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Policy Uncertainty and Foreign Direct Investment

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Abstract

While foreign direct investment (FDI) is known to be the most stable type of international capital flows, it may be particularly susceptible to heightened uncertainty because of its high fixed costs. We investigate the effect of domestic policy uncertainty on FDI inflows into 16 host countries using the OECD bilateral FDI panel dataset and the Economic Policy Uncertainty (EPU) index from 1985 to 2013. The bilateral structure of the data enables us to disentangle pull factors of FDI from its push factors, thereby obtaining a cleaner causal identification of the higher domestic policy uncertainty effect. To alleviate remaining endogeneity concerns, we use the timing of "exogenous" elections as an instrument. We find that domestic policy uncertainty in a host country robustly reduces the FDI inflows, with the effect being larger in countries with less financial development.

Keywords: Economic policy uncertainty; FDI inflows; Elections; Financial development.

JEL codes: F21; F32; F42.

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I. INTRODUCTION

Foreign direct investment (FDI) has long been recognized as a channel for economic growth via the transmission of new ideas and technologies. Numerous empirical and theoretical studies in the literature have examined the link between FDI and growth (e.g., Borensztein et al., 1998; Alfaro et al., 2004; Chowdhury and Mavrotas, 2006; Aizenman et al., 2013) as well as the determinants of FDI (Schneider and Frey, 1985; Froot and Stein, 1991; Bénassy-Quéré et al., 2007; Blonigen and Piger, 2014). In particular, the bulk of empirical studies has focused on the cross-country determinant of FDI and analyzed various factors affecting the decision of firms to invest in a foreign country, such as market size, distance, income level, technological differences, market access costs, and cultural proximity. Because these factors are persistent, previous analyses have typically focused on the long-term determinants drawn from general equilibrium predictions that explain the distribution of FDI across countries and their implications for economic growth.

However, the significant decline in FDI during and aftermath of the global financial crisis (GFC)—a period often characterized by heightened uncertainty about economic policies in many advanced economies, such as unconventional monetary policies, the Brexit referendum, and global trade tensions—suggests that short-term factors, including policy uncertainty, may affect FDI. While both the real-option value channel (e.g., Bernanke, 1983; Bloom, 2009) and the financial channel (e.g., Christiano et al., 2014; Choi et al., 2018; Arellano et al., 2019) predict a negative relationship between uncertainty and investment, there are good reasons to believe that this relationship is stronger for FDI than domestic investment.

First, foreign investment is subject to higher fixed costs than is domestic investment owing to factors associated with national boundaries. Second, foreign investment is more sensitive to the political environment than domestic investment because foreign investors have limited information about and protection from the host country's legal and political institutions (Aizenman and Spiegel, 2006; Dixit, 2011). For example, new constructions of U.S. multinational corporations (MNCs) in Mexico are likely to depend on policy factors such as the Mexican government's tax treaty, labor market regulations, capital controls, and free trade agreements. If the Mexican economic policy is subject to high uncertainty, the U.S. MNCs would adopt a wait-and-see behavior and postpone their FDI, or reallocate their investment to a country showing no policy uncertainty.

Despite this potentially important link between FDI and policy uncertainty, only a few studies have analyzed the role of policy uncertainty in affecting FDI flows (e.g., Julio and Yook, 2016; Nguyen et al., 2018; Azzimonti, 2019; Chen et al., 2019; Honig, forthcoming), mostly for a limited sample of countries or FDI flows at the aggregate level. We extend this literature by providing the first systematic study of how policy uncertainty in a host country affects FDI inflows at the bilateral level for a large sample of economies.

In particular, we use bilateral data obtained from the OECD's International Direct Investment Database.[1] The bilateral structure of this data enables us to control for source country-time fixed effects, and therefore for supply-side effects (i.e., push factors)—that is, any global and country-level shocks affecting FDI flows from a common source country. When controlling for source country-time fixed effects, any time-varying regressors of host countries can be interpreted as the difference between the host-source country pairs. This helps mitigate the concern that policy uncertainty is often correlated across countries or driven by a common factor. The bilateral structure also allows for controlling country-pair fixed effects, which absorb time-invariant variables specific to a country pair (such as distance, common language, and bilateral trade agreements or tax treaties).

We use the economic policy uncertainty (EPU) index constructed by Baker et al. (2016) to measure the degree of uncertainty about the host country's economic policy. Compared to a stock market-based uncertainty measure such as the VIX that captures the uncertainty mostly on financial markets, as well as investor sentiment or risk aversion, the EPU index proxies the uncertainty more specific to economic policy. Moreover, the EPU index is less prone to be

[1] One caveat of the OECD bilateral FDI data is that there is no information about the composition of FDI between cross-border M&A activity and greenfield investment because they are taken from the balance of payments data based on financial transactions. Given that determinants of the two types of FDI might differ from one another, we employ a subsample analysis based on the income level of source countries to shed some light on the consequence of this data limitation.

affected by international financial markets than is stock market volatility, thus strengthening our identification strategy.[2]

Our data covers the FDI inflows to the 16 OECD countries from (on average) 76 source countries that are both advanced and developing economies. We find that an increase in domestic policy uncertainty in the 16 host countries robustly reduced the FDI inflows even after controlling for a broad set of determinants of FDI from the literature. The effect is both statistically and economically significant in that a one-standard-deviation increase in domestic policy uncertainty is followed by a 16.5% decline in FDI inflows using the baseline estimates. While domestic policy uncertainty has adverse effects on FDI inflows from both advanced and developing economies, its quantitative importance is somewhat different.[3]

The use of bilateral FDI data in our analysis largely alleviates a reverse causality issue. However, to the extent that policy uncertainty increases in response to macroeconomic development, simultaneously affecting FDI inflows, our findings might suffer from omitted variable bias. To alleviate this concern, we instrument the EPU index using the host country's timing of exogenous elections and confirm the baseline findings as well as the role of financial development in ameliorating the adverse effect of policy uncertainty on FDI.

We perform extensive robustness checks on the main findings. Among others, we confirm these findings by controlling for stock market volatility—an alternative measure of uncertainty. This result suggests that the EPU index captures different aspects of uncertainty relevant to the MNC's FDI decisions distinct from the uncertainty of financial markets. Our findings are robust to the exclusion of the GFC and its aftermath. We test the robustness of our findings by applying different treatments of zero or negative value issues in the data. Our findings are largely robust to the alternative construction of the dependent variable and an

[2] For example, Fratzscher (2012) and Forbes and Warnock (2012) use the VIX as a measure of global uncertainty or global risk aversion and find that it is a strong global push factor of international capital flows.

[3] Compositional differences between M&A activity and greenfield investment in FDI across income groups suggested by Davies et al. (2018) might be a factor behind this heterogeneity. This calls for a deeper analysis using disaggregated data, which is beyond the scope of our analysis.

alternative estimation technique, such as Poisson pseudo-maximum-likelihood (PPML) estimation.

We further investigate the role of policy uncertainty as a push factor of FDI and find that policy uncertainty in the source country also reduces FDI. To the extent to which the effect of source country policy uncertainty on FDI inflows to the host country is unclear,[4] our finding suggests that firms are unlikely to substitute domestic investment with investment abroad when facing higher policy uncertainty at home. In other words, policy uncertainty has a first-order negative effect on FDI regardless of its origin. In principle, the distance between policy uncertainty in the host and source country can also be an independent factor affecting FDI. We indeed find some non-linear effects of policy uncertainty on FDI: the negative effect of the relative policy uncertainty on FDI diminishes when the source country's economic policy is subject to high uncertainty.

Finally, for more clarity on the channel through which policy uncertainty affects FDI inflows, we investigate the role of financial development. We focus on financial development as the most relevant channel for the following reasons. First, financial depth is directly linked to the volume of FDI flows (Di Giovanni, 2005; Hattari and Rajan, 2009). Second, studies show that these factors determine the effectiveness of FDI in promoting growth (Hermes and Lensink, 2003; Alfaro et al., 2004; Desbordes and Wei, 2017). Third, developed financial markets ameliorate the dampening effect of uncertainty on domestic investment (Carrière-Swallow and Céspedes, 2013; Choi et al., 2018; Karaman and Yıldırım-Karaman, 2019). By estimating the interaction effect between policy uncertainty and financial development—measured by domestic private credit to GDP ratio—we confirm that financial deepening can mitigate the adverse impact of policy uncertainty on FDI inflows.

The remainder of the paper is organized as follows. Section II describes the data on bilateral FDI flows, a measure of policy uncertainty, and data on a group of covariates. Section

[4] For example, higher policy uncertainty in a source country might encourage FDI outflows because firms could substitute domestic investment with foreign investment when the outlook is more predictable for the latter. At the same time, an increase in domestic policy uncertainty could discourage firms' investment regardless of its destinations.

III illustrates the econometric methodology used to mitigate the endogeneity issues and disentangle the FDI demand and supply factors. Section IV presents the main results, a battery of robustness checks, as well as additional exercises for investigating nonlinearities and relevant channels. Finally, Section V concludes.

II. DATA

Bilateral FDI data are taken from the OECD's International Direct Investment Database. While the bilateral FDI data obtained from the UNCTAD are often used for the cross-country analysis, especially for developing economies, the OECD database provides more accurate and consistent data of its member countries.[5] It also has some coverage of FDI between OECD and non-OECD countries, although some transactions with non-OECD countries are missing. OECD does not report any observations of FDI between countries where they are both non-OECD. However, this limitation is not a severe constraint for our study because the EPU index is seldom available for non-OECD countries.[6] We use the annual bilateral FDI flows data of the 16 OECD host countries that have consistent data on the EPU index (Australia, Canada, Chile, France, Germany, Greece, Ireland, Italy, Japan, Korea, Mexico, the Netherlands, Spain, Sweden, the United Kingdom, and the United States) and of their (up to) 166 counterparty countries during the 1985–2013 period.[7]

The counterparty coverage is quite unbalanced because 1,287 country pairs are eventually used in the baseline analysis, while 2,640 (16 times 165) theoretical country pairs are available. Each host country has, on average, the data on FDI inflows from 76 countries that are both advanced and developing economies. Because the FDI flows are taken from the

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[5] See OECD (2008) for the operational guidelines on how FDI activity should be measured, and how it sets the world standard for the collection of direct investment statistics.

[6] The exceptions are Brazil, China, Colombia, Hong Kong, India, Russia, and Singapore.

[7] As of 2019, the EPU index is available only for 23 countries, restricting the cross-sectional dimension of the sample to a certain extent. To the extent to which most of our source countries are developed economies, cross-border M&A activity appears more frequent than greenfield investment in the reported FDI data (Lane and Milesi-Ferretti, 2000; Davies et al., 2018). While we cannot test this hypothesis directly because of the lack of disaggregated data, one should note that the type of FDI we analyze is likely to be different from that studied in the developing economy context.

balance of payments (BOP) based on financial transactions, which include the retained earnings and intra-firm transfers, they provide rather noisy and imperfect measures of direct investment flows. As a result, compared to the domestic investment taken from the national income accounts, the FDI flows may overestimate the amount of the actual "new capital" in the economy (Alfaro et al., 2004).

To provide a sense of the size of FDI inflows across countries, Columns (I) and (III) of Table 1 summarize the annual aggregate and bilateral FDI inflows to each host country, respectively. While this statistic shows the absolute importance of FDI across countries, Columns (II) and (IV) show the aggregate and bilateral FDI inflows normalized by the nominal GDP of the last year to gauge the relative importance of FDI. Not surprisingly, bilateral FDI inflows are relatively more volatile than aggregate FDI inflows, denoted by the relative size of their standard deviation to the mean.

We employ the EPU index constructed by Baker et al. (2016) as a measure of policy uncertainty. This index captures the uncertainty of "who will make economic policy decisions, what economic policy actions will be undertaken and when they will be enacted, the economic effects of past, present and future policy actions, and uncertainty induced by policy inaction." The index has been widely used in recent studies as an alternative to the VIX—the most popular uncertainty measure based on financial market data. The EPU index has also been used to study the effect of policy uncertainty on a firm's domestic investment decisions (Gulen and Ion, 2015; Kim and Kung, 2016), but not on FDI.

In constructing the index, Baker et al. (2016) mainly adopted a narrative approach and utilized the news coverage of policy-related economic uncertainty. They counted the articles appearing in every newspaper containing terms related to economic and policy uncertainty.[8] To meet the criteria for inclusion, each article should contain terms related to the three

[8] For the U.S. index, they refer to the ten largest newspapers: the USA Today, the Miami Herald, the Chicago Tribune, the Washington Post, the Los Angeles Times, the Boston Globe, the San Francisco Chronicles, the Dallas Morning News, the Houston Chronicle, and the Wall Street Journal.

categories of uncertainty, economy, and policy. For example, an article containing the words "uncertain," "Congress," and "economic" meets the criteria.[9]

Figure 1 shows the fluctuations in each country's aggregate FDI inflows in billion USD, along with the evolution of the EPU index over the sample period. Since the EPU index does not always cover the period for which FDI data are available, the availability of the EPU index constrains the sample period of our analysis. The aggregate data, however, does not clearly indicate how policy uncertainty is related to FDI inflows. The average correlation between the two variables is only 0.04, with significant variations across countries, ranging from -0.52 (Greece) to 0.61 (Korea).

This weak unconditional relationship suggests that other confounding factors may mask some theoretical relationship between the two variables. At the aggregate level, all peculiarities of each source country, as well as other global factors, are intermingled, making it difficult to properly separate the push factors from the pull factors, thus confounding our analysis. By exploiting the bilateral data and controlling for the push factors with a constellation of fixed effects, we can better identify the effect of higher domestic policy uncertainty on FDI inflows.

We employ several country-level control variables to capture the macroeconomic environment of the host country, which are motivated by prior research examining determinants of FDI flows at a business cycle frequency (Carstensen and Toubal, 2004; Yeyati et al., 2007; Eicher et al., 2012; Blonigen and Piger, 2014; Julio and Yook, 2016; Azzimonti, 2019; Chen et al., 2019). We obtain the data on the share of government expenditure to GDP, and trade openness measured by the sum of exports and imports over GDP from the World Bank database, and the data on real GDP per capita, GDP growth, the nominal exchange rate, the inflation rate, and the policy rate from the IMF International Financial Statistics. The real effective exchange rate index is taken from the Bank for International Settlements. We take

[9] We downloaded the EPU index (Baker et al., 2016) from www.policyuncertainty.com. The EPU index is based on the national newspaper coverage frequency of policy-related economic uncertainty; this mitigates the concerns mentioned above. Baker et al. (2016) conduct comprehensive searches of newspapers for relevant terms such as "uncertain," "uncertainty," "economic," "economy," and "commerce," and policy-relevant terms such as "central bank," "deficit," "trade policy," and "ministry of finance." For countries other than Australia, Canada, the United Kingdom and the United States, they search for the relevant terms in the native language of the newspapers.

the data on stock market returns, stock market volatility, and exchange rate volatility from Baker et al. (2019)'s database.

For the analysis of the role of financial development in ameliorating the adverse effect of policy uncertainty on FDI, we measure financial development by the bank credit to the private sector as percentages of GDP in line with much of the literature. We also use total bank assets as percentages of GDP for robustness checks. Still, we do not consider alternative measures of financial development such as money stock (M2) as a share of GDP because every host country in our sample is an OECD country. Table 2 presents the summary statistics of the variables used in our analysis.

Table 3 shows the correlation between the main regressors used in the estimation. The EPU index, our measure of policy uncertainty, exhibits a low correlation with most covariates. The correlations are, in general, statistically insignificant—except for real GDP growth and exchange rate volatility—and only modest in its size, suggesting that multicollinearity is unlikely an issue in inferring the effect of policy uncertainty on FDI inflows. However, there exist substantial correlations among other traditional determinants of FDI, which call for caution in interpreting the sign of coefficients on the other covariates.

III. METHODOLOGY

Any empirical analysis of FDI flows should note that the variations in FDI volume reflect the conditions in the host country as well as the country of FDI origin. In our context, ignoring the supply-side factors would bias the estimation results to the extent that the uncertainty in the host country is correlated to those factors. We exploit the bilateral structure of the OECD FDI statistics and control for any time-variant factors in the source country as well as the time-invariant factors for the host-source country pair using fixed effects.

Our identification strategy is similar to that used by Julio and Yook (2016), who examine the effect on FDI inflows of heightened policy uncertainty due to presidential elections in the host country. By limiting their analysis to the FDI flows from the U.S. economy, they effectively control for the supply-side effects and study how the uncertainty created by upcoming elections affects the FDI inflows to these economies. However, they do not exploit large-dimensional bilateral capital flows data as we do.

To gauge the host country's policy uncertainty effect on FDI inflows, we estimate the following equation:

$$fdi_{i,j,t} = \alpha_{i,j} + \alpha_{j,t} + \beta X_{i,t} + \gamma EPU_{i,t} + \varepsilon_{i,j,t}, \tag{1}$$

where our main dependent variable $fdi_{i,j,t}$ denotes the annual bilateral FDI inflows from source country *j* to host country *i* normalized by the lagged nominal GDP in host country *i* (i.e., $fdi_{i,j,t} = \frac{FDI_{i,j,t}}{GDP_{i,t-1}}$).[10] $\alpha_{i,j}$ is the host-source country fixed effect; it controls for any time-invariant factors specific to the country pair, such as distance, common languages, trade agreements, and tax treaties between the two countries,[11] as well as country-level time-invariant factors, such as the legal system and cultural origin. $\alpha_{j,t}$ is the source country-time fixed effect; it controls for any macroeconomic shocks or policy changes affecting the source country, including both external and source country-specific shocks as well as the indirect impact of policy uncertainty through other FDI origin countries. The inclusion of the source country-time fixed effect further maximizes the sample coverage of our analysis, enabling us to circumnavigate data limitation, especially for non-OECD countries.

$X_{i,t}$ is a set of macroeconomic controls in a host country. $EPU_{i,t}$ is the log of the host country EPU index. Given the annual frequency of the data, all regressors enter the equation contemporaneously, which is a common practice in the FDI studies using annual data (e.g., Frenkel et al., 2004; Busse and Hefeker, 2007; Wang and Wong, 2007; Azzimonti, 2019). However, to mitigate any remaining reverse causality concerns running from bilateral FDI inflows to domestic policy uncertainty, we exploit the monthly nature of the original EPU index and use the one-quarter lagged EPU index in the baseline analysis (see, for example,

[10] Instead of taking the log of FDI, we normalize the FDI inflows by nominal GDP to preserve observations with negative values. It is important to note that many observations have negative values at the bilateral level because FDI is measured on a net basis. We test the robustness of this treatment in the following section.

[11] Although factors such as bilateral trade agreements or tax treaties can vary over time, they are likely to be absorbed by the fixed effect owing to their high persistence over time.

Kim and Kung, 2016 for the similar treatment of the EPU index). γ is the coefficient of interest; a negative (positive) γ indicates that economic policy uncertainty reduces (increases) FDI inflows in the host country after controlling for supply conditions in the country of FDI origin and the global factors affecting FDI inflows. Following Abadie et al. (2017), we cluster standard errors at the treatment level, which is at the host country-time levels. We dually cluster standard errors on the host country and year to account for within-country correlation and contemporaneous cross-country correlation in the error term.

Note that our analysis is not limited to the bilateral FDI flows between the 16 OECD countries in the sample, but also covers the bilateral FDI inflows from a large number of non-OECD source countries, including both advanced and developing economies. While estimating the gravity model with the same set of host and source countries more common in the bilateral FDI literature (Bénassy-Quéré et al., 2007; Eicher et al., 2012; Cavallari and D'Addona, 2013; Blonigen and Piger, 2014), we use as many source countries as possible to examine whether the effect of policy uncertainty varies between developed and developing countries.

IV. Empirical Findings

A. Baseline results

Table 4 summarizes the results of baseline regression. Before investigating the policy uncertainty effects on FDI inflows, we show in Column (I) the estimation results of a baseline model without the EPU index. In baseline regression, we control for an extensive set of variables that are purported to affect FDI flows in the literature: real GDP growth, log GDP per capita in USD, trade openness, stock market returns, the policy rate, government spending to GDP ratio, the inflation rate, the bilateral nominal USD exchange rate, the real effective exchange rate (REER), and exchange rate volatility (e.g., Carstensen and Toubal, 2004; Yeyati et al., 2007; Eicher et al., 2012; Julio and Yook, 2016; Chen et al., 2019).

The signs of these variables are mostly consistent with theoretical predictions or previous empirical studies, although some variables are not statistically significant. We provide the interpretation of the statistically significant covariates. First, higher stock market returns are associated with an increase in FDI inflows, which is a mechanical consequence of the definition of FDI flows recorded in the BOP data.[12] Second, high-income countries receive more significant FDI inflows, which is one of the well-known stylized facts about FDI (Blonigen and Piger, 2014). Third, higher inflation that proxies instability of the macroeconomy discourages FDI inflows, which is consistent with many existing studies. A higher government spending share reduces FDI inflows, and this effect appears robust across the specifications. This is likely to capture the practice of government intervention in private investment decisions.

We include the growth of both the nominal exchange rate vis-à-vis USD and the REER, as the two measures capture independent channels through which the exchange rate affects FDI (Kearns and Patel, 2016; Hofmann et al., 2019). Given that a large share of foreign borrowing is denominated in USD, a strong dollar weakens a domestic firm's balance sheet strength, thereby reducing FDI inflows (financial channel). On the other hand, according to the standard trade-channel effect, an increase in the REER reduces FDI inflows through a deterioration in international competitiveness. Our finding that both coefficients are negative and statistically significant supports that both channels are at work. One should note that most of the statistically insignificant covariates are highly correlated with the other variables, as shown in Table 3. For example, real GDP growth is highly correlated with stock market returns. The policy rate is highly correlated with inflation through the Talyor rule-type of monetary policy. Exchange rate volatility is highly correlated with the depreciation of the exchange rate.

Column (II) reports the coefficient on the log EPU index when it enters without any covariates. The effect is negative and highly significant. Column (III) reports the estimation results from controlling for the other covariates. The sign of the EPU coefficient is negative and remains statistically significant at the 1% level even after controlling for the other variables. The sign and significance of the other covariates are largely similar to those in Column (I), which is not surprising given the low correlation between the EPU index and other variables. The magnitude of the coefficient (-0.100) is also economically significant, in that a one-

[12] Among portfolio equity inflows, the investment associated with more than 10% of the ownership of target firms is recorded as FDI flows.

standard-deviation increase in the log EPU index (0.35) leads to a decline in bilateral FDI inflows (as a share of GDP) by as much as 16.5% of its mean (0.21%). We use the specification in Column (III) as a baseline for the rest of the paper.

Our finding that a rise in policy uncertainty in a host country reduces FDI inflows is consistent with the findings of the emerging literature analyzing the role of policy uncertainty in explaining FDI. For example, Julio and Yook (2016) report that during the period just before an election, which is associated with heightened policy uncertainty, the flow of FDI from U.S. firms to foreign affiliates dropped significantly. Azzimonti (2019) analyzes how partisan conflicts on the trade policy affect FDI flows to the U.S. economy. In the international context, taking the timing of national elections as a proxy for policy uncertainty, Chen et al. (2019) show that the aggregate FDI inflows of 126 countries dropped significantly during election years. However, not all studies reach a consensus about the role of policy uncertainty in driving FDI flows. For example, Honig (forthcoming) finds no significant domestic policy uncertainty effect proxied by presidential elections on the aggregate FDI inflows into advanced economies.

B. Robustness checks

In this section, we conduct several sensitivity tests of our main empirical findings. Tables 5 and 6, and Appendix Table A.2 summarize the sensitivity test results.

Controlling for an alternative measure of uncertainty. We use the EPU index constructed by Baker et al. (2016) as a benchmark measure of the government's policy-related uncertainty. Because the EPU index is based on the narrative approach of counting newspaper articles containing words related to the economy, policy, and uncertainty, it is widely considered to capture uncertainty about economic policy. Thus, several recent studies have employed the EPU index along with other financial market-based measures such as the VIX to distinguish the policy uncertainty from the uncertainty of financial markets. As a robustness test, we further control for stock market volatility to confirm that the significant effect we find is not driven by financial market distress.

Appendix Table A.1 presents the correlation between stock market volatility and the EPU index for the 16 countries considered for the baseline analysis. The correlation is far from perfect, except for a few cases. The correlation ranges from -0.36 (Chile) to 0.89 (Mexico); the average is 0.28. Column (I) of Table 5 reports the estimation results when including stock market volatility as an additional control. The inclusion of stock market volatility hardly affects the sign or statistical significance of the EPU coefficient, and the effect of stock market volatility is not statistically significant.

Global financial crisis and its aftermath. As shown in Figure 1, the EPU index rose to an unprecedented level and remained there in most countries during and after the GFC, coinciding with a sharp decline in (aggregate) FDI inflows in many countries. The inclusion of the crisis period and its aftermath might have inflated the policy uncertainty effect on FDI inflows. We check the robustness of our findings by dropping the samples during and after the GFC period (2008–2013). Column (II) shows the results from a specification using only the pre-GFC (1985–2007) samples. One notable change is that the policy rate variable becomes highly statistically significant, suggesting that the low-interest-rate environment in advanced economies since the GFC has weakened the role of the interest rates in explaining FDI inflows. Although the magnitude reduces slightly, the decline in FDI inflows in response to a rise in policy uncertainty is still statistically significant at the 5% level.

Lagged regressors. Regressors have been entered contemporaneously in baseline analysis, given the annual frequency of data. However, some of these regressors might have persistent effects on FDI. To test this possibility, we regress the FDI inflows on a set of lagged regressors, including the EPU index. Column (III) shows that while the effect of slow-moving variables such as real GDP per capita and government spending to GDP is robust, the effect of the rest of the variables tends to become weaker or even switches its sign. This finding suggests that the baseline specification is more appropriate in explaining capital flows at an annual frequency. The coefficient on the EPU index is still negative but not statistically significant in this case.

Maximum uncertainty within a year. Our baseline analysis used the average monthly EPU index value at an annual frequency (with a one-quarter lag). However, using the maximum monthly EPU index value within a year might be more appropriate for our purpose, as the annual frequency of data smooths out much of the variation in the EPU index. Column (IV) shows that our main findings hold with this alternative measure.

Alternative standard error clustering. Standard errors in the baseline analysis are clustered at the host country-time level following Abadie et al. (2017). In Column (V), we confirm that our results are similar when clustering standard errors at the host-source country level.

Alternative construction of the dependent variable. We test the robustness of our findings by applying different treatments of zero or negative values in the data. For various reasons, there are many zero values in FDI observations. The treatment of zero values in trade flows across a pair of countries is a long-standing issue in the trade literature (e.g., Silva and Tenreyro, 2006; Helpman et al., 2008). The trade literature often drops zero values by taking the log of trade flows and estimating log-linearized models. Following standard in the empirical literature, we have dropped those zero values in the baseline estimation. However, as 43 percent of FDI inflow values are zero in our data, the validity of our analysis crucially hinges on the proper treatment of the zero observations. To the extent to which the presence of those zero values is systematic and due to factors that cannot be captured by our regression, our results would be biased.

In a seminal paper, Silva and Tenreyro (2006) have shown that the standard practice of estimating log-linearized models using OLS could result in highly misleading conclusions about trade elasticities in the gravity equation and proposed a simple PPML estimation technique as an alternative. Besides being consistent in the presence of heteroskedasticity, this method also provides a natural way to deal with zero values of the dependent variable. Unfortunately, we cannot adopt the PPML estimation method to FDI inflows, as we have many country-year observations with negative values. This negative value issue presents another difficulty, which does not exist when estimating trade flows.

The presence of negative values arises from the fact that FDI is reported on a net basis, so negative values occur when disinvestment is larger than investment for a particular country pair in a specific year. Simply dropping negative values can induce significant bias in the estimation when using bilateral FDI data.[13] To resolve this issue, we use inward FDI positions instead of inflows (also normalized by the lagged nominal GDP) when applying the PPML estimation. As we are interested in the cyclical fluctuations of FDI, the flow variable better serves our purpose. However, using the stock variable allows for circumventing the negative value issue and enables to apply the PPML estimation. Because there is no perfect solution to the inherent data issue in FDI, we try several alternative constructions of the dependent variable to check how they affect the estimation results.

First, we include the observations with zero FDI inflows in the estimation and include an indicator for zero trade flows as an additional regressor to allow zero and non-zero observations to behave differently.[14] The presence of many zero values would go against find any significant effect of policy uncertainty on FDI, inducing a downward bias in the estimates. Although this treatment is far from ideal, it would offer some lower-bound effect of policy uncertainty. Column (I) in Table 6 indeed confirms the case.

Second, we use inward FDI positions instead of inflows. Before the PPML estimation, we estimate the new dependent variable using OLS with fixed effects to check whether our main findings can be extended to the stock variable. As we now measure the level of FDI rather than its cyclical variation, it might not be surprising that some covariates switch their sign or significance. Nevertheless, Column (II) shows that the adverse effect of policy uncertainty is preserved when using the FDI stock variable. Following Magee (2008), Liu (2009), and Cheong et al. (2015), we use a conditional Poisson pseudo-maximum likelihood (CPPML) estimator to incorporate additional host-source country fixed effects into the PPML estimator.[15] However, the CPPML estimator does not converge when we further control for source country-time fixed effects, probably because the number of dummy variables is too large. Thus, we control for time fixed effects instead of source country-time fixed effects to circumvent the convergence issue. Although the identification becomes weaker in this case, Column (III)

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[13] 23.7% (2.0%) of total observations are negative for non-zero bilateral (aggregate) FDI inflows in the sample.

[14] The zero-value dummy is also included throughout the other exercises when using zero observations.

[15] Note that our dataset includes a time dimension, whereas the dataset used by Silva and Tenreyro (2006) does not.

shows that domestic policy uncertainty still discourages inward FDI when using the CPPML estimator.

Third, following Busse and Hefeker (2007), Yeyati et al. (2007), and Azzimonti (2019), we consider a log transformation of the dependent variable, preserving negative FDI inflows: $fdi^{*}_{i,j,t} = \ln(FDI_{i,j,t} + \sqrt{1 + FDI^{2}_{i,j,t}})$. By employing this method, we maintain the sign of FDI inflows. The values of FDI inflows pass from a linear scale at small absolute values to a logarithmic scale at large values. Although the size of coefficients cannot be directly compared, the estimation results shown in Column (IV) are mostly consistent with the baseline results.

Lastly, following Julio and Yook (2016), we normalize the FDI flows by the lagged FDI position at the bilateral level: $fdi^{*}_{i,j,t} = \frac{FDI_{i,j,t}}{Position_{i,j,t-1}}$. However, the danger in not normalizing FDI inflows by GDP is that episodes of sizeable FDI growth from a small base can appear large without being economically meaningful.[16] Column (V) shows that the negative effect of policy uncertainty is preserved, whereas many of traditional FDI determinants become statistically insignificant in this case.

Treatment of outliers. In the baseline analysis, we control for outliers by dropping the top and bottom 1% of the dependent variable. For robustness checks, we use several alternative thresholds and winsorize the dependent variable. Columns (II) through (IV) of Table A.2 in Appendix summarize the results using two different ways to control for outliers at the 1% and 2.5% threshold levels, respectively. Under all specifications, our qualitative results are robust and not sensitive to different ways of treating outliers.

C. Subsample analysis

OECD vs. non-OECD source countries. We have included FDI inflows into the 16 host OECD countries from both OECD and non-OECD countries for comprehensive analysis. However, the literature finds that determinants of FDI from/to developing economies differ from those of FDI from/to advanced economies. For example, Davies et al. (2018), using a

[16] This issue is unlikely a problem in Julio and Yook (2016), as they focused only on FDI from the United States.

large FDI transaction-level dataset, find that patterns in M&A and greenfield investment across country groups, as well as their determinants, are quite different. Davies et al. (2018) document that the North to South flows are dominant in accounting for greenfield FDI worldwide, whereas the North to North flows are more common in global cross-border M&A FDI.

While both M&A activity and greenfield investment seek out large markets with low international barriers, the former is more sensitive to temporary shocks and more affected by host country factors such as financial development. Greenfield investment, on the other hand, is relatively more driven by factors such as a comparative advantage in source countries and destination taxes. Although which type of FDI is more vulnerable to host-country policy uncertainty is not *ex-ante* clear,[17] it would be an interesting empirical exercise to test their relative sensitivity to policy uncertainty.

Unfortunately, our data do not allow for disaggregation of FDI inflow data into M&A activity and greenfield FDI, so we cannot directly test this hypothesis. Nevertheless, because types of FDI are, to some extent, systematically related to the relative level of economic development between a host and source country, we test whether the effect of domestic policy uncertainty on FDI inflows differs across source countries by estimating equation (1) for two subsamples. Because all host countries are OECD countries, we divide source countries into OECD and non-OECD countries, which represent advanced and developing economies, respectively.

As shown in Table 7, the determinants of bilateral FDI inflows are indeed quite different between the two subsamples. Some regressors switch their sign across the subsamples and, if anything, they are more precisely estimated in the OECD sample, which is consistent with Wang and Wong (2007). For example, GDP per capita, inflation rate, government spending to GDP, and REER are no longer statistically significant in the non-OECD sample. Among others, the lack of significance of international cost competitiveness proxied by REER,

[17] It is reasonable to expect that they are sensitive to the kind of uncertainty particular to each activity. For example, M&A investment is more sensitive to policy uncertainty about taxing on investment income, while greenfield investment is more sensitive to policy uncertainty about local labor market regulations or trade policy. However, the EPU index does not distinguish among specific types of policy uncertainty.

together with a positive effect of nominal exchange rate volatility, for the non-OECD sample implies that the type of FDI inflows from the two groups of countries might differ. However, one should take caution when interpreting these results because measurement errors in FDI flow data are likely to be more severe for the non-OECD sample, working against finding any significant effects.

Nevertheless, the adverse effect of policy uncertainty remains statistically significant for both groups. Although the magnitude of the point estimate appears much larger for the OECD sample, this does not necessarily translate into a stronger effect of policy uncertainty on FDI flows from advanced economies because the relative size of bilateral FDI inflow to GDP is much larger in the OECD sample (on average, 0.55 percent) than the non-OECD sample (on average, 0.04 percent). A one standard deviation increase in the log of the EPU index reduces 12.8 percent of bilateral FDI inflows from OECD countries, while it decreases 30.8 percent of bilateral FDI inflows from non-OECD countries.

Host vs. source country policy uncertainty. Our analysis so far has focused on policy uncertainty only as a pull factor of FDI and ignored its relevance as a push factor because source country-time fixed effects absorb any push factor. Our choice of the model specification is primarily driven by limited cross-country data availability on economic policy uncertainty. However, policy uncertainty could still be a push factor, and its effect on FDI is unclear *ex-ante*. For example, higher policy uncertainty in a source country might encourage FDI outflows because firms substitute domestic investment with foreign investment. At the same time, an increase in domestic policy uncertainty could discourage a firms' investment regardless of its destinations.

Moreover, the effect of policy uncertainty on FDI could be nonlinear. For example, for investment location decisions of MNCs, the so-called "distance" channel of uncertainty might be relevant. Even if the economic policy in a particular destination country is perceived to be uncertain, a firm's foreign investment toward this country might be less affected when the firm is already subject to high policy uncertainty at home. In contrast, when the domestic economic policy is stable and predictable, a firm might not even tolerate a low level of policy uncertainty in the destination country. This kind of reasoning has been used in the FDI literature to analyze the effect of the so-called "corruption distance" (e.g., Habib and Zurawicki, 2002; Wu, 2006; Qian and Sandoval-Hernandez, 2016) and differs from simply comparing the size of individual effects of the host and source country policy uncertainty. For example, in addition to the level of corruption in source or host countries, the distance between the level of corruption in the two countries could discourage FDI because of additional costs to adopt firms into a new environment and this effect could also be asymmetric depending on whether a firm is located in transparent or corrupt countries.

We first investigate the role of policy uncertainty in source country as a push factor of FDI by limiting our sample to a group of source countries where the EPU index is available. In other words, we now focus only on the bilateral FDI flows between the 16 OECD countries. For this exercise, we replace source country-time fixed effects with time fixed effects and include source country-level control variables to assess the role of source country policy uncertainty independently. We estimate the following equation:

$$fdi_{i,j,t} = \alpha_{i,j} + \alpha_t + \beta_1 X_{i,t} + \beta_2 X_{j,t} + \gamma_1 EPU_{i,t} + \gamma_2 EPU_{j,t} + \varepsilon_{i,j,t}, \qquad (2)$$

where α_t is a time (year)-fixed effects; $X_{j,t}$ is a set of source country control variables; $EPU_{j,t}$ is the source country-specific EPU index.[18] This specification is similar to Wang (2018), who analyzes the role of stock market volatility in bilateral cross-border banking flows.

Following Wu (2006), we then test the distance channel of policy uncertainty by including the absolute difference in the EPU index between host and source country pairs. Because the source country EPU index does not enter the equation independently, we include source country-time fixed effects for a conservative setup as before. We further include the interaction between the source country EPU index and the distance measure to investigate whether the distance effect varies with the uncertainty level in the source country, which is our ultimate interest. We estimate the following equation:

[18] We are interested the sign and statistical significance of the coefficients γ_1 and γ_2 rather than the size of point estimates of the coefficients. Thus, even if our econometric model was misspecified, for example because of non-linearities, the resulting bias would not necessarily affect our main conclusion.

$$fdi_{i,j,t} = \alpha_{i,j} + \alpha_{j,t} + \beta_1 X_{i,t} + \beta_2 EPU_{i,t} + (\gamma_1 + \gamma_2 EPU_{j,t}) DISTEPU_{i,j,t} + \varepsilon_{i,j,t}, \quad (3)$$

where $DISTEPU_{i,j,t} = \left|EPU_{i,t} - EPU_{j,t}\right|$. On top of a conventional channel of host country uncertainty captured by β_2, γ_1 would indicate whether FDI inflows are relatively larger when two countries face a similar level of policy uncertainty. More importantly, γ_2 tests the possibility that the distance effect is absent when a source country is already subject to high policy uncertainty.

Columns (I) to (III) in Table 8 summarize the results from estimating equation (2) by varying the scope of control variables. We do not report the coefficients of all control variables to save space. Despite a substantially smaller sample size compared to the baseline analysis, higher policy uncertainty in host countries robustly reduces FDI inflows from the same set of source countries. Although it loses statistical significance under the full set of control variables in Column (III), source country policy uncertainty also appears to decrease FDI. Our finding suggests that policy uncertainty is both a negative pull and push factor, and there is no evidence supporting the substitution effect from domestic to foreign investment in response to higher policy uncertainty at home.[19]

Columns (IV) to (VI) show the results from estimating equation (3). The specification in Column (IV) is the same as the baseline model (Column (III) in Table 4) except that the dimension of source countries is heavily reduced. The result confirms that higher policy uncertainty in a host country still discourages FDI inflows in the limited sample. When the distance measure is introduced in Column (V), this term is statistically insignificant, whereas the coefficient of host country policy uncertainty is not affected significantly. Although this finding implies that there is no unconditional uncertainty distance channel, the statistically significant coefficient on γ_2 indicates that the distance effect varies with the level of policy uncertainty in the source country. The uncertainty distance effect only exists when policy uncertainty in the source country is low. In other words, foreign investment decisions by MNCs

[19] Relative substitution effect might still be present (i.e., a smaller reduction in foreign investment than domestic investment).

are less sensitive to the relative policy uncertainty between the two countries when domestic economic policy is already uncertain enough.

D. Role of financial development

A large amount of literature has focused on the importance of financial development in relation to investment and economic growth (King and Levine, 1993; Levine et al., 2000). The literature claims that by diversifying the risks of low returns and providing liquidity, a developed financial system alleviates investors' anxiety about their uncertain future liquidity needs and the possibility of failing projects, thus contributing to achieving a more favorable environment for investment and economic growth. Regarding FDI, Di Giovanni (2005) and Hattari and Rajan (2009) document that the size of financial markets is associated with the volume of FDI flows.

In related literature, Hermes and Lensink (2003), Alfaro et al. (2004), and Desbordes and Wei (2017) report that a developed financial system plays a crucial role in enhancing the positive effect of FDI on economic growth. When it comes to the literature on uncertainty, Carrière-Swallow and Céspedes (2013), Choi et al. (2018), and Karaman and Yıldırım-Karaman (2019) using cross-country data find that less-developed financial markets amplify the adverse effect of uncertainty on domestic investment. We investigate the role of financial development in ameliorating the adverse effect of policy uncertainty on FDI inflows by including the interaction term between the host country EPU and a measure of financial development.

Of the several financial development measures, we consider domestic private credit to GDP ratio, as it is the most widely-used measure in relevant studies (Demetriades and Hussein, 1996; Hermes and Lensink, 2003; Alfaro et al., 2004; Desbordes and Wei, 2017) and consistently available for the 16 host countries we consider. As with equation (3), we estimate the following regression with an interaction term:

$$fdi_{i,j,t} = \alpha_{i,j} + \alpha_{j,t} + \beta_1 X_{i,t} + \beta_2 FD_{i,t-1} + (\gamma_1 + \gamma_2 FD_{i,t-1}) EPU_{i,t} + \varepsilon_{i,j,t}, \qquad (4)$$

where $FD_{i,t}$ indicates financial development measured by the value of bank credit to the private sector as percentages of GDP. We include financial development as an independent regressor, motivated by Di Giovanni (2005) and Hattari and Rajan (2009). Following Desbordes and Wei (2017), we lag this variable by one year to reduce any potential simultaneity bias, and we adopt a logarithmic transformation to attenuate the influence of outlying values. Domestic private credit to GDP ratio varies a lot across countries and time with a mean value of 111% and a standard deviation of 50%.

We first estimate equation (4) without an interaction term to measure the independent effect of financial development on FDI that is captured by β_2. Consistent with the existing studies, we find a positive and statistically significant effect of financial development on FDI inflows in Column (I) in Table 9. We then estimate equation (4) with an interaction term to investigate whether financial development mitigates the adverse effect of domestic policy uncertainty on FDI inflows. Column (II) shows that the coefficient of the interaction term is positive and statistically significant at the 5% level, suggesting the possibility of financial deepening in moderating the adverse effect of policy uncertainty.

The specification used above only captures the effect of financial development that is identified from the within-country variation due to the inclusion of host-source country fixed effects. However, one might be interested in the financial development effect identified from the cross-sectional variation in the data, which bears independent policy implications. To capture this effect, we drop host-source country fixed effects and use the average value of financial development instead. Column (III) shows that the mitigating effect of financial development is indeed larger in this case. The size of the interaction term indicates the mitigating effect of as much as a 23.2 percent of the decline in bilateral FDI inflows given the one standard deviation increase in policy uncertainty if a country achieves the average level of financial development in New Zealand (top 25% of the distribution) from that in Greece (bottom 25% of the distribution). As a further robustness check, we report in Column (IV) the estimation results of equation (4) with total bank assets to GDP ratio—a broader measure of financial development—substituting domestic private credit to GDP ratio.[20]

[20] The total bank assets include credit to broader sectors, such as households, nonprofit institutions, nonfinancial corporations, state and local governments, and social security funds.

Desbordes and Wei (2017) find that financial development in the host, as well as the source country, is an important determinant of FDI. Even if policy uncertainty in the host country is an obstacle for foreign investment by MNCs, well-developed financial markets in the home country might mitigate the adverse effect of destination uncertainty. For a comprehensive understanding of financial development as a relevant channel, it is necessary to analyze the role of source country financial development. We include the interaction term between host-country policy uncertainty and (lagged) financial development in the source country on top of the original interaction term and estimate the following equation:

$$fdi_{i,j,t} = \alpha_{i,j} + \alpha_{j,t} + \beta_1 X_{i,t} + \beta_2 FD_{i,t-1} + (\gamma_1 + \gamma_2 FD_{i,t-1} + \gamma_3 FD_{j,t-1}) EPU_{i,t} + \varepsilon_{i,j,t}, \quad (5)$$

where both γ_2 and γ_3 are our main interest. The identification of γ_3 is more precise than γ_2 in the sense that source country-time fixed effects absorb both observable and unobservable time-varying source country factors affecting FDI. Column (V) shows that both both γ_2 and γ_3 are positive and statistically significant when they enter the estimation simultaneously. Thus, financial development in the source country is also an important factor mitigating the adverse effect of the host country's policy uncertainty on FDI.

Lastly, we test the so-called "finance distance" channel in line with the previous section by including an additional term capturing the distance in financial development between a pair of countries and investigating whether the interaction term between the distance measure and host country policy uncertainty is significant. Similar to the exercise in the previous section, we estimate the following equation:

$$\begin{aligned} fdi_{i,j,t} = \alpha_{i,j} + \alpha_{j,t} + \beta_1 X_{i,t} + \beta_2 FD_{i,t-1} + \beta_3 DISTFD_{i,j,t-1} \\ + (\gamma_1 + \gamma_2 FD_{i,t-1} + \gamma_3 DISTFD_{i,j,t-1}) EPU_{i,t} + \varepsilon_{i,j,t}, \end{aligned} \quad (6)$$

where $DISTFD_{i,j,t} = \left| FD_{i,t} - FD_{j,t} \right|$. However, Column (VI) shows that neither β_3 nor γ_3 is significant, suggesting that the distance between financial development in each country is not an additional factor affecting FDI once each country's financial development is accounted for.

E. Election timing as an instrument for policy uncertainty

The use of bilateral FDI data in our analysis largely alleviates a reverse causality issue. However, our findings might be subject to the endogeneity problem in that the policy uncertainty increases in response to macroeconomic development that is not captured by choice of our control variables, and this unobservable factor could affect FDI inflows simultaneously (i.e., omitted variable bias). To alleviate this concern, we instrument the EPU index using the timing of host country's "exogenous" elections—that is, those that cannot be called at the discretion of the government—because the timing of these elections is pre-determined irrespective of the development of the economy, including policy uncertainty.

Most existing studies using election timing as a determinant of FDI treat the level of uncertainty surrounding each election the same (Julio and Yook, 2016; Chen et al., 2019; Honig, forthcoming). While this is not an issue for identification purposes, it can be a significant drawback from a measurement standpoint (Gulen and Ion, 2016). We instead consider election timing as an instrument for the EPU index to draw more comprehensive implications. The election timing data is taken from Ahir et al. (2019), which is based on the dataset of Bormann and Golder (2013) and other sources.[21] We use both the legislative and presidential election dates as an instrument and estimate a two-stage least squares (2SLS) model. As such, we effectively estimate the effect of the variation in the EPU index that is driven by the timing of elections.

The election timing must satisfy two conditions for a valid instrument. The first condition, instrument relevance, is that the timing of elections should be correlated with the changes in economic policy uncertainty. The existing theoretical and empirical literature suggests that this condition is likely satisfied (De Figueiredo, 2002; Julio and Yook, 2012; Gulen and Ion, 2016). To formally test whether the instrument satisfies this condition, we report Cragg-Donald Wald F-statistics for weak identification. Weak identification is rejected across specifications.

The second condition for valid instruments is the exclusion restriction: the timing of elections should not be correlated with the error term in the second stage regression,

[21] See Ahir et al. (2019) for further details on a variety of sources.

conditional on the other controls. However, we cannot fully rule out the possibility that national elections may be called early by the national leader or legislative body. Early elections raise the possibility that election timing may be correlated with economic conditions and cause a bias in our estimates of the election effects.[22] To guard against this possibility, we only consider a subset of elections that can be regarded as exogenous. We only use elections that are specified by electoral law and cannot be dissolved before the expiry of the government full term. 74 elections satisfy this condition during the sample period. The inclusion of the array of host-country variables and the constellation of fixed effects, as well as the results of overidentification tests reported below mitigate any remaining endogeneity concern.

Column (I) of Table 10 summarizes the IV regression results when only the level of the EPU index is instrumented by the exogenous election timing. These election dates seem to be a valid instrument for policy uncertainty. Kleibergen and Paap (2006) rank statistic does reject the null hypothesis of under-identification. While the standard rule of thumb is that an F-statistic below 10 indicates a potential problem with instrumental relevance (Staiger and Stock, 1997), the Cragg and Donald F-statistic is 14.490, exceeding the threshold, indicates the relevance of our instrument. Moreover, an overidentifying restrictions test using the Hansen J-statistic cannot reject the null hypothesis because the p-value is 0.210. The finding that a rise in domestic policy uncertainty reduces FDI inflows holds in the IV regression as well.

We extend the instrument variable framework for re-evaluating the role of financial development in mitigating the adverse effect of domestic policy uncertainty on FDI inflows. Following Karaman and Yıldırım-Karaman (2019), we also treat the mechanism of interest—the interaction term between financial development and policy uncertainty—as endogenous and include the interaction terms between financial development and the exogenous election timing in the instrument set (Wooldridge, 2010). Column (II) reports the estimation results when the interaction term between lagged financial development and policy uncertainty is

[22] For example, the unprecedented level of uncertainty surrounding political decisions regarding the Brexit has led the U.K. prime minister May to call a snap general election.

instrumented using the timing of exogenous elections. The IV regression result confirms the OLS result of the ameliorating effect of financial development.

V. Conclusion

This paper contributes to the rapidly growing literature on the link between uncertainty, international capital flows, and firms' investment decisions. In contrast to most prior studies focusing on uncertainty as a global push factor of capital flows, we exploit the bilateral structure of the OECD FDI data to control for shocks affecting the economic conditions in both host and source countries, thereby better identify the role of host country policy uncertainty as a pull factor of FDI inflows.[23]

The results suggest that higher policy uncertainty in the host country robustly reduces FDI inflows. Unlike previous studies using an election timing dummy as a proxy for uncertainty, we capture the time-varying intensity of policy uncertainty using the EPU index. We then use election timing as an instrument to mitigate any remaining endogeneity concerns and confirm our baseline findings. To further shed light on the channel through which heightened policy uncertainty in the host country reduces FDI inflows, we analyze the role of financial development. We find that the adverse effect is ameliorated in a host country with developed financial markets, indicating important policy implications for securing financial stability and robust growth during the era of heightened policy uncertainty worldwide.

While domestic policy uncertainty has negative effects on FDI inflows from both advanced and developing economies, we find that its quantitative importance is different. Compositional differences between cross-border M&A activity and greenfield investment in FDI across income groups suggested by Lane and Milesi-Ferretti (2000) and Davies et al. (2018) might be the factor behind this heterogeneity. Still, existing theoretical or empirical studies are silent about the asymmetric effect of policy uncertainty on M&A activity and

[23] While the literature has recently focused on the effect of global uncertainty on international capital flows, only a few studies have used country-specific uncertainty to explain the pattern of bilateral capital flows (Gourio et al., 2015; Wang, 2018; Choi and Furceri, 2019).

greenfield investment. Investigating this mechanism would be a fruitful direction for future research.

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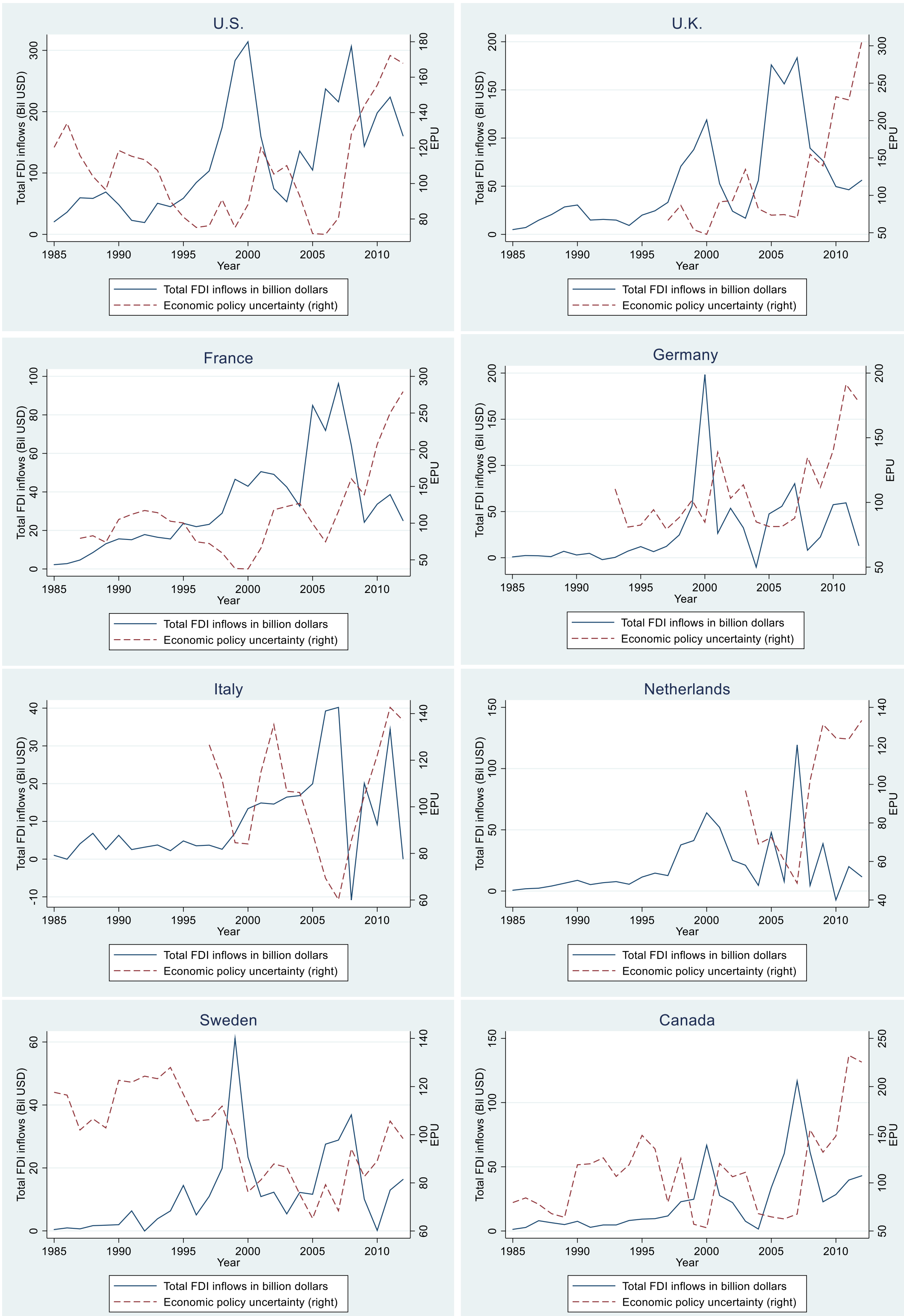
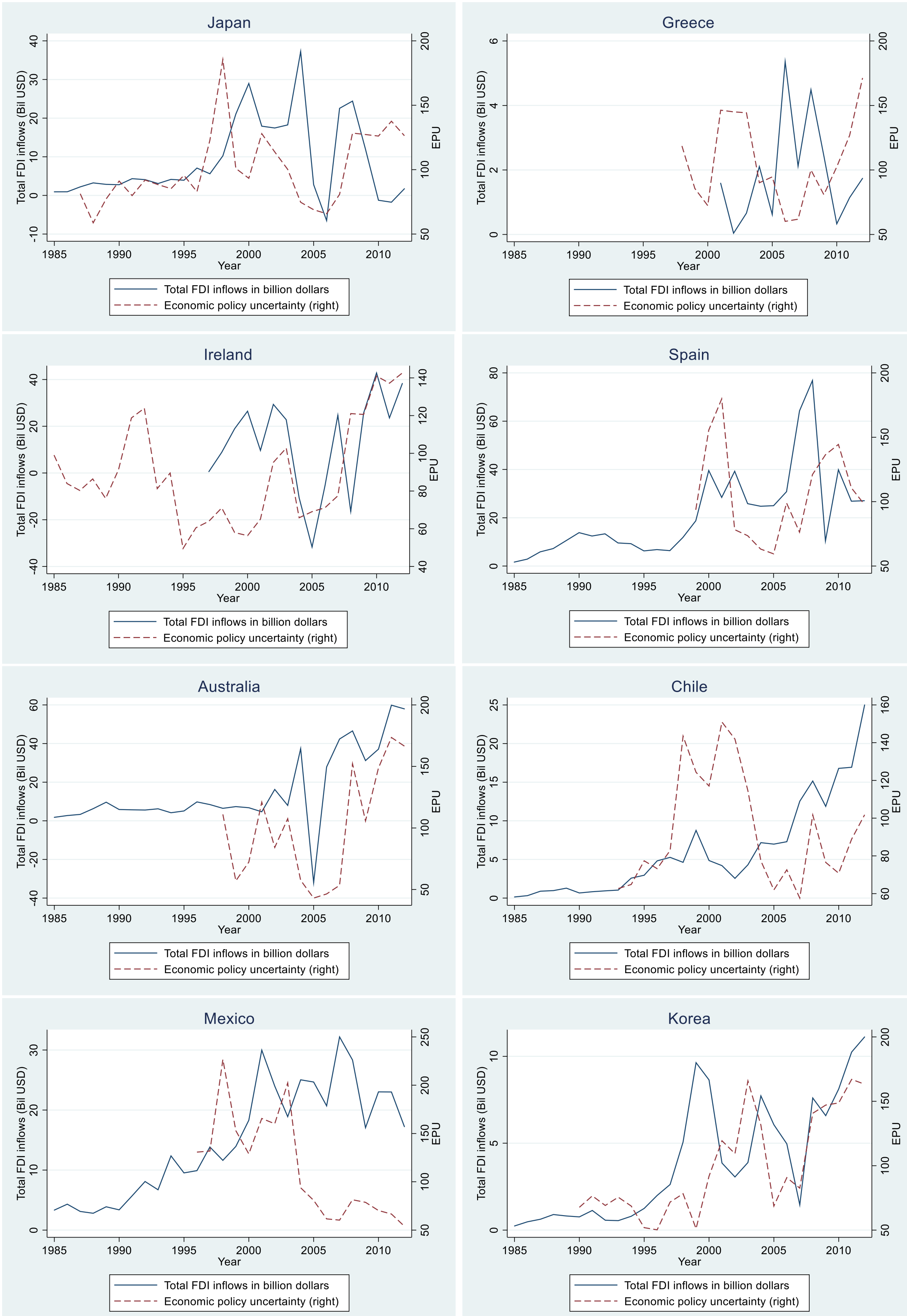
Figures and Tables

Figure 1. Aggregate FDI inflows and economic policy uncertainty in 16 countries





Note: The left axis shows aggregate FDI inflows in billion USD, while the right axis shows the EPU index.

Table 1. FDI inflow summary statistics

Country	(I) Aggregate flows ($ millions)	(II) Aggregate flows/lagged GDP	(III) Bilateral flows ($ millions)	(IV) Bilateral flows/lagged GDP
Australia	25,085.42	9.31	1,269.74	0.72
	(24,933.93)	(7.69)	(4,783.30)	(1.92)
Canada	24,469.39	7.51	5,195.33	0.30
	(26,557.01)	(5.89)	(8,484.91)	(1.56)
Chile	16,606.73	10.69	343.09	0.59
	(4,352.65)	(8.18)	(1,002.24)	(2.04)
France	38,317.15	5.36	493.58	0.10
	(22,743.46)	(5.00)	(2,054.13)	(0.58)
Germany	40,165.09	5.23	686.92	0.14
	(45,279.13)	(5.78)	(3,685.95)	(0.76)
Greece	1,913.06	9.13	32.05	0.08
	(1,694.90)	(8.40)	(2,52.69)	(0.96)
Ireland	13,006.33	42.76	180.98	0.95
	(24,632.22)	(78.19)	(3,042.93)	(3.09)
Italy	15,867.89	4.91	166.57	0.06
	(14,113.78)	(5.42)	(1,850.10)	(0.50)
Japan	9,657.37	0.69	368.35	0.03
	(10,893.60)	(1.54)	(1,727.11)	(0.18)
Korea	6,037.93	3.90	76.78	0.05
	(2,985.03)	(4.30)	(336.77)	(0.30)
Mexico	18,866.89	8.46	271.10	0.18
	(6,132.23)	(5.06)	(1,488.88)	(1.13)
Netherlands	27,449.32	6.00	318.04	0.42
	(38,631.93)	(7.62)	(3,065.85)	(1.87)
Spain	34,564.17	4.75	1472.29	0.54
	(19,268.03)	(8.25)	(4,709.09)	(2.03)
Sweden	13,183.47	8.06	494.03	0.90
	(13,702.75)	(7.47)	(1,991.67)	(2.66)
United Kingdom	84,027.29	11.55	2,118.83	0.42
	(52,312.53)	(6.94)	(7,798.76)	(1.66)
United States	127,446.20	3.80	2,639.14	0.05
	(89,569.40)	(2.70)	(8,256.85)	(0.29)
Average	31,041.48	6.84	1,007.93	0.34
Standard deviation	32,149.07	2.88	1,352.19	0.30

Note: Columns (I) and (III) measure the aggregate and bilateral FDI inflows into each host country in a million USD. Columns (II) and (IV) normalize the aggregate and bilateral FDI inflows by the nominal GDP of the last year. The sample covers the period from 1985 to 2013, and the numbers in parentheses denote standard deviations.

Table 2. Descriptive statistics

Variables	Mean	Median	Std. Dev.	Min	Max
EPU index	108.69	102.89	40.07	34.77	283.86
Real GDP growth (%)	2.32	2.61	2.71	-9.18	9.61
Stock market returns (%)	5.14	9.07	21.90	-60.93	54.67
Log GDP per capita ($)	34,476.12	36,699.74	11,318.39	8,109.19	54,020.12
Trade openness (%)	42.06	41.74	20.37	13.31	148.07
Inflation rate (%)	2.80	2.34	2.81	-2.00	15.93
Policy rate (%)	4.83	4.06	4.79	0	26.89
Government spending to GDP (%)	18.03	18.25	4.36	8.11	27.60
Bilateral USD exchange rate (%)	0.22	-0.63	8.97	-19.56	39.20
Real effective exchange rate (%)	-0.05	0.40	6.14	-22.26	15.95
Exchange rate volatility (%)	2.30	2.26	0.83	0.32	5.89
Stock market volatility (%)	19.65	18.29	7.59	7.91	46.02
Bank private credit to GDP (%)	111.45	102.53	50.83	14.77	221.88
Bank total assets to GDP (%)	146.74	140.15	49.34	23.58	258.26

Note: There are 16 host countries in the sample, which covers from 1985 to 2013. A positive value on the bilateral USD exchange rate denotes nominal depreciation of the domestic currency vis-à-vis USD, while a positive value on the real effective exchange rate denotes real appreciation of the domestic currency against its trade partners.

Table 3. Correlation between main regressors

	EPU	Real GDP growth	Stock market returns	GDP per capita	Trade openness	Inflation rate	Policy rate	Gov. spending to GDP	Bilateral USD exchange rate	Real effective exchange rate	Exchange rate volatility
EPU	1										
Real GDP growth	-0.296*	1									
Stock market returns	-0.113	0.405*	1								
GDP per capita	-0.003	-0.215*	-0.049	1							
Trade openness	-0.012	0.012	-0.034	0.032	1						
Inflation rate	0.070	0.183*	0.007	-0.558*	0.008	1					
Policy rate	-0.091	0.218*	0.036	-0.572*	-0.058	0.803*	1				
Gov. spending to GDP	0.109	-0.341*	-0.008	0.535*	0.280*	-0.344*	-0.280*	1			
Bilateral USD exchange rate	-0.004	-0.155*	-0.080	-0.124*	0.027	0.140*	0.166*	-0.025	1		
Real effective exchange rate	-0.071	0.202*	-0.015	-0.071	-0.007	0.153*	0.111	-0.146*	-0.457*	1	
Exchange rate volatility	0.133*	-0.352*	-0.219*	0.069	0.025	-0.086	-0.121	0.061	0.226*	-0.221*	1

Note: A positive value on the bilateral USD exchange rate denotes nominal depreciation of the domestic currency vis-à-vis USD, while a positive value on the real effective exchange rate denotes real appreciation of the domestic currency against its trade partners. * indicates a 5% significance level.

Table 4. Baseline results

	Bilateral FDI inflows		
	(I) Without EPU	(II) EPU only	(III) Baseline
EPU		-0.114***	-0.100***
		(0.042)	(0.034)
Real GDP growth	-0.006		-0.008
	(0.007)		(0.008)
Stock market returns	0.002***		0.002***
	(0.001)		(0.001)
GDP per capita	0.609***		0.581***
	(0.188)		(0.183)
Trade openness	0.001		0.001
	(0.002)		(0.002)
Inflation rate	-0.034**		-0.022*
	(0.013)		(0.011)
Policy rate	0.011		0.004
	(0.007)		(0.007)
Government spending to GDP	-0.064***		-0.053**
	(0.023)		(0.021)
Bilateral USD exchange rate	-0.015***		-0.016***
	(0.004)		(0.004)
Real effective exchange rate	-0.005***		-0.005**
	(0.002)		(0.002)
Exchange rate volatility	0.023		0.028
	(0.019)		(0.019)
Host-source fixed effect	Yes	Yes	Yes
Source-time fixed effect	Yes	Yes	Yes
Observations	13,776	13,776	13,776
Adjusted R-squared	0.285	0.268	0.285

Note: The dependent variables are the bilateral FDI inflows normalized by the lagged GDP. Heteroskedasticity-robust standard errors in parentheses. Standard errors are clustered at the host country-time levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level.

Table 5. Robustness checks

	Bilateral FDI inflows				
	(I) Including SMV	(II) Before GFC	(III) Lagged regressors	(IV) Max EPU	(V) Standard errors
EPU	-0.106***	-0.089**	-0.044	-0.089**	-0.100***
	(0.035)	(0.044)	(0.031)	(0.038)	(0.032)
Real GDP growth	-0.006	0.011	0.006	-0.008	-0.008
	(0.007)	(0.011)	(0.004)	(0.007)	(0.006)
Stock market returns	0.002***	0.002**	-0.001**	0.002***	0.002***
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
GDP per capita	0.582***	0.856**	0.543***	0.584***	0.581***
	(0.183)	(0.331)	(0.168)	(0.185)	(0.151)
Trade openness	0.001	0.004	-0.002	0.001	0.001
	(0.002)	(0.004)	(0.001)	(0.002)	(0.002)
Inflation rate	-0.021*	-0.018	-0.023**	-0.023**	-0.021
	(0.011)	(0.017)	(0.009)	(0.010)	(0.013)
Policy rate	0.004	0.012**	-0.006	0.005	0.004
	(0.007)	(0.005)	(0.007)	(0.007)	(0.006)
Government spending to GDP	-0.051**	-0.029	-0.062***	-0.058***	-0.053***
	(0.021)	(0.027)	(0.019)	(0.021)	(0.016)
Bilateral USD exchange rate	-0.015***	-0.019***	0.000	-0.015***	-0.016***
	(0.004)	(0.004)	(0.001)	(0.004)	(0.002)
Real effective exchange rate	-0.005**	-0.005	-0.010***	-0.005 ***	-0.005***
	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)
Exchange rate volatility	0.022	0.077**	-0.006	0.028	0.028
	(0.020)	(0.033)	(0.021)	(0.019)	(0.020)
Stock market volatility	0.045				
	(0.032)				
Host-source fixed effect	Yes	Yes	Yes	Yes	Yes
Source-time fixed effect	Yes	Yes	Yes	Yes	Yes
Observations	13,776	8,872	12,629	13,776	13,776
Adjusted R-squared	0.285	0.343	0.267	0.285	0.285

Note: The dependent variables are the bilateral FDI inflows normalized by the lagged GDP. Heteroskedasticity-robust standard errors in parentheses. Standard errors are clustered at the host country-time levels except for column (V). *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level.

Table 6. Alternative construction of dependent variables

	(I) Including zeros	(II) Use FDI position, including zeros (OLS)	(III) Use FDI position, including zeros (PPML)	(IV) Busse and Hefeker (2007) transformation	(V) Normalized by lagged FDI position
EPU	-0.025**	-0.134***	-0.069*	-0.131*	-14.000*
	(0.009)	(0.037)	(0.037)	(0.072)	(7.724)
Real GDP growth	-0.005***	-0.002	0.024***	-0.077***	-1.823
	(0.002)	(0.005)	0.006	(0.019)	(1.504)
Stock market returns	0.000	0.000	0.001	0.009***	0.072
	(0.000)	(0.000)	(0.001)	(0.002)	(0.133)
GDP per capita	0.253***	0.420*	-0.487	0.914	-36.773
	(0.073)	(0.229)	(0.546)	(0.717)	(51.328)
Trade openness	-0.000	0.002	0.007***	0.013*	-0.246
	(0.000)	(0.003)	(0.003)	(0.008)	(0.337)
Inflation rate	-0.005	-0.002	0.004	-0.023	2.767
	(0.003)	(0.015)	(0.010)	(0.043)	(2.502)
Policy rate	-0.001	-0.025***	-0.008	0.057**	1.167
	(0.001)	(0.009)	(0.010)	(0.024)	(1.746)
Government spending to GDP	-0.025***	0.147***	-0.007	-0.209***	-6.221**
	(0.008)	(0.019)	(0.027)	(0.053)	(2.605)
Bilateral USD exchange rate	-0.005***	-0.007***	-0.009***	-0.095***	-1.947***
	(0.001)	(0.002)	(0.002)	(0.009)	(0.404)
Real effective exchange rate	-0.001*	-0.000	0.003	-0.007	0.315
	(0.001)	(0.002)	(0.003)	(0.009)	(0.602)
Exchange rate volatility	0.014***	0.070***	-0.008	0.143***	3.625
	(0.004)	(0.019)	(0.032)	(0.043)	(4.635)
Host-source fixed effect	Yes	Yes	Yes	Yes	Yes
Source-time fixed effect	Yes	Yes	No	Yes	Yes
Time fixed effect	No	No	Yes	No	No
Observations	28,995	29,217	27,640	28,995	12,778
Adjusted R-squared	0.365	0.863		0.149	0.198
Log-likelihood			-8,988.277		

Note: The dependent variables are the bilateral FDI inflows normalized by the lagged GDP. Heteroskedasticity-robust standard errors in parentheses. Standard errors are clustered at the host country-time levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level.

Table 7. Subsample analysis: OECD vs. non-OECD source countries

	Bilateral FDI inflows	
	(I) OECD only	(II) non-OECD only
EPU	-0.203***	-0.037**
	(0.070)	(0.018)
Real GDP growth	-0.013	-0.005
	(0.016)	(0.006)
Stock market returns	0.003**	0.001**
	(0.001)	(0.000)
GDP per capita	1.137***	0.144
	(0.340)	(0.166)
Trade openness	0.003	-0.005
	(0.003)	(0.003)
Inflation rate	-0.042**	-0.000
	(0.017)	(0.013)
Policy rate	0.021	0.003
	(0.013)	(0.006)
Government spending to GDP	-0.072**	-0.001
	(0.031)	(0.007)
Bilateral USD exchange rate	-0.031***	-0.004**
	(0.007)	(0.002)
Real effective exchange rate	-0.013***	-0.001
	(0.004)	(0.001)
Exchange rate volatility	0.018	0.022**
	(0.034)	(0.010)
Host-source fixed effect	Yes	Yes
Source-time fixed effect	Yes	Yes
Observations	6,025	7,751
Adjusted R-squared	0.316	0.144

Note: The dependent variables are the bilateral FDI inflows normalized by the lagged GDP. Heteroskedasticity-robust standard errors in parentheses. Standard errors are clustered at the host country-time levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level.

Table 8. Subsample analysis: host vs. source country policy uncertainty

	Bilateral FDI inflows					
	(I) No controls	(II) Host country controls	(III) Both country controls	(IV) Without EPU distance	(V) With EPU distance	(VI) With interaction term
EPU (host)	-0.326***	-0.187*	-0.245*	-0.305*	-0.280*	-0.160*
	(0.121)	(0.104)	(0.134)	(0.167)	(0.148)	(0.09)
EPU (source)	-0.217**	-0.270***	-0.153			
	(0.104)	(0.092)	(0.101)			
EPU distance					-0.164	-3.238**
					(0.241)	(1.632)
EPU distance						0.737*
× EPU (source)						(0.397)
Host-source fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Source-time fixed effect	No	No	No	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	No	No	No
Host controls	No	Yes	Yes	Yes	Yes	Yes
Source controls	No	No	Yes	No	No	No
Observations	2,903	2,701	2,701	2,701	2,701	2,701
Adjusted R-squared	0.269	0.303	0.305	0.373	0.387	0.387

Note: The dependent variables are the bilateral FDI inflows normalized by the lagged GDP. Heteroskedasticity-robust standard errors in parentheses. Standard errors are clustered at the host-source country levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level.

Table 9. The role of financial development

	Bilateral FDI inflows					
	(I) FD only	(II) Interaction term	(III) Average value of FD	(IV) Alternative measure of FD	(V) With Source country FD	(VI) With FD distance
EPU	-0.096***	-1.252***	-1.343***	-0.856*	-1.255*	-1.944***
	(0.035)	(0.480)	(0.481)	(0.452)	(0.661)	(0.680)
l.FD	0.290***	-1.116**	-1.371***	-0.491	-1.011	-2.033**
	(0.088)	(0.500)	(0.529)	(0.466)	(0.639)	(0.786)
EPU × l.FD		0.272**	0.297***	0.175*	0.248*	0.462***
		(0.112)	(0.111)	(0.101)	(0.140)	(0.171)
EPU × l.FD (source)					0.009*	
					(0.005)	
l.FD distance						0.008
						(0.008)
EPU × l.FD distance						-0.002
						(0.002)
Host-source fixed effect	Yes	Yes	No	Yes	Yes	Yes
Source-time fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Host controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,552	13,552	13,552	12,315	11,124	10,319
Adjusted R-squared	0.270	0.266	0.178	0.268	0.296	0.296

Note: The dependent variables are the bilateral FDI inflows normalized by the lagged GDP. FD is the log of the financial development variable. Heteroskedasticity-robust standard errors in parentheses. Standard errors are clustered at the host country-time levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level.

Table 10. Using legislative and presidential elections as instruments

	Bilateral FDI inflows	
	(I) IV using exogenous election timing	(II) IV using exogenous election timing
EPU	-1.122***	-3.724**
	(0.427)	(1.762)
l.FD		-0.034**
		(0.017)
EPU × l.FD		0.863**
		(0.433)
Real GDP growth	-0.015*	-0.008
	(0.008)	(0.009)
Stock market returns	0.002**	0.003***
	(0.001)	(0.001)
GDP per capita	0.476	0.271
	(0.448)	(0.578)
Trade openness	-0.003	-0.002
	(0.004)	(0.006)
Inflation rate	-0.021	-0.031
	(0.042)	(0.043)
Policy rate	0.017	0.095*
	(0.012)	(0.055)
Government spending to GDP	-0.030	-0.021
	(0.038)	(0.045)
Bilateral USD exchange rate	-0.024***	-0.024***
	(0.003)	(0.003)
Real effective exchange rate	-0.010**	-0.010**
	(0.004)	(0.004)
Exchange rate volatility	0.067	0.083
	(0.041)	(0.052)
Kleibergen and Paap rank statistics (p-values)	31.089 (0.000)	19.981 (0.000)
Cragg-Donald Wald F-statistics	14.490	11.160
Hansen J overidentification tatistics (p-values)	1.573 (0.210)	0.115 (0.733)
Host-source fixed effect	Yes	Yes
Source-time fixed effect	Yes	Yes
Observations	13,776	13,552

Note: The dependent variables are the bilateral FDI inflows normalized by the lagged GDP. FD is the log of the financial development variable measured by domestic private credit to GDP ratio. Heteroskedasticity-robust standard errors in parentheses. Standard errors are clustered at the host country-time levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level.

Appendix

Table A.1. Correlation between economic policy uncertainty and stock market volatility

Country	Corr (EPU, SMV)	Country	Corr (EPU, SMV)
Australia	0.352	Japan	0.463
Chile	-0.360	Korea	-0.108
Canada	-0.096	Mexico	0.892
France	0.136	Netherlands	0.412
Germany	0.387	Spain	0.859
Greece	0.270	Sweden	-0.173
Ireland	0.474	United Kingdom	0.261
Italy	0.326	United States	0.350
Average	0.278	Median	0.338

Note: The correlation between the economic policy uncertainty index and realized stock market volatility.

Table A.2. Alternative treatment of outliers

	(I) Baseline	(II) Winsorized (1%)	(III) Trimmed (2.5%)	(IV) Winsorized (2.5%)
EPU	-0.100***	-0.069**	-0.058***	-0.057***
	(0.034)	(0.029)	(0.021)	(0.022)
Real GDP growth	-0.033	-0.009	-0.029***	-0.024
	(0.030)	(0.027)	(0.010)	(0.018)
Stock market returns	0.006***	0.008**	0.002**	0.006**
	(0.002)	(0.003)	(0.001)	(0.002)
GDP per capita	0.581***	0.167	0.427***	0.368***
	(0.183)	(0.129)	(0.120)	(0.115)
Trade openness	0.001	0.007*	0.001	0.002
	(0.002)	(0.004)	(0.001)	(0.002)
Inflation rate	-0.087*	-0.061	-0.026	-0.052
	(0.045)	(0.059)	(0.026)	(0.035)
Policy rate	0.004	0.009	-0.001	0.006*
	(0.007)	(0.005)	(0.003)	(0.003)
Government spending to GDP	-0.053**	-0.048**	-0.031***	-0.040***
	(0.021)	(0.019)	(0.011)	(0.014)
Bilateral USD exchange rate	-0.063***	-0.086***	-0.044***	-0.064***
	(0.015)	(0.023)	(0.010)	(0.016)
Real effective exchange rate	-0.529**	-0.526**	-0.384**	-0.498***
	(0.206)	(0.203)	(0.155)	(0.170)
Exchange rate volatility	0.112	0.124*	0.133***	0.093**
	(0.078)	(0.072)	(0.039)	(0.046)
Host-source fixed effect	Yes	Yes	Yes	Yes
Source-time fixed effect	Yes	Yes	Yes	Yes
Observations	13,776	13,875	13,559	13,875
Adjusted R-squared	0.367	0.243	0.431	0.334

Note: The dependent variables are the bilateral FDI inflows normalized by the lagged GDP. Heteroskedasticity-robust standard errors in parentheses. Standard errors are clustered at the host country-time levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level.