservable year-fixed effects (λ_t) in the model except when I add variables that are time-varying but invariant between firms and countries.

I include several macro variables ($X_{j,t}$) to control country-specific time effects. For the baseline model, I first consider election dummies

($Election_{j,t}$) which is designed to capture political uncertainty due to elections (Julio and Yook (2012, 2016)). I obtain the Election timing data from Brandon Julio for periods between 1985 and 2005 and I extend it manually for remaining sample period as guided by them.[3] Following Julio and Yook (2012, 2016), election dummies indicate 1 if fiscal year ends between -45 days and +274 days of election dates, 0 otherwise. Second, I include annual GDP growth rate (%) ($GDP\ growth\ rate_{j,t}$) to control economic states. GDP data is obtained from the *World Development Indicators* (WDI) from the World Bank. Additional macro controls are included for robustness checks, and I will discuss those variables in following sections.

The dependent variable, the level of corporate investment, is measured by the capital expenditure ($CAPX_{i,j,t}$) scaled by beginning of the period total assets ($TA_{i,j,t-1}$). To control the investment opportunity, I include Tobin's Q ($Tobin's\ Q_{i,j,t}$) which is calculated at the end of the period as the market value of equity plus the book value of asset minus book value of equity, all divided by book value of assets. I also control operating cash flow ($OCF_{i,j,t}$) normalized by beginning of the period total assets and sales growth rate ($Sales\ growth_{i,j,t}$) calculated as the year-on-year growth in annual sales.

[3] I appreciate Brandon Julio and Youngsuk Yook for their generosity of providing the detailed election data.

To be included in my analysis, firms must have at least three sets of non-missing observations for all variables in the model. Firm characteristics are winsorized at the 1st and 99th percentile and standard errors are clustered by firm and year throughout the analysis (Petersen, 2008). For the baseline regression model, the number of unique firms is 43,197 with 397,169 firm-year observations between 1985 and 2015 for 23 countries.

Table 1 presents descriptive statistics for main variables. First, observations are geographically well-distributed. They cover every continent of the world except Africa. Second, observations have considerable variations in the development level. Hence, I suggest my analysis is acceptable to study the relationship between economic policy uncertainty and corporate investment internationally.

3. Empirical Results

In this section, I present my regression results on the relationship between economic policy uncertainty and corporate investment. I begin with the analysis on the average effect of economic policy uncertainty on corporate investments followed by regressions allowing variation in the effect of economic policy uncertainty conditioning on investment irreversibility. Then, I conduct multiple regressions by country to investigate whether above results are driven by few countries. I also address variations in the sensitivity of investment to economic policy uncertainty across country. Finally, I

investigate whether economic policy uncertainty crosses the border especially when countries are economically connected.

3.1 The effect of economic policy uncertainty around the world

Table 2 presents my baseline regressions results. The first column reports the regression of corporate investment on the natural logarithm of EPU index with firm and year fixed effects. The following two columns add firm-level controls and macro controls. In every specification, EPU index and corporate investment are negatively associated with statistical significance at 1 percent level. In my baseline specification in column (3), for example, the coefficient of $\log EPU$ shows that firms reduce their investment level 0.009 on average when EPU doubles. This effect amounts to slightly above 30 percent of the median investment level 0.029 in my sample, which suggests its economic significance.

In column (4), I allow variations in the effect of uncertainty depending on investment irreversibility measured by property, plant, and equipment ($PPE_{i,j,t}$) scaled by total assets at end of the period $\left(TA_{i,j,t}\right)$. Specifically, I add an interaction term between the natural logarithm of EPU index and investment irreversibility ($\log EPU_{i,j,t} \times \frac{PPE_{i,j,t}}{TA_{i,j,t}}$) and investment irreversibility ($\frac{PPE_{i,j,t}}{TA_{i,j,t}}$) to my baseline model. I find a negative and statistically significant coefficient on the interaction term, which suggests firms with

higher investment irreversibility are more sensitive to economic policy uncertainty when they choice investment timing.

I further investigate how long the effect of EPU lasts. For this purpose, I consider a regression model

$$\frac{CAPX_{i,j,t}}{TA_{i,j,t-1}} = \alpha_i + \sum_{l=0}^{L} \beta_l \log EPU_{i,j,t-l} + \delta_1 Tobin's\ Q_{i,j,t} + \delta_2 \frac{OCF_{i,j,t}}{TA_{i,j,t-1}}$$

$$+ \delta_3 Sales\ growth_{i,j,t} + X_{j,t}\gamma + \lambda_t + \epsilon_{i,j,t}$$

where $L \in \{0, 1,2,3\}$. β_L is designed to capture L-year lagged effect of EPU. Figure 2 presents point estimates for β_L and bands for two standard errors away from the point. It shows that the coefficient loses its statistical significance when one year lagged, and even turns its sign to positive when three years lagged.

In summary, my baseline results suggest that on average the negative relationship between economic policy uncertainty and corporate investment is observed in the international sample.

3.2 Robustness check: potentially omitted macro variables

Policymakers tend to change economic policy when the economy is bad.[4] At the same time, executives would reduce investment levels in response to the economic recession. Therefore, both economic policy uncertainty and corporate investment can be affected by time-varying and

[4] Bloom (2014) shows uncertainty is highly countercyclical.

country-specific macro variables, which cannot be captured by year dummies and, thus, are omitted in my baseline regressions.

For these reasons, I add three macro variables to my baseline model for robustness check. First, I control an expected future economic condition measured by forecasted annual GDP growth rate (%) for the next year ($Forecasted\ GDP\ growht\ rate_{j,t}$) provided by the IMF's *World Economic Outlook* (WEO) database. Second, I include an annual real interest rate (%) ($Real\ interest\ rate_{j,t}$) . Third, I add an annual inflation rates (%) ($Inflation\ rate_{j,t}$). Last two variables are obtained from the *World Development Indicators* (WDI) from the World Bank.

Table 3 presents the regression results including additional macro variables. I sequentially add each macro variables to the first three columns. Across these three specifications in Table 3, the coefficient of $\log EPU$ is negative and statistically significant at 1 percent level. The last column considers investment irreversibility in the model. The coefficient of the interaction term is also negative and statistically significant at 1 percent level. These findings suggest that my baseline results are robust to the inclusion of these macro variables.

3.3 Multiple regressions by countries

The most representative firms in my sample are from the US. The observations from the US uniquely cover the whole sample period and the number of it is over 25 percent of the total observations. As a result, my findings may be mainly driven by sample from the US and just iterate findings

in the US firms of Gulen and Ion (2016). To address this issue, I conduct multiple regressions by countries for my baseline model. Because the cross-country variations in EPU index at each t disappears when I restrict my sample to a single country, I exclude year dummies in this analysis.

Table 4 presents the results of regressions by country. The first column shows the coefficient values of $\log EPU$ in my baseline model without year dummies. Coefficients have a negative value in 18 out of 23 countries, with statistical significance at 5 percent level in 14 countries. In terms of economic significance, India shows the greatest effect of economic policy uncertainty on investment (-0.051).

The sixth column shows the coefficient values of $\log EPU \times PPE/TA$ in my baseline model with $\log EPU_{i,j,t} \times PPE_{i,j,t}/TA_{i,j,t}$ and $PPE_{i,j,t}/TA_{i,j,t}$ and without year dummies. Coefficients have a negative value in 20 out of 23 countries, with statistical significance at 5 percent level in 14 countries. Ireland shows the greatest variation in effect of economic policy uncertainty on investment depending on investment irreversibility (-0.210).

In summary, these results show that the negative relationship between economic policy uncertainty and investment is observed in over the half of countries in my sample, which indicates that the relationship is not driven by few countries. Taking the results of Subsection 3.1 through 3.3 into consideration, I suggest Bernanke (1983)'s prediction holds around the world.

3.4 Cross-country variations: legal origin, culture, and government spending

In this subsection, I investigate cross-country variations in the effect of EPU. In particular, I consider several country characteristics and conduct regressions

$$\frac{CAPX_{i,j,t}}{TA_{i,j,t-1}} = \alpha_i + \beta_1 \, log \, EPU_{i,j,t} + \beta_2 \log EPU_{i,j,t} \times Country \; Characteristic_{j,t} + \delta_1 Tobin's \; Q_{i,j,t} + \delta_2 \frac{OCF_{i,j,t}}{TA_{i,j,t-1}} + \delta_3 Sales \; growth_{i,j,t} + X_{j,t}\gamma + \lambda_t + \epsilon_{i,t}.$$

Since most country characteristics are time-invariant, I remain firm-fixed effects in the model rather than including those country characteristics.

First, I examine the differential effects of economic policy uncertainty on investment by legal origin. Legal origin is a well-known proxy for the level of investor protection (La Porta, de Silanes, Shleifer, & Vishny, 1998). Specifically, I construct a dummy variable which indicates one if a country has a common law origin, otherwise zero ($Common \; law_j$). Julio and Yook (2012) argue that firms in common law countries are less likely to reduce their investment when political uncertainty rises because stronger investor protection in common law countries would limit the effect of politics on the business operation. On the other hand, one might expect that economic policy uncertainty would have lower effect on the investment decision since under low investor protection official policy is less important than private

relationship with politicians. Thus, there are two competing hypotheses for the effect of legal origin.

Second, I investigate the effect of cultural differences. In particular, I consider individualism and uncertainty avoidance indexes measured by Hofstede (2001). The original indexes range from 0 to 100, but I divide them by 100 to have between 0 and 1. For individualism ($Individualism_j$), I highlight a link between individualism and confidence level. When the level of uncertainty is so high, agents may only have a range of possible outcomes but not a probability distribution. In this case, pessimistic agents can act as if the worst outcomes will occur, which is called an ambiguity aversion (Hansen, Sargent, & Tallarini, 1999). In the opposite way as remarked in Bloom, Floetotto, Jaimovich, Saporta-Eksten, and Terry (2018), optimistic agents may act as if the best outcomes will happen, which leads to positive relationship between uncertainty and corporate investment. Since individualism is related with overconfidence (Heine, Lehman, Markus, and Kitayama (1999); Markus and Kitayama (1991)), I expect firms in counties that have higher individualism would show lower investment sensitivity to economic policy uncertainty. For uncertainty avoidance ($UncAvoidance_j$), a prediction is quite direct: I expect firms in countries that have higher uncertainty avoidance would show higher investment sensitivity to economic policy uncertainty.

Third, I investigate variations of the effect of EPU on investment by the level of government spending. Belo, Gala, and Li (2013) show that firms in industries with higher exposure to government spending exhibit greater

sensitivity to political cycles. Similarly, I expect firms in countries that have higher government spending would show greater investment sensitivity to economic policy uncertainty since their cashflows are more likely to be affected by economic policy. I measure the level of government spending by a share of government consumption in total GDP ($GovSpending_{j,t}$) which is obtained from the *World Development Indicators* (WDI) from the World Bank.

Table 5 presents the results of regression for cross-country variations. Each column sequentially includes the interaction term of $\log EPU$ with a common law dummy, individualism index, uncertainty avoidance index, and government spending to total GDP. Unlike my ex ante predictions, country characteristics do not explain variations in the effect of economic policy uncertainty on investment.

3.5 Spillover effects: from the US to other countries

Economic policy uncertainty can cross the border. One, firms run their business not only in their home country but also in foreign countries. Two, in an open economy, exports can account for a large part in business. For the first channel, the outcome of uncertainty shock in foreign countries may be observed in fund flow or foreign direct investment (Julio & Yook, 2016). However, throughout the second channel, economic policy uncertainty in foreign countries can affect investments even when firms do not have an office in those countries. In this paper, I highlight the second channel and

define this effect as a spillover effect of economic policy uncertainty and expect the spillover effect would be stronger where the economic connectedness between countries is higher.

I focus on the spillover effect of economic policy uncertainty form the US to other countries since the US has enough time-series of EPU index and is with the largest merchandise imports in the world.[5] Assuming firms in countries that are more dependent on the US economy would be more connected to the US economy, I consider three additional variables to the baseline model: an EPU index of the US ($\log US\ EPU_{i,t}$), a country's economic dependency on the US ($US\ dependency_{j,t}$), and an interaction term ($\log US\ EPU_{i,t} \times US\ dependency_{j,t}$). The interaction term is designed to capture variations in the spillover effect depending on economic connectedness to the US economy. Due to multicollinearity, I exclude year dummies when I include an EPU index of the US in the model but include additional macro variables discussed in Subsection 3.2 and annual GDP growth rate (%) of the US ($US\ GDP\ growth\ rate$) to control time effects.

I proxy a country's economic dependency on the US by two measures. One is a share of exports to the US in total GDP ($Exports\ to\ the\ US_{j,t}$) and the other is a share of imports from the US in total GDP plus a share of exports to the US in total GDP ($Imports\ from\ and\ exports\ to\ the\ US_{j,t}$). Imports

[5] *The World Factbook* 2018. Washington, DC: Central Intelligence Agency, 2018. https://www.cia.gov/library/publications/the-world-factbook/index.html

and exports data are obtained from the IMF's *Direction of Trade Statistics* (DOTS) database.

Table 6 presents the regression results of the spillover effect. In column (1) and (2), a share of exports to the US in total GDP is used to measure a country's economic dependency on the US, while a share of imports from the US in total GDP plus a share of exports to the US in total GDP is used in column (3) and (4). In column (1) and (2), coefficient values of $\log US\ EPU \times US\ dependency$ are negative with statistical significance at 5 percent level. Coefficient values of $\log US\ EPU \times US\ dependency$ in column (3) and (4) are also negative with statistical significance at 10 percent level. In summary, these results suggest that that firms in countries that are more dependent on the US economy tend to have higher investment sensitivity to economic policy uncertainty.

4. Conclusion

In this paper, I investigate the relationship between economic policy uncertainty and corporate investment around the world. I show that Bernanke (1983)'s prediction holds internationally. More importantly, I find the spillover effect of economic policy uncertainty among economically connected countries. My findings contribute to the empirical literature on the effect of uncertainty which is still at an early stage. Moreover, my results highlight a channel for the spillover effect of uncertainty which has not been investigated in previous studies.

Even though this paper reports the negative relationship between economic policy uncertainty and investment around the world and across borders, the causal inference is still challenging in my results. In particular, my country-level measure for an economic dependency on the US is quite suggestive yet. Omitted or unobservable variables still can affect both investment and economic policy uncertainty in the US even though I control several macro variables. By employing firm-level variables for economic dependency on the US or other countries, one can at least rule out time-fixed effects and provide more concrete evidence in subsequent studies.

Appendix

Definition of variables

CAPX/TA: the capital expenditure scaled by beginning of the period total assets.

logEPU: the natural logarithm of the arithmetic average of economic policy uncertainty index for 12 months before during the fiscal year.

PPE/TA: the property, plant, and equipment scaled by total assets at end of the period.

Tobin's Q: the market value of equity plus the book value of asset minus book value of equity, all divided by book value of assets, at the end of the period.

OCF/TA: the operating cashflow scaled by beginning of the period total assets.

Sales growth: the year-on-year growth in annual sales.

Election: a dummy variable which indicates 1 if fiscal year ends between -45 days and +274 days of election dates, 0 otherwise.

GDP growth rate: the year-on-year growth in annual GDP (%).

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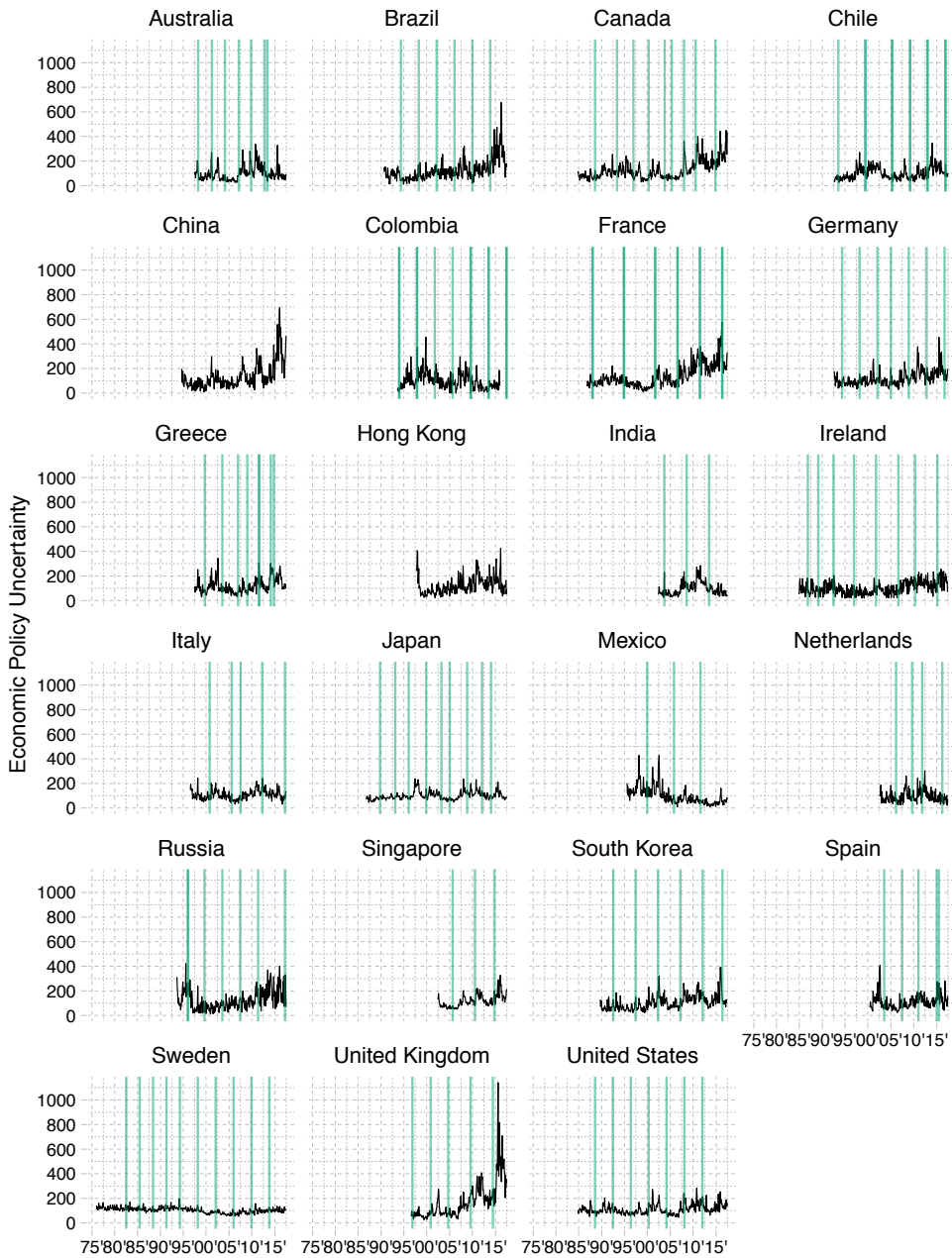

Figure 1
Time-series of EPU Indexes and Election Dates

This figure presents fluctuations in EPU indexes for 23 countries. Green horizontal lines are dates for major political elections in each country.

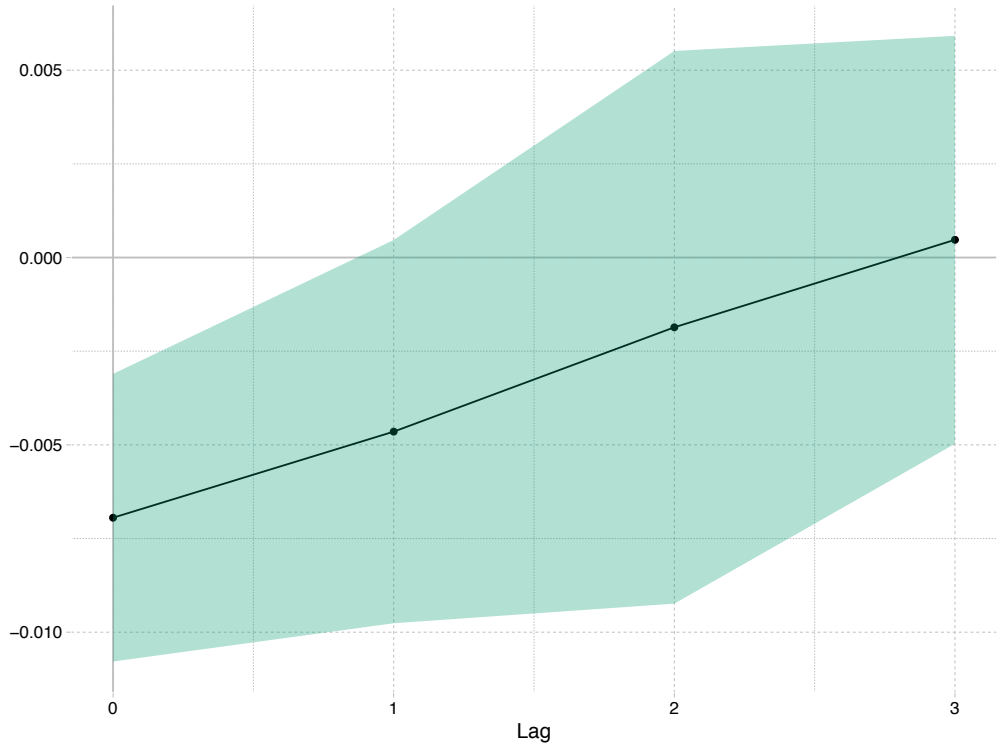

Figure 2
The Lagged-effect of EPU indexes on investment

This figure presents estimates for the coefficient of $\log EPU$ in

$$\frac{CAPX_{i,j,t}}{TA_{i,j,t-1}} = \alpha_i + \sum_{l=0}^{L} \beta_l \log EPU_{i,j,t-l} + \delta_1 Tobin's\ Q_{i,j,t} + \delta_2 \frac{OCF_{i,j,t}}{TA_{i,j,t-1}} + \delta_3 Sales\ growth_{i,j,t} + X_{j,t}\gamma + \lambda_t + \epsilon_{i,j,t}.$$

The solid black line shows point estimates of β_L for each L on x-axis and green area presents ranges of two standard errors away from the point

Table 1
Descriptive Statistics

In Panel A, I report descriptive statistics for full sample after winsorized at 1st and 99th percentile. For the definition of variables, see Appendix. In Panel B, I present descriptive statistics by country. For legal origin, E, F, G, and S denote English, French, German, and Scandinavian respectively. For firm-level variables, I report an average of firm-year observations within country.

Panel A: Full

	N	Mean	St. Dev.	Q1	Median	Q3
CAPX/TA	397,169	0.059	0.089	0.008	0.029	0.070
Tobin's Q	397,169	1.650	2.019	0.760	1.027	1.672
OCF/TA	397,169	0.022	0.221	-0.003	0.049	0.110
Sales growth	397,169	0.223	0.887	-0.048	0.066	0.225

Panel B: By Country

Country	N. Obs.	N. of Unique Firms	Fiscal Year Ends	Legal Origin	CAPX/TA	Tobin's Q	OCF/TA	Sales growth
Australia	18,385	2,426	19981231-20151231	E	0.079	1.814	-0.048	0.487
Brazil	4,060	499	19951231-20151231	F	0.058	1.289	0.061	0.208
Canada	20,635	2,585	19881031-20151231	E	0.101	1.807	0.004	0.378
Chile	3,153	267	19941231-20151231	F	0.055	1.278	0.078	0.172
China	29,977	3,825	19951231-20151231		0.075	2.235	0.053	0.242
Colombia	786	97	19941231-20151231	F	0.040	0.946	0.060	0.274
France	11,297	1,110	19901231-20151231	F	0.055	1.342	0.053	0.111
Germany	11,969	1,196	19931231-20151231	G	0.057	1.436	0.038	0.158
Greece	3,003	319	19981231-20151231	F	0.044	1.013	0.035	0.040

Hong Kong	18,198	1,911	19990331-20151231	E	0.048	1.537	0.014	0.281
India	20,180	2,523	20031231-20151231	E	0.084	1.323	0.033	0.245
Ireland	1,233	133	19940131-20151231	E	0.059	1.513	0.058	0.214
Italy	4,210	420	19971231-20151231	F	0.043	1.158	0.045	0.099
Japan	56,802	4,790	19880331-20151231	G	0.037	1.089	0.052	0.055
Mexico	2,326	234	19961231-20151231	F	0.054	1.126	0.075	0.160
Netherlands	1,612	209	20040331-20151231	F	0.042	1.350	0.065	0.157
Russia	3,034	465	19971231-20151231		0.082	1.141	0.079	0.227
Singapore	8,067	913	20031226-20151231	E	0.057	1.195	0.042	0.178
South Korea	22,490	2,143	19941231-20151231	G	0.059	1.078	0.043	0.158
Spain	1,591	196	20011231-20151231	F	0.047	1.267	0.050	0.136
Sweden	6,213	722	19921231-20151231	S	0.052	1.809	0.007	0.319
United Kingdom	31,041	3,650	19971225-20151231	E	0.048	1.605	0.016	0.288
United States	116,907	12,701	19860331-20151231	E	0.057	2.087	-0.001	0.242

Table 2
Baseline Regressions

All regressions except the last column include 397,169 firm-year observations between 1985 and 2017 for 23 countries. The dependent variable is the capital expenditure scaled by beginning of the period total assets. $\log EPU$ is the natural logarithm of economic policy uncertainty indexes for each country. For other controls, see Appendix. The number of observations decreases to 392,878 in column (4) since PPE/TA is available only for those observations. Standard errors clustered by firm and year are reported in parentheses.

	CAPX/TA			
	(1)	(2)	(3)	(4)
logEPU	-0.010***	-0.009***	-0.009***	0.006
	(0.002)	(0.002)	(0.002)	(0.004)
logEPU * PPE/TA				-0.049***
				(0.016)
PPE/TA				0.344***
				(0.074)
Tobin's Q		0.003***	0.003***	0.003***
		(0.0003)	(0.0003)	(0.0003)
Cashflow		-0.0005	-0.001	-0.003
		(0.005)	(0.005)	(0.005)
Sales growth		0.015***	0.015***	0.016***
		(0.001)	(0.001)	(0.001)
Election			-0.00005	-0.0001
			(0.001)	(0.001)
GDP growth rate			0.001***	0.001***
			(0.0004)	(0.0003)
Firm-fixed effects	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Clustered Std. Errors	Firm and Year	Firm and Year	Firm and Year	Firm and Year
N	397,169	397,169	397,169	392,878
Adjusted R^2	0.434	0.455	0.456	0.473

Notes:
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 3
Robustness Check

All regressions except the last column include 364,082 firm-year observations between 1985 and 2017 for 23 countries. The dependent variable is the capital expenditure scaled by beginning of the period total assets. $\log EPU$ is the natural logarithm of economic policy uncertainty indexes for each country. $Forecated\ GDP\ growth\ rate$ is a lead one-year GDP growth rate forecasted in the period. For other controls, see Appendix. The number of observations decreases to 359.644 in column (4) since PPE/TA is available only for those observations. Standard errors clustered by firm and year are reported in parentheses.

	CAPX/TA			
	(1)	(2)	(3)	(4)
logEPU	-0.010***	-0.010***	-0.009***	0.005
	(0.002)	(0.002)	(0.002)	(0.005)
logEPU * PPE/TA				-0.047***
				(0.016)
PPE/TA				0.335***
				(0.076)
Election	-0.0002	-0.0003	-0.00000	-0.00002
	(0.002)	(0.001)	(0.001)	(0.001)
GDP growth rate	0.001***	0.001***	0.001***	0.001***
	(0.0004)	(0.0003)	(0.0003)	(0.0003)
Forecasted GDP growth rate	0.0001	0.00002	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Real interest rate		-0.001	-0.001**	-0.001**
		(0.0004)	(0.0003)	(0.0003)
Inflation rate			-0.001	-0.001
			(0.001)	(0.001)
Firm characteristics	Control	Control	Control	Control
Firm-fixed effects	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
N	364,082	364,082	364,082	359,644
Adjusted R^2	0.459	0.459	0.459	0.476

Notes:
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 4
Multiple regressions by country

In this table, I present the results of multiple regressions by 23 countries for two models. For the first five columns, I run the regression model

$$\frac{CAPX_{i,t}}{TA_{i,t-1}} = \alpha_i + \beta \log EPU_{i,t} + \delta_1 Tobin's\ Q_{i,t} + \delta_2 \frac{OCF_{i,t}}{TA_{i,t-1}} + \delta_3 Sales\ growth_{i,t} + X_t\gamma + \epsilon_{i,t}$$

for each country and report coefficients, clustered standard errors by firm and year and statistical significances of $\log EPU$, and the number of observations and values of adjusted r-squared. For the last five columns, I run the regression model

$$\frac{CAPX_{i,t}}{TA_{i,t-1}} = \alpha_i + \beta_1 \log EPU_{i,t} + \beta_2 \log EPU_{i,t} \times \frac{PPE_{i,t}}{TA_{i,t}} + \beta_3 \frac{PPE_{i,t}}{TA_{i,t}} + \delta_1 Tobin's\ Q_{i,t} + \delta_2 \frac{OCF_{i,t}}{TA_{i,t-1}} + \delta_3 Sales\ growth_{i,t} + X_t\gamma + \epsilon_{i,t}$$

for each country and report coefficients, clustered standard errors by firm and year and statistical significances of $\log EPU$, and the number of observations and values of adjusted r-squared.

	logEPU	Std. Errors	Statistical Significance	*N*	Adjusted R^2	logEPU * PPE/TA	Std. Errors	Statistical Significance	*N*	Adjusted R^2
Australia	-0.008	0.007		19,309	0.411	-0.005	0.041		19,074	0.426
Brazil	0.008	0.014		4,218	0.481	-0.056	0.041		4,200	0.506
Canada	-0.026	0.008	< .01	21,692	0.482	-0.098	0.031	< .01	21,515	0.489
Chile	-0.011	0.008		3,188	0.444	-0.020	0.013		3,175	0.463
China	0.008	0.007		30,739	0.361	-0.032	0.015	< .05	30,730	0.375
Colombia	0.008	0.004	< .05	833	0.489	0.013	0.020		829	0.492
France	-0.019	0.003	< .01	11,706	0.432	-0.080	0.017	< .01	11,695	0.456
Germany	-0.025	0.008	< .01	12,317	0.374	-0.091	0.030	< .01	12,305	0.393
Greece	-0.017	0.007	< .05	3,087	0.378	-0.060	0.021	< .01	3,085	0.386
Hong Kong	-0.015	0.004	< .01	18,718	0.318	0.019	0.010	< .10	18,701	0.334

India	-0.051	0.016	< .01	20,714	0.320	-0.109	0.051	< .05	20,620	0.354
Ireland	-0.037	0.014	< .01	1,293	0.530	-0.210	0.034	< .01	1,289	0.589
Italy	-0.020	0.006	< .01	4,325	0.402	-0.126	0.032	< .01	4,324	0.433
Japan	-0.010	0.004	< .01	57,451	0.501	-0.050	0.012	< .01	57,426	0.529
Mexico	0.007	0.005		2,413	0.531	0.006	0.015		2,410	0.536
Netherlands	-0.004	0.005		1,742	0.610	-0.043	0.008	< .01	1,714	0.631
Russia	-0.017	0.008	< .05	3,290	0.517	-0.008	0.033		3,285	0.527
Singapore	-0.022	0.005	< .01	8,320	0.391	-0.087	0.028	< .01	8,288	0.422
South Korea	-0.010	0.009		22,858	0.326	-0.017	0.028		22,841	0.352
Spain	-0.023	0.009	< .01	1,668	0.397	-0.107	0.032	< .01	1,663	0.413
Sweden	0.001	0.021		6,506	0.359	-0.066	0.085		6,495	0.393
United Kingdom	-0.016	0.002	< .01	32,798	0.479	-0.042	0.011	< .01	30,698	0.491
United States	-0.015	0.005	< .01	122,539	0.506	-0.078	0.017	< .01	120,850	0.528

Table 5
Cross-country Analysis

All regressions except the last column include 397,169 firm-year observations between 1985 and 2017 for 23 countries. The dependent variable is the capital expenditure scaled by beginning of the period total assets. $\log EPU$ is the natural logarithm of economic policy uncertainty indexes for each country. For other controls, see Appendix. Column (1)-(4) include a dummy variable for common law countries, individualism index, uncertainty avoidance index, and a share of government spending in total GDP as a country characteristic respectively. Standard errors clustered by firm and year are reported in parentheses.

Dependent variable	CAPX/TA			
Country characteristic	Common law	Individualism	UncAvoidance	GovSpending
	(1)	(2)	(3)	(4)
logEPU	-0.007***	-0.009***	-0.010***	-0.012***
	(0.002)	(0.003)	(0.003)	(0.003)
logEPU * Country characteristic	-0.003	0.001	0.002	0.019
	(0.002)	(0.003)	(0.004)	(0.012)
Tobin's Q	0.003***	0.003***	0.003***	0.003***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Cashflow	-0.001	-0.001	-0.001	-0.001
	(0.005)	(0.005)	(0.005)	(0.005)
Sales growth	0.015***	0.015***	0.015***	0.015***
	(0.001)	(0.001)	(0.001)	(0.001)
Election	0.00000	-0.0001	-0.00004	-0.0001
	(0.001)	(0.001)	(0.001)	(0.001)
GDP growth rate	0.001***	0.001***	0.001***	0.001***
	(0.0004)	(0.0003)	(0.0003)	(0.0003)
Firm-fixed effects	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
N	397,169	397,169	397,169	397,169
Adjusted R^2	0.456	0.456	0.456	0.456

Notes:
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 6
Spillover Effect

The dependent variable is the capital expenditure scaled by beginning of the period total assets. $\log EPU$ is the natural logarithm of economic policy uncertainty indexes for each country. For other controls, see Appendix. In column (1) and (2), I measure $US\ dependency$ by a share of exports to the US in total GDP. The difference between two columns is that column (2) include $\log US\ EPU$, $US\ GDP\ growth\ rate$, $Forecasted\ GDP\ growth\ rate$, $Real\ interest\ rate$, and $Inflation\ rate$ but exclude year dummies. In column (3) and (4), I measure $US\ dependency$ by a share of exports to and imports from the US in total GDP. The difference between two columns is analogous to the difference between column (1) and (2). Standard errors clustered by firm and year are reported in parentheses.

Dependent variable	CAPX/TA			
US dependency	Export/GDP		(Import+Export)/GDP	
	(1)	(2)	(3)	(4)
logEPU	-0.008***	-0.015***	-0.008***	-0.013***
	(0.002)	(0.004)	(0.002)	(0.004)
logUS EPU		0.003		0.002
		(0.006)		(0.006)
logUS EPU * US dependency	-0.057***	-0.073**	-0.018*	-0.025*
	(0.021)	(0.028)	(0.011)	(0.014)
US dependency	0.335***	0.462***	0.127**	0.227***
	(0.114)	(0.161)	(0.059)	(0.075)
Tobin's Q	0.004***	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
Cashflow	0.022***	0.023***	0.021***	0.023***
	(0.005)	(0.004)	(0.005)	(0.004)
Sales growth	0.015***	0.015***	0.015***	0.015***
	(0.001)	(0.001)	(0.001)	(0.001)
Election	-0.0001	-0.001	-0.0001	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)
GDP growth rate	0.001***	0.002***	0.001***	0.002***
	(0.0004)	(0.001)	(0.0004)	(0.0005)
US GDP growth rate		-0.001		-0.001
		(0.001)		(0.001)
Forecasted GDP growth rate		0.004***		0.004***
		(0.001)		(0.001)
Real interest rate		0.0002		0.0002

		(0.0004)		(0.0004)
Inflation rate		-0.0001		-0.0001
		(0.001)		(0.001)
Firm-fixed effects	Yes	Yes	Yes	Yes
Year dummies	Yes	No	Yes	No
N	280,232	252,044	280,232	252,044
Adjusted R^2	0.441	0.438	0.441	0.438

Notes: [***]Significant at the 1 percent level.
[**]Significant at the 5 percent level.
[*]Significant at the 10 percent level.

국문 초록

이 논문은 신문 기사를 바탕으로 한 23 개국의 경제정책 불확실성 지표를 활용해 기업투자와 경제정책 불확실성이 국제적으로 음의 관계를 가짐을 보였다. 국가별 분석에서도 23 개국 중 14 개국에서 통계적으로 유의한 음의 관계가 나타났다. 국가별 관계의 크기는 법 계통, 문화, 또는 정부지출액의 크기에 영향 받지 않았다. 또한 나는 미국의 경제정책 불확실성이 미국과 경제적으로 깊게 연관된 국가의 기업 투자를 저해함을 보였다. 이러한 결과는 경제정책 불확실성이 기업투자에 국제적으로 영향을 끼치며, 이것은 국경 내뿐만 아니라 국경 너머에도 경제정책 불확실성이 영향을 끼칠 수 있음을 시사한다.

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