Policy Uncertainty, Multinational Firms, and Reallocation *

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Abstract

Multinationals are often considered a tool through which economic shocks originating in a region get magnified. This paper, in contrast, shows that elevated economic policy uncertainty (EPU) in a country is associated with increase in investment by a firm in other regions. I find that (multinational) firms hold back investment in a country subjected to higher EPU, which they reallocate to projects in other countries. I find the impact to be higher for firms with tighter financial constraints. I also find that the reallocation is directed more towards countries that provide a better legal environment. The study uses establishment-level data of mining firms as a laboratory. Limited input–output linkage across mines allows me to study the impact caused particularly through the allocation decision of firms. The empirical strategy exploits variations in: i) parent country of mines operating in the same country; & ii) country of operation of mines owned by same firm. Overall, my findings highlight that multinationals could potentially stabilize the escalation of regional policy uncertainty shocks to global crisis.

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1 Introduction

Since the financial crisis in the US, there has been an increased interest in studying the link between policy-related uncertainty and economic outcomes in general and firms' decision making in particular (Baker, Bloom, and Davis (2016), Julio and Yook (2012), among others). A significant proportion of firms (particularly in developed countries) are multinational in nature and represent a primary feature of the world economy through which shocks tend to propagate (Alviarez (2019)). Cravino and Levchenko (2016) estimates that 20–40% of a foreign affiliate's shock has its origin in their home country. Given this premise, this paper studies the way multinational firms, through their decision to allocate resources, propagate policy-related uncertainty across countries.

There is a growing body of research that studies the way economic shocks originating in a country could have a negative impact on other economies. Multinational firms have been particularly highlighted as a tool through which local shock can magnify and thereby escalate to global crisis. This is empirically observed through a negative shock to funding or business cycle fluctuations at the parent firm location and a consequent reduction in economic activity across foreign affiliates (Desai and Foley (2004), Cravino and Levchenko (2016), Alviarez (2019), Biermann and Huber (2019), among others). Economic policy uncertainty (henceforth, EPU), causing reductions in the economic activity of firms, manifests itself as a negative shock like any other. Consequently, it is natural to expect that a rise in EPU is also likely to be negatively propagated across countries through multinational firms. This paper, in contrast, finds that an increase in EPU in a country is associated with an increase in investment by a multinational firm in their foreign operations. I find that firms reduce investment in the location with elevated EPU and are left with additional resources that they can internally allocate to other business units, thereby causing a positive propagation. This paper, consequently, provides evidence of an instance whereby multinational firms could prevent the escalation of local shock to global crisis.

There are several challenges that might hinder the empirical identification of a multinational firm's allocation decision across countries caused by economic policy uncertainty. To fix idea, consider a period of elevated policy uncertainty caused by the discussion around possible reduction in government budget deficit in a country (say Canada). The first concern is that the uncertainty in Canada could itself lead to overall attractiveness to invest in a competing country that has a more stable policy outlook (say Australia), creating an increase in aggregate demand there. Alternatively, this period of uncertainty in Canada could be correlated with local economic factors in Australia. Secondly, uncertainty in Canada could lead to reduction in production of engines by a manufacturing firm (say Bombardier) in Canada which might cause a reduction in investment in Bombardier's assembling unit in Thailand. However, this could be owing to engines being an input in assembling segment and not necessarily through the allocation decision of the firms.

Using a laboratory of mining sector firms, I address the first concern by comparing operations of Canadian multinational mining firms in Australia with other mining operations there, and consequently subjected to the same local conditions. This also allows me to highlight the importance of multinational firms' ability to flexibly allocate capital and labour across different operations. Using mining firms with limited production linkages as my empirical setup also allows me to particularly identify internal capital decision making from production linkages across different units of the same firm.

The empirical analysis of this paper uses database on international operations of mining firms domiciled in multiple countries and data on economic policy uncertainty index of 15 countries constructed by Baker, Bloom, and Davis (2016). This allows me to infer whether a mine is facing policy uncertainty in its home country.[1] Therefore, I can compare the difference in investment of firms mining in the same country (and in most instances, mining the same commodity) but subject to periods of varying degrees of EPU in their respective home countries. Multinational firms hold back investment in the country with elevated policy uncertainty and internally reallocate it to projects in other countries that are in need of capital. This provides a basis to investigate cross-sectional heterogeneity based on the degree of financial constraint to which a firm is subjected. Next, I investigate whether the institutional quality, measured as bilateral investment treaty (BITs) between two countries plays a role in firms' choice of the location of investment during periods of elevated economic policy uncertainty. Finally, since I know the location of mining properties, I use satellite images of light density at night around the mines as a credible measure of local growth to quantify the positive effect of foreign uncertainty in economic activity.

The analysis in this paper begins by looking at the share of capital expenditure (capex) of mining firms that move to a foreign economy when a country is subject to periods of elevated EPU. I find that a 100% increase in EPU in a country is associated with a 10 percentage point increase in the share of expenditure in foreign countries by the multinationals. It is associated with decrease in capex by firms in the domestic country and an increase in the foreign countries, while the aggregate firm level capex remains largely unchanged. The results indicate that multinationals shift investment to other countries in response to domestic EPU

[1] Alternatively, I also use uncertain elections as a measure of periods when economic policy uncertainty is particularly high.

and thereby prevent local shocks from magnifying globally.

As discussed above, the result could, however, be driven by investment opportunities in foreign countries and not by the rising EPU in the country of firm. To rule these concerns out, I look at capex in a country (thereby subject to the same local conditions) by firms with varying countries of origin. I find that as EPU in the country of headquarters of the firm doubles (increases by 100%), capex increases by around 23%. To put this magnitude in perspective, the EPU index rises on average by around 25% in the year of imminent elections, leading to around a 6% increase in expenditure in foreign countries. On looking at within-firm allocation (including firm $\times$ year fixed effect), I find the magnitude to rise sharply, highlighting internal reallocation of resources across countries.

Next, I compare investment in establishments in the same country, mining the same commodity, but owned by firms varying in their country of origin. I find that the ratio of investment to value of mines increases by 20 basis points in foreign mines as the policy uncertainty index in their home country doubles. Given that the mean is around 90 basis points, the result shows an increase by more than 20%. These pieces of evidence taken together highlight that multinational firms tend to reallocate investment outside as domestic EPU increases.

To further probe the underlying mechanism behind the empirical findings, I exploit several dimensions of heterogeneity in the data. I begin by examining the differential effect of EPU on investment in the foreign establishment of firms varying in their degree of financial constraints. As discussed before, the thesis in this paper builds on the idea that firms withhold investment in the region that has high policy uncertainty and consequently are left with resources that they can potentially allocate to establishments in other regions. If all the unaffected business units of a firm are operating at their optimum without any financial constraint, there might be no reallocation of investment by the multinational firm. Also, the additional resource is more valuable to a firm that was subjected to a tighter constraint and thereby slackens the constraint by a greater magnitude.[2] The finding echoes Fazzari, Hubbard, and Petersen (1988), where investment is shown to have greater sensitivity to cash flow for financially constrained firms.

Next, I investigate whether institutional quality in the country where the mines are located drives the intensity of reallocation. The idea is that better quality of institutions provides

[2]Since the optimality condition for a constrained firm requires that the marginal revenue product of capital deviate from its cost by the degree of financial constraint, greater reduction in the constraint is associated with a higher increase in investment under standard upward sloping concave production technology. Consistent with this, I find the impact of foreign EPU to be higher in establishments of firms with stricter financial constraints.

better protection for investors and hence such countries would be more attractive as investment destinations during periods of policy uncertainty.[3] I use BITs signed by two countries as a measure of institutional quality between the signatories (Bhagwat, Brogaard, and Julio (2017), Cao, Li, and Liu (2017)). BITs particularly protect investors from expropriation risk as well as allowing easier repatriation of profits. I find that firms shift their investment to countries that provide better institutional quality. BITs allow me to compare investment in mines in the same host country where institutional quality differs for different foreign countries.[4]

I also explore alternate definitions of policy uncertainty and country of origin of a firm to establish robustness of the results in this paper. Following the literature, I use three alternate ways of identifying periods of elevated EPU. First, I use periods prior to elections in general and close elections in particular as an alternate measure of policy uncertainty (Akey (2015), Jens (2017), Asher and Novosad (2017), among others). Second, I use an uncertainty index constructed by Ahir, Bloom, and Furceri (2018) which uses economic intelligence unit country reports made by IMF. Third, I use the residual from regressing country EPU on global EPU (Davis (2016)) as a measure of policy uncertainty for each country. The primary results of the paper are qualitatively the same in all the above instances. The result is also robust to alternate definition of home country as country where the maximum operations of the firms are located. I also provide some external validity of the results using compustat segment data and find that as EPU in the US increases, firms tend to shift investment in their foreign subsidiaries.

There can be a possible concern that the results in the paper are driven by changes in expectations and not necessarily by policy-related uncertainty. I attempt to address this concern in the following way. Firstly, I include measures of sentiment indices in the empirical analysis as a control for changes in expectation (Gulen and Ion (2015), Hassan, Hollander, van Lent, and Tahoun (2019), among others). Secondly, I split my sample between periods of relatively high and low sentiment with the idea that if the result is driven by negative sentiment then the relationship between EPU and foreign investment should be

[3]Refer to Acemoglu, Johnson, and Robinson (2005) for a review of the role of institutional quality or the lack thereof as a potential cause of underdevelopment.

[4]The optimality condition of resource allocation would require the marginal revenue product per unit cost of capital to be equalized across all establishments, and for a constrained firm it equals the degree of the constraint. Since better institutional quality is associated with higher marginal productivity, it implies greater allocation of resources. As discussed before, elevated policy uncertainty frees up resources to allocate in other establishments. This implies that under the new optimality condition, the marginal revenue product of all the establishments has to decrease (i.e. increase in capital). The concavity of the function would require a greater increase in capital for establishments which are already operating at a higher level of capital. This would then manifest as more resources being allocated to establishments located in places that provide better legal institutions.

significant only in periods of negative sentiment. I find that that the relation between EPU and investment in foreign countries is identical in either of the sample splits. Thirdly, uncertain elections provide an event where uncertainty resolves after the election. I find the effect on foreign investment fades immediately after the election as the uncertainty is resolved. Meanwhile, I do not find any change during less uncertain elections. Expectations are, however, likely to change during any elections.

In the final analysis of the paper, I investigate whether the allocation of investment to foreign economies has a positive impact in the local economic activity around the mines. For this purpose, I look at economic activity measured as night time light in arbitrarily drawn small areas called cells of 55×55 km^2 (0.5×0.5 degree latitude). The idea is that reallocation of assets might not have an aggregate effect for the entire country, but the positive spillover could occur at a local level around the mines. I map the mining properties to each of the cells. Thus, for each cell I know whether it has a mine and if that mine is owned by a domestic or foreign company. Also, for each of these cells I have night time light data obtained from satellite images, which have been shown in the literature as a good proxy for local economic activity. I find that the level of economic activity measured by the luminosity data around foreign mines is 5% higher following a 100% increase in policy uncertainty originating from their home countries, suggesting positive spillover in real economic activity.[5]

In summary, I find that multinational firms tend to invest more in foreign countries as a response to domestic policy uncertainty. The empirical strategy helps me to control for investment opportunities coming up in foreign countries and other linkages that might drive the result. I also attempt to indicate that the results are driven primarily by uncertainty aspect of possible policy changes and not necessarily through changes in expectations. In contrast to previous findings where multinationals have been considered a catalyst for shock propagation across countries, I provide a scenario where multinational firms could act as a global stabilizer and prevent local shocks from escalating to a global magnitude.

Related Literature: This research contributes most directly to the literature on the role of policy uncertainty on firms' decision making, and it extends it by studying the way policy uncertainty propagates across countries. Julio and Yook (2012) and Jens (2015), among others, used elections as a measure of policy uncertainty to show that firms decrease investment during elections. Meanwhile, economic policy uncertainty index developed by Baker, Bloom, and Davis (2016) has been used to study the impact of uncertainty surrounding policy deci-

[5] Meyer (2004) provides a review highlighting the need to better understand the role of multinational enterprises in broader social and environmental contexts, particularly in developing countries.

sions on investment by firms, mergers and acquisitions, and other economic activity (Gulen and Ion (2015), Akey and Lewellen (2015), Bonaime, Gulen, and Ion (2018)).[6] I contribute to this strand of literature by studying the way resources are allocated within a firm in the face of policy uncertainty. This also allows me to contribute to the literature by examining how policy uncertainty in a country spills over to other economies. At a macro level, Gauvin, McLoughlin, and Reinhardt (2014) and Klößner and Sekkel (2014) show how uncertainty related to macroeconomic policies propagates to other countries through portfolio flows. Julio and Yook (2016) highlighted a drop in aggregate FDI flows from US companies during periods of election activity in the host countries. Cao, Li, and Liu (2017) looks at cross-border mergers and acquisitions during periods of national elections, while Campello, Cortes, d'Almeida, and Kankanhalli (2018) highlights the way investment by US companies decreased following Brexit in the UK. The current paper is distinct from these existing works in several different ways. First, I highlight the importance of firms operating in multiple countries in propagating uncertainty through their internal decision to invest across different mines and thereby provide a a microeconomic understanding of policy uncertainty that might spill over through reallocation of assets by firms with a global presence. Second, the setting allows me to control for local economic shocks and identify the impact of policy uncertainty from foreign economies. Third, the mining sector provides a setting wherein I can distinguish internal capital decision making in propagation of policy uncertainty from other production and input–output linkages.[7] The granularity of the data also allows me to control for several other confounding factors. Finally, my result highlights a scenario where policy uncertainty can positively impact investment in foreign countries.

A growing literature highlights the way shocks tend to propagate in an economy: production linkages (Acemoglu, Carvalho, Ozdaglar, and Tahbaz-Salehi (2012), Acemoglu, Akcigit, and Kerr (2016), Barrot and Sauvagnat (2016), among others); financial and social linkages (Acemoglu, Ozdaglar, and Tahbaz-Salehi (2015), Acemoglu, Ozdaglar, and Tahbaz-Salehi (2015)); and international banking (Schnabl (2012), Gilje, Loutskina, and Strahan (2016)).[8] Lamont (1997) shows that cash flow shock in the oil subsidiaries of a firm could lead to reduction in capital expenditure of non-oil subsidiaries. This paper attempts to causally infer the role of multinational firms and/or firms with multiple establishments in spreading

[6]There is also a large literature on the impact of policy or political uncertainty on asset prices Brogaard and Detzel (2015),Pástor and Pietro (2003), Pástor and Veronesi (2013).

[7]The mining sector has been used for empirical studies by Tufano (1996) as a setup for risk management exercises in the gold industry. Meanwhile, Moel and Tufano (2002) uses real options model to study the opening and closing of mines. Wittry (2019) uses the resource extraction sector to empirically investigate debt overhang.

[8]Alcácer and Zhao (2012) show that internal linkages could endogenously arise owing to competition in foreign market.

local shocks to policy uncertainty from one region to the other.[9] Giroud and Mueller (2017) studies the way shocks to local consumer demand, measured as housing price shock in a zip code in the US, propagate to other regions through firms' internal network of establishment. Apart from being a distinct setting—within the US versus multi-country—I also analyze the impact of different kind of shocks, namely shocks to policy uncertainty versus demand shock. Consequently, my findings also differ from theirs. While Giroud and Mueller (2017) finds a reduction in employment owing to foreign shocks, I find an increase in investment following policy uncertainty in other economies. In the same spirit, this paper is also distinct from Cravino and Levchenko (2016) in using a multi-country setup to show that a 10% increase in sales in the parent firm is associated with a 2% increase in sales in the affiliated firm. Such works—this included—provide the microeconomic foundation of a more macro-level research on the propagation of economic shocks across countries (Kose, Prasad, and Terrones (2003), Kelly, Pastor, and Veronesi (2014), Gauvin, McLoughlin, and Reinhardt (2014), among others).

Finally, this paper also contributes to the literature on the importance of strong institutions in economic development in general and investments in particular (see Acemoglu, Johnson, and Robinson (2005), Michalopoulos and Papaioannou (2013a), and Dell (2010), among others). In the context of multinationals, Henisz (2000) (as well as Henisz and Delios (2001), Henisz (2002), among others) have highlighted the importance of political hazard in the context of market entry. I use BITs as a measure of institutional quality between two countries. Bhagwat, Brogaard, and Julio (2017) show BITs have a strong positive impact on cross-border mergers and acquisitions, while Fotak, Lee, and Megginson (2019) shows that BITs lead to an increase in the size of syndicated loans as well as the cost of debt. I use BITs as a measure of expropriation risk and show that firms, when faced with elevated uncertainty, tend to reallocate assets more to countries who are signatories of a bilateral treaty.

Structure: The remainder of this paper proceeds as follows. Section 2 describes the data used in the empirical analysis of this paper. Section 3 lays down the details of our empirical strategy. Section 4 describes the primary results that drive the thesis of this paper. Section 5 provides an additional set of results with the objective of further probing the robustness

[9] There is a large literature that has highlighted the comovement in sales and investment of affiliate and parent firms of a multinational firm, particularly through internal capital markets or input–output linkages (Desai, Foley, and Hines (2009), Kleinert, Martin, and Toubal (2015), and Boehm, Flaaen, and Pandalai-Nayar (2019), among others). Multinationals have also been shown to be an important factor to match the comovement in international business cycles and trade (see Helpman (1984), Ghironi and Melits (2005), Menno (2014), Zlate (2016)). Given that most of these studies have information on either parent or affiliate firms, causal inference is limited.

of our main findings. Finally, Section 6 concludes the paper.

2 Background and Data

I use data from from four primary sources: data on the international operations of mining sector firms from S&P global market intelligence database (SNL metals and minings), data on economic policy uncertainty index is constructed by Baker, Bloom, and Davis (2016) and compiled for other major economies in www.policyuncertainty.com, data on the signing and ratification of bilateral investment treaties obtained from United Nations Conference on Trade and Development (UNCTAD). The establishment level data on mining sector firms provides information on the location of owners which in turn is merged with the economic policy uncertainty data. Meanwhile, information on the location of establishment and the firm headquarters allows me to merge with information on bilateral investment treaties. Lastly, the latitude and longitude of mines allows me to allocate each mine to a cell (55×55 Km^2) and merge it with and nighttime light data obtained from PRIO-GRID v2 (Tollefsen, Strand, and Buhaug (2012)).

2.1 Mining Firms

The primary data source used in this paper is information on mining sector firms across the world and data on their international operations. SNL metals and mining provide detailed data on mining sector firms, location of their mines, exploration expenditure among other details. The location of mines are geocoded and thereby I can know their exact location, commodities they produce, and the amount of production. Berman, Couttenier, Rohner, and Thoenig (2017) uses this dataset to study the effect of commodity price in fuelling conflict around mines in Africa. I augment the dataset by a novel data, SNL mine economics which provides yearly investment data on a sub-sample of the mines (around 1000 mines). SNL mine economics covers 14 minerals and has the detailed data of sample of mines covering these properties.[10] The mining properties covered by SNL mine economics account for an average of 60% output by production volume varying from 48% of total lead recovered in an average year to around 84% of total output of copper. This data allows me to compare investment for active mines producing the same commodity but are owned by firms varying in their country of origin.

[10]Copper, Nickel, Lead, Zinc, Gold, Silver, Platinum, Palladium, Rhodium, Uranium, Molybdenum, Cobalt, Coal and Iron Ore.

Figure (1) shows the geographic distribution of firms. I see that Australia and Canada account for the major share of the firms (49%) followed by US, Great Britain and others. However, the exploration budget spent by these mining firms as depicted in figure (2) is spread across all parts of the world.

Table (1) provides the summary statistics of our primary database. Panel A summarizes the data at the firm–year level. Since our empirical specification requires within-firm allocation, I restrict our sample to firms which have at least two plants, one in home country and one in foreign. I see that on an average a firm has around 24 mining properties (that include mines at all stage, not necessarily active) producing around 4 commodities spanning around 4 different countries of operation. Panel B provides data summarized at the level of a country where the mines are located. The average number of commodities mined is around 20. There are nearly 15 countries owning mining properties in a country. A country in our sample also receives on an average USD 388 million as exploration budget from different firms.

Panel C provides summary statistics on the subsample of mines obtained from mine economics as mentioned above. The average value of a mine, i.e. the value of existing resources in a mine, is around USD 54 million. Firms invest around 0.8% of the value of mines as yearly capital expenditure of which around 0.5% is for the purpose of development while the other .3% is sustaining capital.

2.2 Economic Policy Uncertainty

The measure of economic policy uncertainty (EPU) used in the empirical analysis of this paper is obtained from Baker, Bloom, and Davis (2016). The authors provides a news-based policy uncertainty index for 15 countries: Australia, Brazil, Canada, China, Chile, France, Germany, India, Italy, Japan, Russia, Spain, South Korea, the United Kingdom and the United states.[11] Though this restricts the primary analysis of the paper to firms headquartered in these 15 countries, it accounts for nearly 80% of all the mining firms in our sample.

The economic policy uncertainty index is obtained as a monthly count of words about the economy, policy and uncertainty. The authors searched several newspaper of each of the countries and counted words like "economic", "economy", "uncertain", "uncertainty" and several other terms related to policy or regulation.[12] The raw count of words are scaled

[11]The data is available for download at www.policyuncertainty.com

[12]For example, in the case of the US, "Congress", "deficit", "Federal Reserve", "legislation", "regulation",

by total number of articles in the same newspaper and month. Each newspaper-level series is normalized to a standard deviation of one. Finally, the index is obtained by averaging across all the newspapers to obtained the required index for each of these countries. Baker, Bloom, and Davis (2016) performs a host of checks to ensure that the index is an accurate measure of uncertainty. The measure has been used extensively to study the effect of policy uncertainty on firm decision making not only in the US but also across different countries (Gulen and Ion (2015), Greenland, Ion, and Lopresti (2016) among others).

The correlation matrix reported in table (2) shows that in most instance the correlation is very low and in some instance it is even negative. For the countries which have the maximum number of mining firms, i.e. Australia and Canada, the correlation of their economic policy uncertainty index is 0.46.

2.3 Bilateral Investment Treaty

A bilateral investment treaty is a voluntary and reciprocal agreement between two countries which is structured to promote and protect private investments made by the nationals of the signatories in each other's territory.[13] The investment treaty establishes the contract which lays down the rights and protections of the nationals of one country when they invest in the other. Primarily, BITs provide protection against illegal nationalization, expropriation of assets and any other action that might undermine the ownership of the investor. One main feature of BITs is that they allow investors from signatories to bring suit against states directly to an international arbitration body, International Center for the Settlement of Investment Dispute (ICSID), rather than local courts. The ICSID facilities conciliation and arbitration of investment disputes between Contracting States and nationals of other Contracting. Since it came into force, ICSID has been involved in more than 700 cases of investor–state disputes. Given these features, BITs improve the property right of investors and allow them to operate in an environment with better institutional quality.[14]

The main purpose of a BIT has been to promote foreign investment by treating a foreign investor in the same way as a domestic investor and protecting them from any expropriation. In the event of an expropriation BITs enable the foreign investor to get adequate and quick compensation (Bhagwat, Brogaard, and Julio (2017)). In a recent settlement mediated by

or "White House" (including variants like "uncertainties", "regulatory", or "the Fed"). The words for this category differed for different countries.

[13]The definition is taken from uk.practicallaw.thomsonreuters.com

[14]The ICSID came into force in 1966 by the Convention on the Settlement of Investment Disputes between States and Nationals of Other States (the ICSID Convention or the Convention) and is a part of the World Bank group. http://icsidfiles.worldbank.org/ICSID/ICSID/StaticFiles/basicdoc/intro.htm

the ICSID, Bolivarian Republic of Venezuela had to pay USD 1 billion for expropriating investments of Canadian mining company Rusoro Mining Ltd. in accordance with the BIT signed by the two countries in 1996.[15]

The first BIT was signed between Germany and Pakistan in 1959 and since then there have been 2959 BITs that have been signed between countries; of these, 2361 are in force. It is important to note here that not all BITs that are signed are automatically ratified. The treaties have to be ratified in both the countries' respective Parliaments to come into force. For example, Brazil has signed BITs with 21 different nation but there is only one (with Angola) that is in force. It is only when a treaty comes into force that the signatories are bound by the terms of its contract.

Figure 3 shows the yearly evolution of the number of BITs signed. It can be seen that from the 1960s–1980s there were very few BITs signed every year, and the number increased rapidly after that and peaked in the late 1990s and early 2000s. In our sample which consists of the years 2002–2016, 89 treaties were signed. Figure 5 provides the geographical distribution of the number of BITs signed by countries. Panel A highlights the distribution of BITs signed before 2002 while the Panel B shows the distribution of BITs signed post 2002.[16]

2.4 Satellite Light Density

To study the real impact of policy uncertainty spill-over I require data on economic development around the mines. Given that there are limited geocoded measure of economic development at a very microeconomic level, I use satellite images on light density as a proxy for economic activity. Henderson, Storeygard, and Weil (2012) showed the importance of satellite data on night lights to augment official income growth which has later been used extensively in the literature as a measure of economic development (Michalopoulos and Papaioannou (2013a), Michalopoulos and Papaioannou (2013b) among others).

Defense Meteorological Satellite Programs Operational Linescan System (DMSP-OLS) reports images of Earth captured at night between 20:00 and 22:00. The measure created by them is an integer ranging from 0 to 63 and is available for every 1 km^2. I use the data collated at a cell level provided by prio-grid v2. Apart from night-time lights data, each grid cell contains cell-specific information on armed conflicts, socio-economic conditions, ethnic

[15]The case is titled *Rusoro Mining Ltd. v. Bolivarian Republic of Venezuela (ICSID Case No. ARB(AF)/12/5)* and can be found here.

[16]This is important for our empirical strategy as it provides a scenario where for the same country pair the institution quality changes which thereby helps in identification.

groups, physical attributes, climatic conditions and more. For this paper I map the geocoded mines to every cell and consequently for each cell I know whether it has mines and the policy uncertainty index associated with each cell.

3 Empirical Strategy

In this section I present our strategy to empirically test the main hypotheses of this paper. I will discuss the setting and the way it helps me to causally study the intended effect.

3.1 Foreign Policy Uncertainty and Investment

In this section I present our strategy to empirically test the main hypotheses of this paper. I will discuss the setting and the way it helps me to causally study the intended effect.

3.1.1 Foreign Policy Uncertainty and Investment

There are the following empirical challenges to studying the effect of policy uncertainty on a firm's decision to invest differently in domestic and foreign mines. Firstly, it is difficult to obtain different international operations of same firm. Secondly, a measure which provides a variation in policy uncertainty of a country. Thirdly, one must control for the time-varying economic conditions in the foreign country. Our setting attempts to solve this by using establishment-level data on metals and mining firms varying across the country of operation. Given that our data are for firms domiciled in multiple countries, at each point in time our data allow me to compare establishments of firms from two different countries operating in the same foreign nation. Finally, Baker, Bloom, and Davis (2016) provides index of policy uncertainty that is time-varying and distinct for 15 large countries. Given these features of the data, our baseline empirical specification takes the following form.

$$Y_{jit} = \beta_1 Log(EPU_{j,t-1}) \times Foreign_{ji} + \beta_{jt} + \beta_{ji} + \sum_{c} \beta^{c}_{it} + \epsilon_{jit} \tag{1}$$

where for a firm j, Y_{jit} is measures investment, production exploration budget among others in country i in the year t. The location of firm is identified as the country of its headquarters. $Log(EPU_{j,t-1})$ is the lagged economic policy uncertainty index for the country of the firm's locations. $Foreign_{ji}$ is a dummy that takes the value 1 for the operations of a firm in foreign country and 0 otherwise.

For most of our results, I present specifications that include firm–year (β_{jt}), firm–country of operation (β_{ji}) and country of operation–commodity–year dummies. The full set of fixed effects (FEs) helps me to rule out a range of identification concerns. The firm–year dummies allow me to capture time-varying characteristics of firms and ensures that the estimation of β_1 does indeed come from within-firm differences of foreign and domestic operations. The firm–country of operation dummies allows me to control for any time-invariant relationship of a firm with a particular country. For example, if there is a general propensity of a firm to invest in some countries or a close connection with the government, it is accounted for with this fixed effect. Finally, country of operation–commodity–year fixed effects allows me to control for time trends across mines in the country where the firm operates. This rules out the concern that our results might be driven by the unobservable factors in the foreign country rather than the domestic policy uncertainty. This also allows the estimation of β_1 to come from mines owned by firms from different countries, varying in their policy uncertainty index, operating in the same country. This also allows me to infer that the estimated impact on foreign units is not only compared to domestic units of the same firm but also compared to other units in the country and thereby suggests a positive impact of domestic policy uncertainty on investment in other countries.

To test the impact of financial constraint I use measures like leverage, size and size-age index and test for cross sectional heterogeneity between high and low constrained firms. To do this I append regression specification 1 with a constraint measure.

3.2 Role of Institution

I intend to study the role that local institution quality plays when firms decide for which foreign operations they should increase investment when faced with domestic policy uncertainty. However, institutional quality being very persistent and sticky, it is difficult to identify its impact. Further, institutional quality is also correlated with other macroeconomic variables and hence it is an impediment for identification. To resolve this I use passage of bilateral investment treaty between two countries as a shock to institutional quality between two countries. The treaty also allows for a change in institutional quality between a country pair. To study whether policy uncertainty causes firms to invest relative more in countries with whom a bilateral treaty has been signed I use the following regression specification:

$$\begin{aligned} Y_{jit} &= \beta_1 Log(EPU_{j,t-1}) \times Foreign_{ji} \times BIT_{jit} + \beta_2 Log(EPU_{j,t-1}) \times Foreign_{ji} \times NoBIT_{jit} \\ &\quad + \beta_3 BIT_{jit} + \beta_{jt} + \beta_{ji} + \sum_c \beta_{it}^c + \epsilon_{jit} \qquad (2) \end{aligned}$$

As mentioned in Section 3.1.1, the subscripts j, i and t stand for firm, country of operation, and year, respectively. BIT_{jit} takes a value 1 if there is a bilateral investment treaty in force in time t between country i and the domicile country of firm j. Similarly, $NoBIT_{jit}$ takes value 1 if there is no BIT in force between country i and country of the firm j at time t. The other variables and fixed effects have the same definitions as in equation 1.

β_1 and β_2 have the same triple difference interpretation as described in 3.1.1. The difference is that β_1 (β_2) is the amount of investment in mines located in foreign countries with a BIT in force (not in force) compared to domestic mines when a firm is hit by policy uncertainty in its home country. In order to test our conjecture that institution quality matters when firms decide where to invest when faced with domestic policy uncertainty, I check if the coefficient $\beta_1 > \beta_2$.

3.3 Local Economic Impact Around Foreign Mines

In this section I lay down the strategy to investigate if there is a real impact on economic activity around foreign-owned mines. The idea is that if firms shift investment to foreign countries when faced with domestic uncertainty, it should be reflected in aggregate economic activity around the mines. However, getting sub-national data on economic activity in most economies is difficult and this provides an empirical challenge as our intended effect might not be reflected at the country-wide data level. I resolve this by performing our analysis at the cell level (55×55 km^2) and using night-time light data as a proxy for economic activity (Henderson, Storeygard, and Weil (2012), Michalopoulos and Papaioannou (2013a)). Tollefsen, Strand, and Buhaug (2012) provides data of night-time light obtained as satellite image at the cell level.

Using the coordinates of mines, I map each mine to a particular cell. Thus for each cell I know whether it has a mine and if the mine is owned by a company domiciled in a different country, and following that I have the economic policy uncertainty index. If a cell has multiple foreign mines, I aggregate the policy uncertainty index of their respective country. To identify our intended effect I follow Berman, Couttenier, Rohner, and Thoenig (2017) and use the following regression specification:

$$Y_{kjt} = \beta_1 Log(EPU_{i,t-1}) \times Foreign_k + \beta_{jt} + \beta_i + \epsilon_{kjt} \tag{3}$$

Where Y_{kjt} is the natural logarithm of night-time light data of cell k in country j at time t. $Log(EPU_{i,t-1})$ is the lagged value of average economic policy uncertainty index of the foreign mines located in the cell. $Foreign_i$ takes the value 1 if the cell has at least one mine that is foreign-owned. In equation (3) I focus on the estimation of β_1. As I include country–year dummies (β_{jt}) our identification assumption requires $Log(EPU_{i,t-1}) \times Foreign_k$ to local determinants of economic activity. This seems reasonable as the policy uncertainty is an index of the foreign country and not related to local conditions in the area of mines. Also, whether a cell has a foreign-owned mine or not is time-invariant and is not affected by local conditions.[17] I perform the analysis for all cells, where the identification comes from the comparing cells with foreign mines with both cells with domestic mines and cells with no mines. I also do the same by restricting our sample to the subset of cells containing mines.

4 Results

4.1 Local versus Foreign Uncertainty

Before proceeding to our regression results, in Figure (6) I present a visual representation of the relationship between exploration expenditure in a country and both local and foreign policy uncertainty. Local policy uncertainty is defined as the natural logarithm of the EPU index of a country where a firm is incurring the expenditure. Meanwhile, foreign uncertainty is the natural logarithm of the EPU index of the country where the firm is headquartered. To filter out any confounding effect of policy uncertainty from firms' home country when plotting the relationship between exploration expenditure and local policy uncertainty, I obtain residuals from regressing exploration budget on policy uncertainty of firms' home country and set of country–firm dummies. The residual represents variation in firms' expenditure that is unexplained by policy uncertainty originating from firms' home country and also controls for time-invariant trends of a firm operating in different countries. To have a comparable local policy uncertainty across different countries, I subtract the mean local policy uncertainty index of each country. For a given percentile of de-meaned log(local EPU), the plot shows the mean value of the residual exploration budget and log(local EPU). I proceed analogously when plotting the relationship between a firm's exploration expenditure and foreign uncertainty.

Consistent with the existing literature, local policy uncertainty is likely to reduce expenditure by firms in that region and thereby in the top panel of Figure (6) there is negative relationship between exploration budget spent by a firm in a country and the policy uncer-

[17] While the foreign ownership can vary, I do not see much of a switch from foreign to domestic mines in our sample.

tainty index of that country. However, in the bottom panel of Figure (6) I see a positive relationship between exploration budget spent in a region and policy uncertainty in the domicile country of the firm. This provides initial support to our thesis of positive spill-over of policy uncertainty.

I contrast this with an alternate economic shock manifested as the decline in local and foreign GDP.[18] I follow a similar approach above and plot the relationship between residual exploration expenditure and demeaned local and foreign GDP decline in Figure (7). I find that as local GDP declines, expenditure by firms reduces. However, in contrast to foreign uncertainty, as foreign GDP declines, expenditure of firms declines. This alludes to our assertion that different economic shocks can have different spill-over effects. Decline in GDP, which is more in line with a decline in aggregate demand in an economy, is likely to have negative spill-over (Giroud and Mueller (2017)), while policy uncertainty which increases the riskiness to operate in a region can manifest itself as a positive spill-over through multinational firms.

In Table (4) I lay down the result from the following regression analysis that underlie the above figures.

$$\begin{aligned} Log(ExplorationExpend_{ijt}) &= \beta_1 Log(EPU_{j,t-1}) \times Foreign_{ji} + \beta_2 Log(EPU_{i,t-1}) \\ &\quad + \beta_3 GDPgrowth_{j,t-1} \times Foreign_{ji} + \beta_4 GDPgrowth_{i,t-1} \\ &\quad + \beta_{ji} + \epsilon_{jit} \qquad (4) \end{aligned}$$

The main dependent variable is the exploration expenditure of a firm j in a country i at time period t. I want to study the the impact of foreign policy uncertainty ($Log(EPU_{j,t-1}) \times Foreign_{ji}$) and local policy uncertainty ($Log(EPU_{i,t-1})$) and compare it with foreign GDP growth ($GDPgrowth_{j,t-1} \times Foreign_{ji}$) and local GDP growth ($GDPgrowth_{i,t-1}$).

In column 1 I see that as local uncertainty increases by 100%, the share of budget expenditure by a firm in that country decreases by 3.4 percentage points. Similarly, as uncertainty increases by 100% in the headquarters of the firm, then investment in a country increases by 2.2 percentage points. However, decline in GDP growth both at the local level and at the location of the home country of the firms leads to decline in investment expenditure. I see similar effects when the log of expenditure is used as the dependent variable in columns 3 and 4 and when an indicator variable of positive expenditure is used as the dependent variable in columns 5 and 6.

[18] Note here that I invert the GDP growth and plot the relationship with GDP decline so that it can be visually interpreted as a negative shock and can be comparable with the negative shock represented in Figure (6).

However, it should be noted that the above analysis is done only in countries where a policy uncertainty index is available. Further, there are other confounding factors in the country of operation that might affect the causal inference of the study. Given that the primary objective of this paper is to identify the spill-over of of foreign policy uncertainty, in the subsequent sections I will compare operations within a country belonging to firms that are subject to different exposure to policy uncertainty by the virtue of the fact that they are headquartered in different countries. Also, the remaining analysis will not be restricted by the country of operations with available policy uncertainty index but will consider all countries of operations with firms headquartered in countries that have available data on policy uncertainty index.

4.2 Policy Uncertainty and Impact on Exploration Expenditure

Exploration activity is one of the most important operations of mining companies and hence the budget spent on exploration is a crucial choice variable of mining firms. I begin our analysis at the aggregate country level where I am interested to see if the share of exploration budget spent in foreign countries is correlated with domestic economic policy uncertainty. The idea is that the necessary condition for policy uncertainty to spill over is that firms shift their investment to foreign economies as a response to domestic policy uncertainty which consequently gets manifested as the increase in investment in the host countries. To investigate whether aggregate foreign expenditure by a country increases, I use the following regression specification:

$$\left(\frac{ForeignExplorationBudget}{TotalExplorationBudget}\right)_{it} = \beta_1 Log(EPU_{i,t-1}) + \beta_i + \beta_t + \epsilon_{it} \tag{5}$$

Where i represents country where firms are located and t indicates year. Estimating changes in the share of budget spent in foreign countries to total budget eliminates a potential upward bias while estimating β_1 as there might be substitution of budget from home country to foreign country (Haselmann, Schoenherr, and Vig (2018)).[19] I present the findings of regression equation (5) in Table (5).

In column 1 where I include country fixed effects and no time fixed effects I find that 100% increase in economic policy uncertainty leads to around 6 percentage points increase in share of exploration budget in foreign countries. In column (2) of table (5) I include time fixed effects, which allows the identification to come from difference in policy uncertainty across

[19]See Appendix IA.3 for a detailed illustration of this issue.

different countries. I find that 100% increase in policy uncertainty index causes around 10 percentage point increase the share exploration budget towards foreign countries. Given that EPU increases by 69 log points from the year 2002 to 2016, the increase is to the tune of 6.9 percentage points. The results thus lend some support to our intended thesis that domestic policy uncertainty leads to relatively higher investment in foreign countries. In columns 5 and 6, the main variable of interest is the natural logarithm of (1+) exploration expenditure spend in foreign economies. I find that the quasi elasticity of foreign expenditure and policy uncertainty is around 0.7 in column (3) and in column 4, where I include time dummies the quasi elasticity is around 0.4. However, it is difficult to infer causality from regression equation (5) since there are other country-specific time varying factors that I are unable to completely account for. Also, I are not able to control for economic environment in the foreign countries as well as the idiosyncracies underlying the decision making of each firm. Thus, for a better causal inference I perform the following variant of regression equation (1) at firm(j)-country of operation(i)-year(t) level.

$$\left(\frac{ExplorationBudget}{TotalExplorationBudget}\right)_{jit} = \beta_1 Log(EPU_{j,t-1}) \times Foreign_{ji} + \beta_{jt} + \beta_{ji} + \beta_{it} + \epsilon_{jit} \quad (6)$$

The primary coefficient of interest β_1 is the difference between sensitivity of share of foreign budget and share of domestic budget with change in domestic policy uncertainty. The coefficient is also identified from the difference in share of foreign exploration budget spent by two firms operating in the same country but domiciled in different countries.[20]

Table 6 reports the results from the regression specification (6). In columns 1 and 2 the main dependent variable is the log of exploration expenditure by firms. In column 1, I include Firm $\times$ Destination Country and Destination Country $\times$ Year fixed effects. The identification thus comes from firms operating in a country, but subjected to different policy uncertainty by the virtue of being headquartered in different countries. I find that as policy uncertainty in the foreign country increases by 100%, expenditure by firms increases by 23%. To put this magnitude in perspective, the EPU index rose by around 69 log points in our sample from 2002-2016, this implies an increase of 16 log units of exploration expenditure (7% of sample mean). In column (2) I include firm$\times$year fixed effect, and thereby control for any time varying firm specific idiosyncracies. Further, since the impact that particularly stems from demand is likely to impact all the operations/establishments in the same direction as shown in section IA.5 firm$\times$year fixed effect controls for it.[21] It also allows the coefficient

[20] The difference in domicile countries provides the variation in the policy uncertainty index between the firms

[21] The existing literature have talked about the centralized budget constraint and consequently if one

to be identified from the allocation of expenditure across the domestic and foreign operations of a firm. I find that as foreign policy uncertainty doubles, exploration increases by 58%. The increase in the magnitude of the coefficients alludes to the point that policy uncertainty in the home country cause reallocation of expenditure from domestic to foreign operations.

In columns 3 and 4 the main variable is the share of of exploration that a firm invests in a particular country. In column 5, I see that the share of budget expenditure that a country receives from a foreign firm is 1.5 percent higher as the policy uncertainty in the domicile country of the firm doubles. The magnitude of the coefficient is higher to the tune of 8.2 in column 6 when I include firm×year fixed effects, thereby identifying the intended effect through within firm reallocation of exploration resources.

4.3 Policy Uncertainty and Investment

Next, I test spillover of policy uncertainty on establishment level investment of the mining firms. The identification strategy stems from comparing two mining establishments producing the same commodity and operating in the same country, but are subject to different levels of policy uncertainty since they belong to firms varying in their country of domicile. For a subset of properties, as shown in figure (IA.2), I have investment details at the level of mines. Using this data I test the following variant of regression specification (1)

$$CAPEX_{jp(i)t} = \beta_1 Log(EPU_{j,t-1}) \times Foreign_p + \beta_{jt} + \beta_p + +\beta_{ji} + \sum_c \beta^c_{it} + \epsilon_{jpt} \qquad (7)$$

The results from the above equation is presented in table 7. In columns 1 and 2 the main dependent variable is ratio of total capex to the value of mines. The primary explanatory variable is the policy uncertainty originating from the headquarters of of the firm (j) which owns the establishment p in the country i. Different fixed effects allows me to control for different confounding factors and allows me to identify the impact of policy uncertainty. Column (1) includes Destination country × commodity × year, which causes the β_1 to be identified from mines operating in the same country and mining the same commodity but subject to different policy uncertainty owing to their head quarters being in different countries. Firms × Destination country allows the identification to come from time series variation of policy uncertainty in a firm's home country and consequently controls for time invariant firm-operation country relationships. Establishment fixed effects controls for time

establishment of the firm gets affected through reduced demand/tightened revenue, then the other wings subsidizes it and consequently investment reduces from all the establishments invariant characteristics of a particular property. I find that as policy uncertainty in the home country increases by 100%, share of capex to value of mines increases by 20 basis points compared to other plants. Consider again a 69 log point increase in the EPU from 2002 to 2016. This would lead to 13.8 basis points increase (.69*20) in capital expenditure, which is around 15% compared to the sample mean of 90 basis points.

In column (2) I include firm×year fixed effects which controls for time-varying idiosyncracies of a particular firm. This also allows the primary variable of interest β_1 to come from variation country of location of mines of the same firms. In column 2 the coefficient of interest increases in magnitude to 60 basis points. The increase could partially be caused by the substitution of investment from the mines located in the country of headquarters to other mines. However, given in section IA.5, I show that policy uncertainty could affect both through cash flow as well as through increase in risk. The former is impacted similarly across all the operations of the same firm and hence a firm × year fixed effects likely control for it and leads the impact to come through only the uncertainty channel.

Next I group the total capital expenditure into development and sustaining capital expenditure. I report them in columns 3&4 and 5&6 of table 7 respectively. I find that the entire effect is largely driven by increase in development capital. In column 3 I see that as policy uncertainty doubles in the home country, development capital expenditure increase by 10 basis points, which is around 25% compared to sample mean. Meanwhile the impact almost doubles as I include firm × year fixed effects.[22] I do not find any significant impact for the sustaining capital.[23]

4.4 Policy Uncertainty and Impact on Production

Given that I find that firms explores and invest relatively more in their foreign operations when faced with domestic policy uncertainty, the natural next question to ask is whether it translates into an increase in output produced by the firms in the mines located in foreign countries. To empirically test our thesis I perform the following variant of our baseline

[22] With regard to magnitude in perspective, 69 log points increase in EPU would lead to 6.9 basis points increase in the ratio. Given that the mean is 40 basis points it would lead to an increase of around 15%. Similarly in column 4, this would lead to 27.6 basis points increase and thereby is around 60% rise compared to the sample mean

[23] The result is similar in spirit with Atanassov, Julio, and Leng (2015), who highlights an increase in R&D expenditure during periods of elevated political uncertainty.

specification:

$$Log(Output)_{jp(i)t} = \beta_1 Log(EPU_{j,t-1}) \times Foreign_p + \beta_{jt} + \beta_p + +\beta_{ji} + \sum_c \beta_{it}^c + \epsilon_{jpt} \quad (8)$$

The primary dependent variable is the natural logarithm of the volume of output produced by firm j in mine p located at country i in time period t.[24] The results of this regression is reported in table (8).

In column 1 the main dependent variable is a dummy which takes 1 if a mine produces positive output and 0 otherwise. Using this variable in the above empirical specification (4.4) gives the increase/decrease in the probability of production, or the result at the extensive margin. I do not find any impact at the extensive margin. Alternatively I do not find that policy uncertainty in a region can convert an inactive mine to active in a foreign location. In column 2 the main dependent variable is the natural logarithm of the quantity of commodities mined. I find that the the coefficient β_1 is significant and the magnitude is .163. This implies that as policy uncertainty in a foreign country increases by 100% the commodity mined in a particular region increases by 6.3%. Again, to put the magnitude in the same interpretation as before, 69 log points increase in EPU leads to around 11% increase in the quantity mined in a foreign location. Thus I see an increase in the intensive margin. In column 4 the main dependent variable is the value of the total mining output. I find that as policy uncertainty doubles the value of output in foreign economies increases by 19%. With regards to the rise of EPU by 69 log points in the sample, the increase in the value of the output increases by 13.11 log points in average firm level value of output. In columns 3 and 5 which is a measure of both intensive and extensive margin I do not see any significant impact. Thus the rise is particularly focussed in the intensive margin, i.e. active mines shored up their production during periods of elevated policy uncertainty in their home country.

4.5 Role of Financial Constraint

In this section I investigate the role of financial constraints in the magnitude of spillover. As has been discussed before, the spillover is a result of reallocation of investment from a country subjected to high levels of policy uncertainty. The idea being that if a region is subject to policy uncertainty firms are unlikely to invest there, this leaves them with excess resources which they can invest in other regions. However, this argument implicitly assumes

[24] Given that I are comparing output of mines of same commodity as I include country of mine-commodity-year fixed effects, I avoid the problem that the inherent amount of mining in different commodities is very different

that the firm is financially constrained and consequently has not optimized investment across its establishments. Thus a natural cross sectional implication of our thesis is that the spillover through reallocation is driven by firms with tighter financial constraint. I use different proxies for financial constraints like existing leverage (Giroud and Mueller, 2017), size of the firms (Beck, Demirgüç-Kunt, and Maksimovic, 2005) and size-age index Hadlock and Pierce (2010) and perform the following version of regression specification (2).[25]

$$\begin{aligned}\left(\frac{CAPEX_{jp(i)t}}{Value_{jp(i)t-1}}\right) \quad = \quad & \beta_1 Log(EPU_{j,t-1}) \times Foreign_{ji} \times HighConstrained_{it-1} + \\ & \beta_2 Log(EPU_{j,t-1}) \times Foreign_{ji} \times LowConstrained_{it-1} \\ & + \beta_{jt} + \beta_{ji} + \beta_p + \sum_c \beta^c_{it} + \epsilon_{jit} \qquad (9)\end{aligned}$$

The results from the above equation is presented in table (9). In columns 1 and 2 uses leverage of the firm as a measure of financial constraint and classifies firms to be high constrained if the leverage is greater than the median across firms. In line with our thesis, I find that the results are driven by the firms that are more constrained. In column 1 I find that as policy uncertainty index doubles, the ratio of capex to the value of mines that firms above the median level of leverage incurs in foreign establishments increases by 80 basis points, meanwhile the share of development capex increases by 60 basis points. In columns 3 and 4 I use size as a measure of financial constraint and group firms that are lower than the median size as more financially constrained. Firms that are more constrained increases the share of capex to value of mines by 1.1 percentage points in establishments located in foreign countries while firms that are bigger in size increases investment in foreign establishments by only 30 basis points. I find similar impact for development capex as well. In columns 5 and 6, the I use size-age index as a measure of financial constraint and the results that I obtain are qualitatively similar.

This lends support to our hypothesis that the spillover of policy uncertainty through multinational firms are particularly caused by the firms that are in need of capital. Policy uncertainty in a region deters firm to invest in an establishment there. Consequently firms have resources that they divert to establishments in other countries leading to a positive spillover effect.

[25] I also find the result to be robust to using financial constraint measures of (Kaplan and Zingales, 1997), (Whited and Wu, 2006) as reported in table IA.5

4.6 Role of Legal Institution

Given that I see that firms invest relatively more in their foreign units when faced with policy uncertainty in their home, the next question I are interested to study is whether the quality of institution in a country drives investment there. The idea, as I discussed before, is that given there already exist a risk in home country firms would want to invest more in countries where their investment is secured. However, measuring quality of institution is difficult and the majority of indicators vary by countries and hence are correlated with country specific characteristics. Consequently I use BITs as a measure of bilateral institutional quality which allows me to compare two countries having different property rights/ expropriation threat operating in same country (Bhagwat, Brogaard, and Julio (2017), Fotak, Lee, and Megginson (2017) among others). To empirically investigate our intended thesis, I use the following version of regression specification (2), which is grouping the foreign countries in equation (7) into foreign countries with which the home country of the firm has a BIT signed and the other country with which there is no BIT. To test this proposition I run the following variation of our primary regression specification.

$$\begin{aligned}\left(\frac{CAPEX_{jp(i)t}}{Value_{jp(i)t-1}}\right) &= \beta_1 Log(EPU_{j,t-1}) \times Foreign_{ji} \times BIT_{jit} + \\ &\quad \beta_2 Log(EPU_{j,t-1}) \times Foreign_{ji} \times NoBIT_{jit} + \beta_3 BIT_{jit} \\ &\quad + \beta_{jt} + \beta_{ji} + \beta_p + \sum_c \beta^c_{it} + \epsilon_{jit} \qquad (10)\end{aligned}$$

In column (1) our dependent variable is $\left(\frac{CAPEX_{it}}{Value_{it-1}}\right)$. I find that as policy uncertainty increases by 100%, share of capital expenditure to the total value of the mine by a firm increases by 80 basis points in country with an existing BIT (with the home country of the firm) compared to domestic mines and by 40 basis points in mines with no BIT in force. Given the average share of CAPEX is around 80 basis points, the coefficient implies that as policy uncertainty doubles, CAPEX share also doubles in countries with BIT but increase by 50% in countries with no BIT. In column (2) our dependent variable is is $\left(\frac{Development\,CAPEX_{it}}{Value_{it-1}}\right)$. I find that the entire rise in the CAPEX share is driven by development CAPEX is exactly the same in magnitude as observed in column (1). Meanwhile I do not see any significant effect in column(3) where the dependent variable is $\left(\frac{Sustaining\,CAPEX_{it}}{Value_{it-1}}\right)$. Thus it confirms our earlier assertion that the entire rise in CAPEX is driven by the developmental capital expenditure. Finally in column (4) our dependent variable is $\left(\frac{CAPEX_{it}}{Sustaining\,CAPEX_{it}}\right)$. I find that the ratio increases by around 29 percentage points in mines located in countries with which the home country of the firm has a BIT in force, as domestic policy uncertainty index doubles. Meanwhile the impact is around 15 percentage point in countries with no BIT in force.

4.7 Foreign Policy Uncertainty and Impact on Economic Activity

I next want to investigate if the increase in investment by firms in the foreign economies have a real spillover in the local economic activity. It is unlikely that investment in a mine would have an overall effect in the country GDP, hence the ideal unit of observation should be at sub-national level and more specifically around the mines. However, as mentioned before, subnational data of economic activity is difficult to observe and hence I use night time light data obtained from satellite images as a measure of economic activity. The unit of observation is at the level of cell (55×55 km^2). The benefit of using data at this granularity has the benefit that it provides me a measure of economic activity at a very granular level. Further the definition of cells are also exogenous to intra or international borders. I call a cell to be a foreign mine if at least one mine in that cell is owned by a company of foreign origin. If a cell has more than 1 foreign mine I average their policy uncertainty index. Thus for each cell if it has no mine foreign policy uncertainty index is 0. If the mine has only domestic mine foreign uncertainty is 0. If a cell has foreign mine it's policy uncertainty index is average of the policy uncertainty of all the countries where the headquarter of the firms owning the mines. Given that owner countries can be different, the foreign-mine cells have distinct time series of policy uncertainty index.

To test our intended thesis I use the regression specification 3 with log(Night time Light) as our main dependent variable. The results are reported in table (11). In column (1) and (2) I include all the cells, both with and without mines. Thus in this specification I compare economic activity in: cells with and without mines; cells with foreign mines and cells with domestic mines; in cells with foreign mines varying in policy uncertainty in their home country. I find that as policy uncertainty increases by 100% in the home country cells with foreign mines have 5.6% increase in their economic activity measured by nighttime light. On including other cell specific exogebous controls like rainfall and drought prone months the effect is 4.4%.

In column (3) and (4) I restrict our sample to cells consisting a mine. Thus I leave out the control group of cells containing no mines. I find that as foreign policy uncertainty doubles, cells have an increase in economic activity by 1.6%. On including the controls the effect is largely unchanged.

5 Robustness Tests

5.1 Impact Over Time

In the analysis so far I have highlighted the impact of foreign policy uncertainty in period t and investment in period t+1. However, the impact might persist more than a year. In this section I investigate the persistence of the impact. I perform the regression specification (2) with the dependent variable ranging from t to t+3. The results are reported in table (12)

In column 1 the primary dependent variable is the contemporaneous share of capital expenditure. I do not find any significant impact on the capital expenditure in period t. This is in line with the extensive literature that highlights that there exist a capital adjustment cost and consequently capital adjusts slowly (see Hall (2004), Cooper and Haltiwanger (2006) among others). Following this, I find that the impact of policy uncertainty in the period t on foreign establishments occur in the next period as presented in column 2. In column 3 the dependent variable is capital expenditure share two years ahead. I find that as policy uncertainty in a country increases by 100%, investment in foreign plants and consequent spillover increases by 70 basis points. However, I do not find the impact to persist after 2 years. In columns 5 to 8 the dependent variable is development capital expenditure. The results are qualitatively similar and I find that the effect persists for 2 years following policy uncertainty.

5.2 Control for Expectation

One of the major challenge to study the impact of uncertainty in general and policy related uncertainty in particular is to separate news that impacts uncertainty from the news that affects the conditional mean. For the purpose of this paper, such effect on mean could confound the inference of policy uncertainty having a positive impact on investment in foreign establishments. To alleviate this concern I toe Hassan, Hollander, van Lent, and Tahoun (2017) and Gulen and Ion (2015) and control for broad based indices for business sentiment. The idea is that the business sentiment and consumer sentiment would capture the expected changes of a possible policy and thereby controlling for it, I could be able to disinter the impact. I include measures of business confidence index and composite leading indicators collated by OECD.[26] The results are reported in table (13).

[26]For the measure of business confidence I use business confidence index is obtained from: *OECD (2019), Business confidence index (BCI) (indicator). doi: 10.1787/3092dc4f-en* and composite leading indicator is

In columns 1 and 2 the dependent variables are share of capital expenditure and share of development capital expenditure respectively. The primary explanatory variables are natural logarithm of policy uncertainty and the interaction with foreign establishments, standardized business sentiment and interaction of foreign sentiment and finally the interaction of standardized composite indicator and foreign establishments. The idea being that the latter two terms would control for the first moment impacts on investment in foreign establishments and thus allow me to identify the spillover particularly emanating from policy uncertainty. I find that as policy uncertainty doubles, investment (share of value of mines) in foreign establishment increases by 60 basis points similar in magnitude as observed in section (4.3). However I do not find any significant impact of the sentiment indicators. For a more comparable analysis on the magnitudes, in columns 3 and 4, I replace the policy uncertainty measure from natural logarithm to standardized EPU index. I find that the effect on investment in foreign mines only occurs as standardized policy uncertainty increases and there is no significant impact of the sentiment index. Finally, in columns 4 and 5, the main explanatory variable is standardized residual obtained from regressing policy uncertainty index on the sentiment indicators. As our earlier results I find that as this measure of policy uncertainty increases investment in foreign mines also increases.

Another possible impediment to the causal inference of this study is that, the impact I identify could be a result of implementation of a policy rather than the uncertainty regarding the policy itself. To address this concern I intend to see if there is any difference in the relationship of policy uncertainty and investment in foreign establishments between periods that uncertainty is followed by a positive sentiment and periods when uncertainty is followed by a negative sentiment. I use our measure of sentiment as described above and estimate the following regression specification

$$\begin{aligned}\left(\frac{CAPEX_{jp(i)t}}{Value_{jp(i)t-1}}\right) \quad = \quad & \beta_1 Log(EPU_{j,t-1}) \times Foreign_{ji} \times Positive_{j,t} + \\ & \beta_2 Log(EPU_{j,t-1}) \times Foreign_{ji} \times Negative_{j,t} \\ & + \beta_{jt} + \beta_{ji} + \beta_p + \sum_c \beta^c_{it} + \epsilon_{jit} \qquad (11)\end{aligned}$$

If policy uncertainty is driving the effect then I the coefficients of β_1 and β_2 is supposed to be statistically indistinguishable. The results reported in table (14) shows the same, thus underlining our thesis that it is the policy uncertainty that drives the impact on investment.

obtained from: *OECD (2019), Composite leading indicator (CLI) (indicator). doi: 10.1787/4a174487-en*

5.3 Alternate Measure of Policy Uncertainty - Uncertain National Elections

In this section, I use an alternate definition of policy uncertainty using years imminent to national elections. I further group elections as more and less uncertain elections in two ways: i) More uncertain election being the ones where the difference between the vote share of winner and runner up is less than 5%. ii) More uncertain elections being the elections with higher than average effective number of parties (ENOP). Where, $ENOP = \frac{1}{\sum_{i=1}^{n} p_i^2}$. I perform the following regression analysis and test if the impact is higher during periods of more uncertain elections.

$$\begin{aligned}\left(\frac{CAPEX_{jp(i)t}}{Value_{jp(i)t-1}}\right) &= \beta_1 MoreUncertainElection \times Foreign_{ji} + \\ &\beta_2 LessUncertainElection \times Foreign_{ji} \\ &+\beta_{jt} + \beta_{ji} + \beta_p + \sum_c \beta_{it}^c + \epsilon_{jit} \end{aligned} \tag{12}$$

The results are reported in table 15. It shows that during the period imminent to foreign uncertain elections capex share increases by around 40 basis points, while during non uncertain elections, there is no significant increase in investment. I also plot investment around the uncertain election cycles in foreign countries in figure 8. The figure shows a significant increase in the period 0, which is the year just prior to uncertain elections. However, there is no significant impact in the other periods.

5.4 Controlling for Global Policy Uncertainty Index

As noted in section (2.2) I showed that there exist some correlation of economic policy uncertainty index across different countries. Thus, one possibility could be that a global policy uncertainty index is possibly driving the result.[27] To address this I project epu of each country on the global policy uncertainty and obtain the residuals and standardized the residual. Global policy uncertainty index is the gdp weighted average of the policy uncertainty index of the countries that has epu data. I estimate our primary regression specification with the exception that the measure of policy uncertainty is the standardized residual instead of the natural logarithm of the index. The results are presented in table (16).

[27] It should be noted that our empirical analysis is driven by difference in policy uncertainty of firms headquartered and hence by the virtue of our empirical design I differentiate any common trend

In column 1 I find that as residual policy uncertainty index increases by 1 standard deviation, capex ratio in foreign establishments increases by 20 basis points. Given that the average is 80 basis points, it shows an increase by 25%. In column 2 I group a country pair by whether they have a signed bilateral investment treaty and without any bilateral treaty. In line with our existing results I find that the impact particularly being driven by countries with signed BITs. In column 3 I group firms based on their financial constraint and find support for our initial assertion that the impact is driven by firms with a tighter financial constraint. I find qualitatively similar results in columns 4-6 where the dependent variable is development capital expenditure.

5.5 Alternate Definition of the Origin of Policy Uncertainty

In the analysis so far I have identified the parent country of the firm where the headquarter is located. However, one possible concern can be that firms might not operate where there headquarters are and consequently reallocation is likely to occur from places with the biggest operation. Consequently, to alleviate this concern I now identify the parent country of the establishment as the country which has the largest amount of operations of the firm and not its headquarters. Though it is important to note that in our sample a large majority of firms have headquarters in the same country as their largest operation.[28] I estimate the baseline specification using the policy uncertainty index of the country of the country of the firm with largest operation and report the result in table (17)

The primary dependent variable is the capital expenditure share. In columns 1 and 2 the main explanatory variable is the natural logarithm of EPU. In column 1 I find 20 basis points increase in investments when policy uncertainty doubles in the country where the firm (of which the establishment is a part of) has its largest operation. In column 2 I include firm×year fixed effects and find that the magnitude increases to 70 basis points. I find qualitatively similar results in columns 3 and 4 where I measure policy uncertainty by taking the residual from the global policy uncertainty index.

I also exploit the fact that some firms have their main operations in countries outside its headquarters. Since headquarters of the firma also the source of the primary funding for firms, I can test the cross sectional prediction of whether the instance where the largest operations belong to the headquarters vis-a-vis where they do not belong there. The results are reported in table (18). I find that the firms increase their investment only when the policy uncertainty increases in the headquarter location that also corresponds to the country

[28] The main exception to this is firms headquartered in UK and firms headquartered in Japan

of the main operations of the firm (column 1). However, if this is not the case I do not find any impact (column 2).

5.6 External Validity - Compustat Segment Data

In this section I provide some external validation of the impact that I observe so far through the use of segment data in compustat. The idea is to show that beyond the mining sector sector firms tend to shift investment outside US during periods of high policy uncertainty. The identification is driven by the difference in investment by a firm in US vis-a-vis foreign economy during periods of elevated policy uncertainty. To test this in the data I perform the following regression specification, where I regress the natural logarithm of segment i of industry k operating in country j in time t. The main variable of interest is β_1. The regression also includes segment and industry $\times$ year fixed effects. As the data only has firms from 1 particular country, we are not able to include operating country $\times$ year fixed effects as before and hence I cannot control for local factors in the country that might drive the impacts.

$$log(CAPEX)_{i(k)jt} = \beta_1 EPU_{jt-1} \times Foreign_{ji} + \beta_i + \beta_{kt} + \epsilon_{ijt} \tag{13}$$

The result from the regression is reported in table (19). In column 1 I find that as policy uncertainty in US increases by 1%, capital expenditure in foreign economies increases by 0.26%. In columns 2 and 3 I divide the sample between big and small firms with the former being the top tercile while the latter being the bottom tercile. I find that the result is more pronounced in the sample of smaller firms which furthers the story that the impact is driven by financially constrained firms. In the last column I look at the share of capex by a firm in the foreign economy.[29] The results are qualitatively similar as before.

6 Concluding Remarks

In this paper, I provide microeconomic evidence which highlight that firms operating in multiple countries can lead to propagation of policy uncertainty between countries. I particularly show a scenario where multinational firms, subjected to elevated policy uncertainty in a region increases investment in other countries. The economic rationale being that elevated

[29] As explained in appendix this prevents double counting and non-parametrically accounts for firm$\times$ year fixed effects

policy uncertainty in a region causes firms to reduce investment from that country and shift its capital to the other. The set up that utilizes establishment level data of mining firms allows me to address several identification issues. Firstly, the data comprising of mining establishments of firms belonging to different countries, helps me to separate policy uncertainty originating from other countries from local economic shocks. Secondly, the data allows me to exploit variations in within firm allocation of resources across countries. Finally, in the mining industry there is neither much complementarity nor input-output linkages across mines. Consequently I could neatly identify reallocation as the mechanism of propagation.

I next look at the cross sectional heterogeneity in firms' choice to reallocate capital. I find the reallocation to be particularly higher for firms with stricter financial constraint. I also find that during policy uncertainty in home country, firms tend to invest more in their foreign establishments that are located in countries which provide better protection from expropriation risk and consequently stronger property rights. Finally, I show that the reallocation leads to improvement in real economic activity around foreign owned mines. Thus in the scenario of this article policy uncertainty in foreign economies lead to a positive spill over in real economic activity which highlights a bright side of policy uncertainty.

This article thus provides evidence of a scenario where multinational firms, through their ability to internally allocate resource tend to stabilize regional shocks from blowing up into a global crisis.

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Figure 1: Domicile Countries of Mining Firms

The picture shows the location of the head quarters of mining companies across the world. It can be seen that Australia and Canada are the major location of the mining companies.

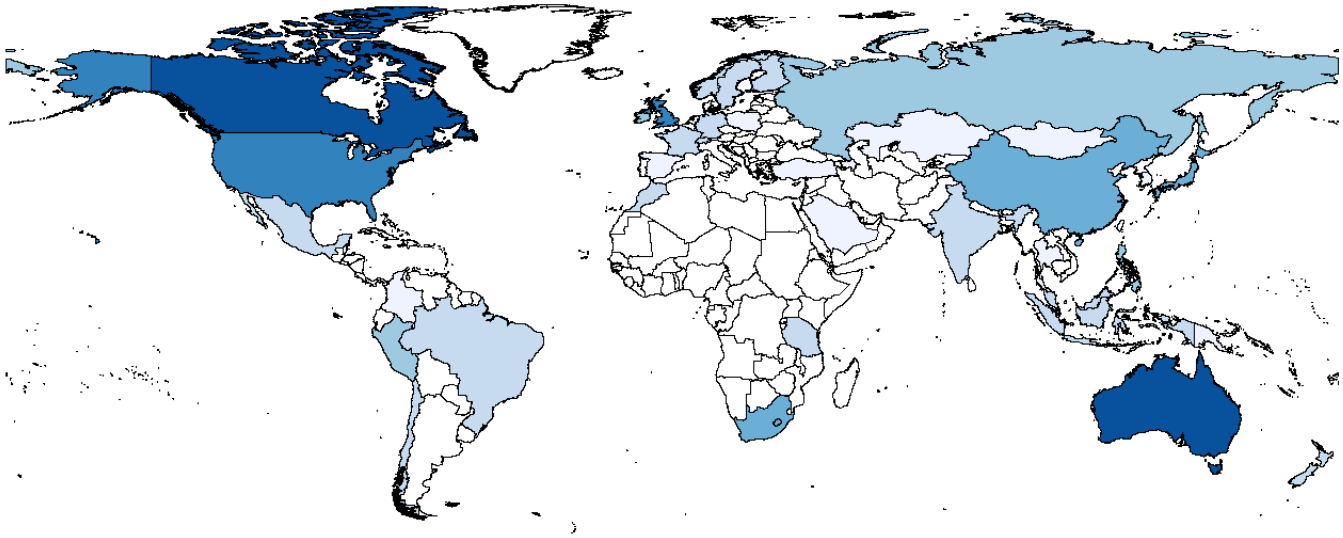


Figure 2: Average Exploration Expenditure Spent in Countries

The following picture shows the average amount spent in exploration by the mining companies across different countries across the world.

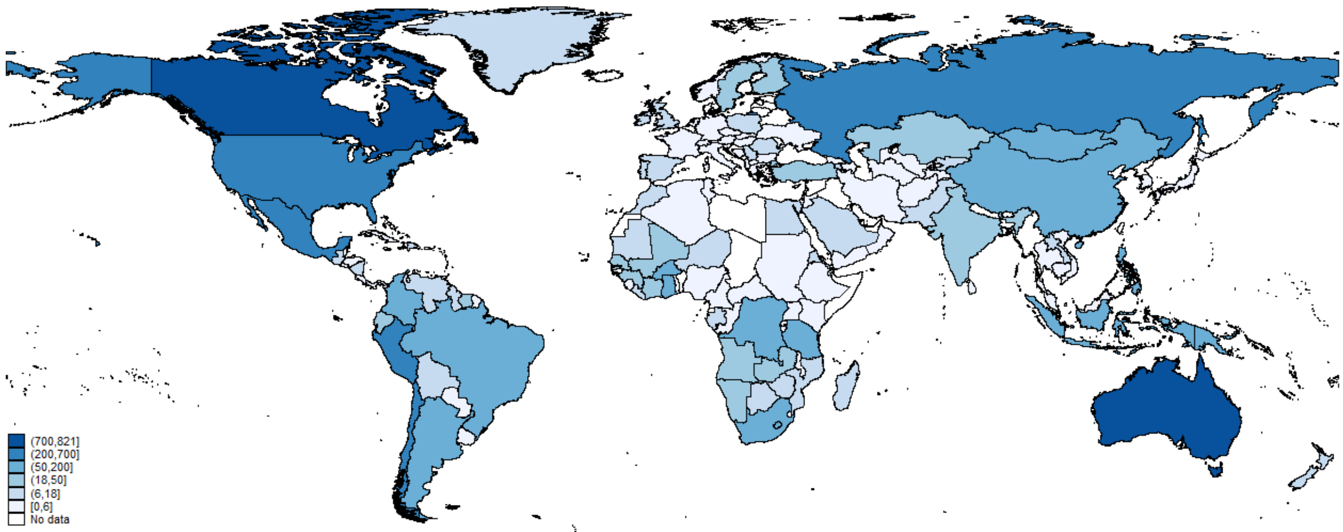


Figure 3: Number of BITs Signed Over Years

The following picture shows the number of BITs that were signed each year between two country pairs.

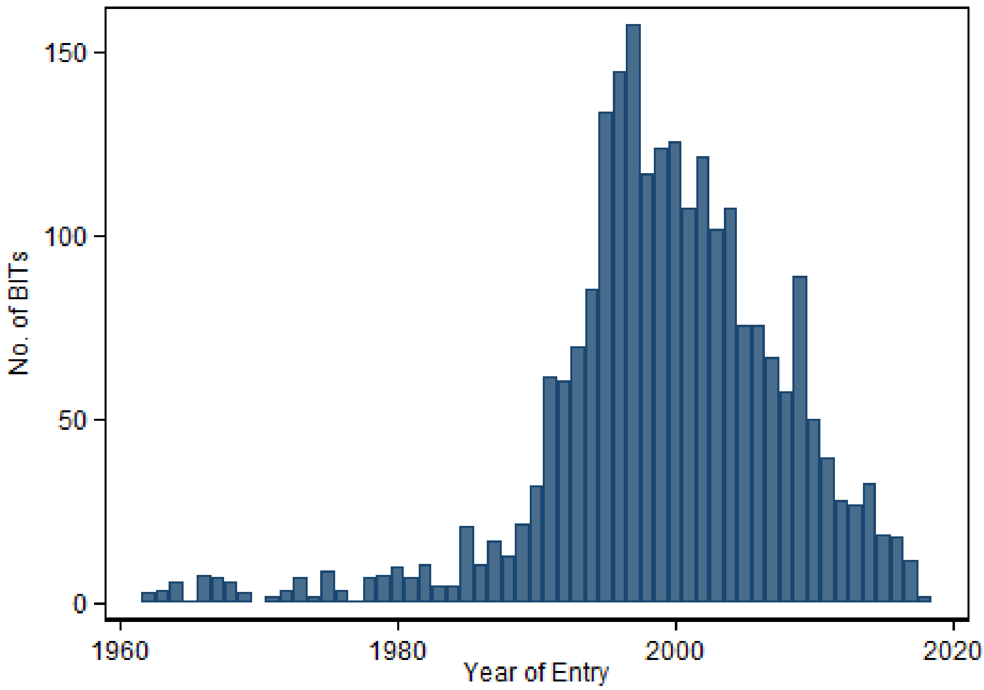


Figure 4: Distribution of BITs Across Countries

The following picture shows the distribution of BITs across countries. The darker shades are the countries with higher number of bilateral treaties signed.

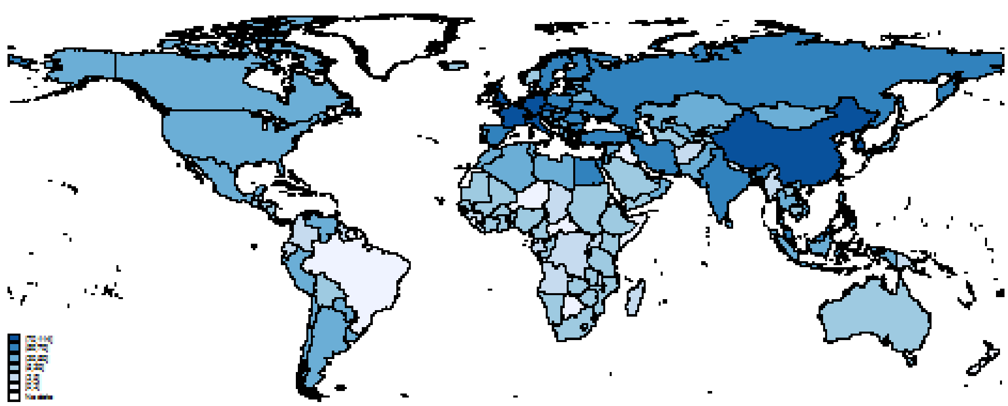


Figure 5: Cells Containing Mines and Nighttime Light

The following picture shows the cells in each country that consists at least one mine

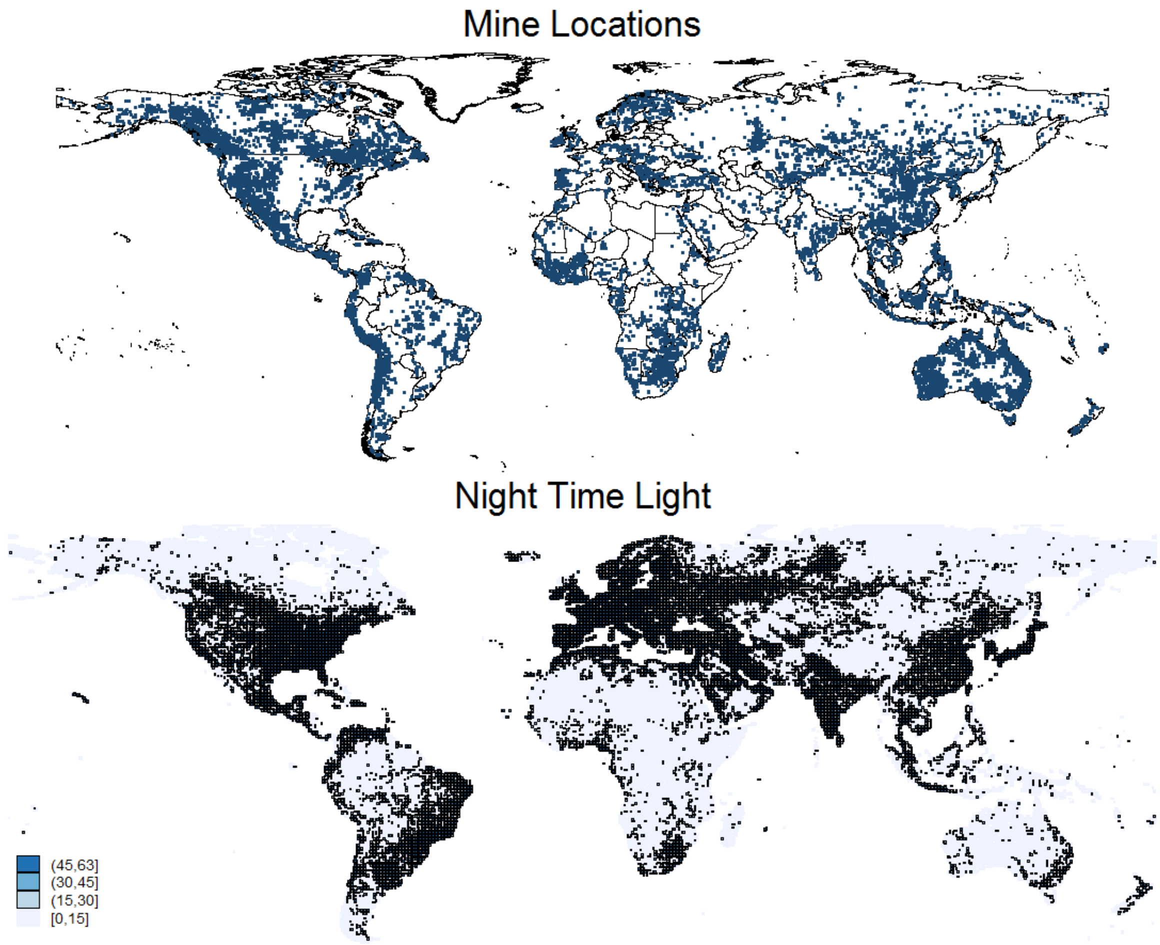


Figure 6: Local Vs. Foreign Economic Policy Uncertainty

The following figure plots the relationship between policy uncertainty index and exploration expenditure by the firms. The left panel plots the relationship between policy uncertainty index of the country of operation and the exploration expenditure. The right panel plots the relationship between policy uncertainty index of the domicile country of the firm and exploration expenditure in other countries. To plot the graph, I demean the policy uncertainty index of each country and sort them in 100 buckets. I plot the mean of the index and exploration amount of each bucket. The graph provides the contrast between the impact caused by local and foreign policy uncertainty.

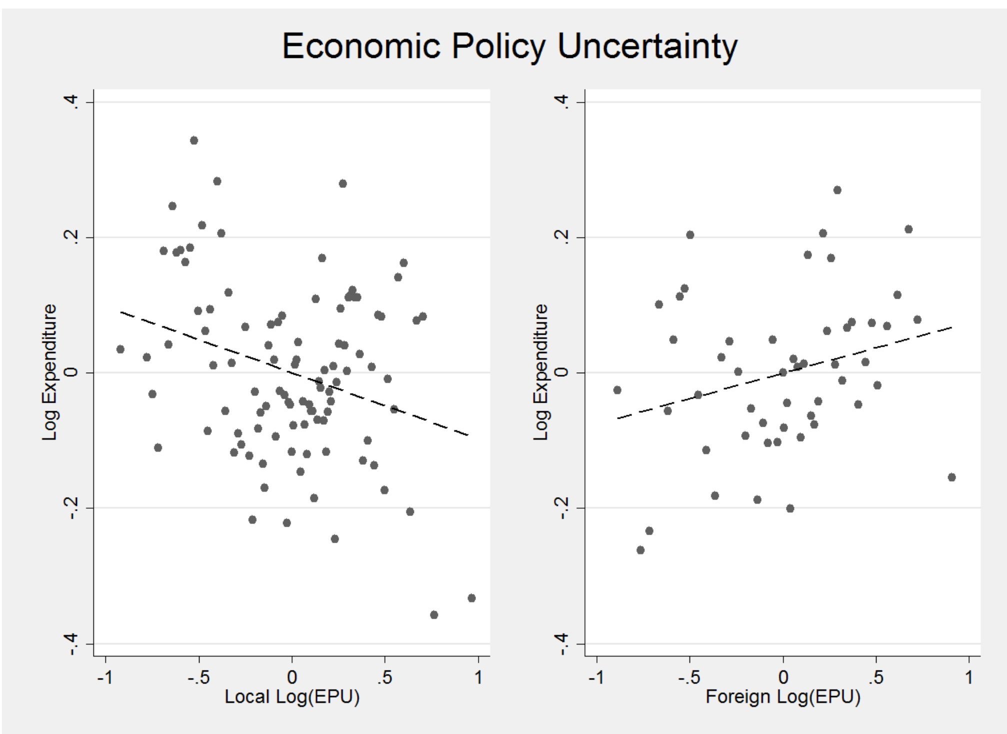


Figure 7: Local Vs. Foreign GDP Decline

The following figure plots the relationship between GDP decline (negative of growth) and exploration expenditure by the firms. I use decline instead of growth to interpret it as a negative shock. The left panel plots the relationship between GDP decline of the country of operation and the exploration expenditure. The right panel plots the relationship between GDP decline of the domicile country of the firm and exploration expenditure in other countries. To plot the graph, I demean the GDP decline of each country and sort them in 100 buckets. I plot the mean of the GDP decline (demeaned) and exploration amount of each bucket. The graph provides the contrast between the impact caused by local and foreign GDP decline.

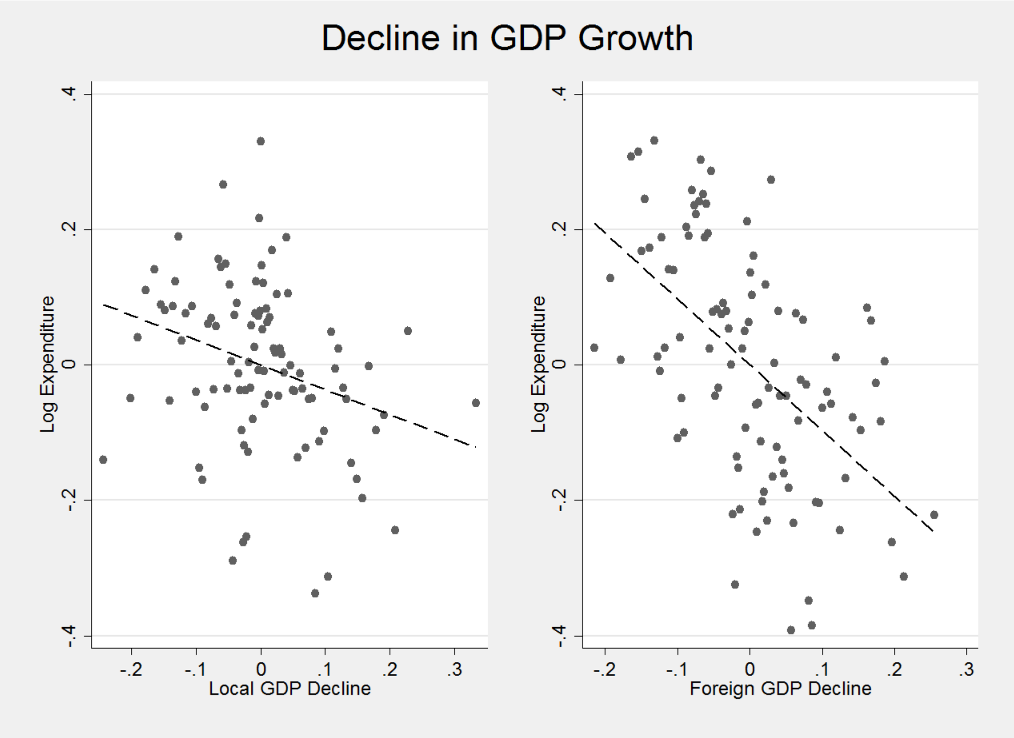


Figure 8: Investment Around Uncertain Elections in The Domicile Country of Firms

The following figure plots the relative investment in mines when their parent country is subject to uncertain elections uncertain elections in their respective home country.

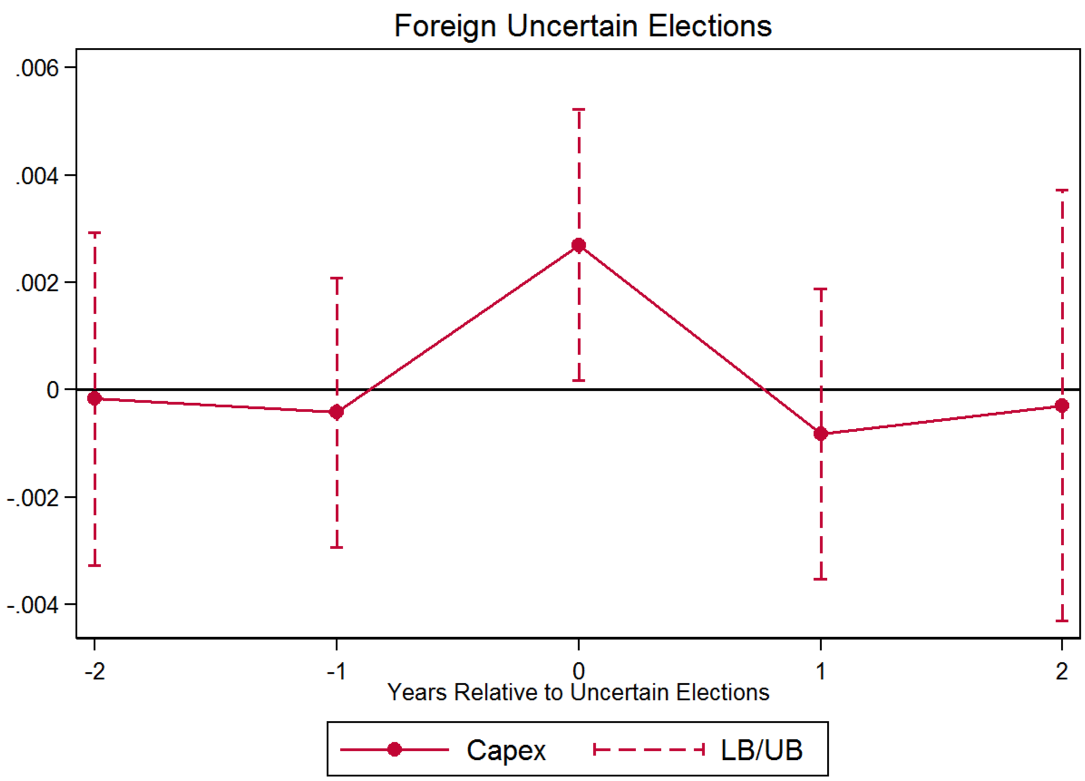


Table 1: Summary Statistics

The following table lays down the summary statistics of the primary variables employed in our analysis. Panel A provides the summary statistics at the firm-year level. There are 1200 firms in our sample operating in around 100 countries over 2002 to 2016. Panel B provides the summary statistics of the country where the firms operate. Finally in panel C, I provide summary statistics on the subset of mining properties for which I have data on the yearly investment. The subset includes investment detail in active mines of 14 commodities. Of the 14 commodities the data provides information on mines covering an average of 60% to total output.

Panel A: Firm-Year Level (1200)					
	Mean	St Dev	P25	P50	P75
No. of Properties	24.27	30.73	5	11	30
No. of Commodities mined	3.59	3.18	1	1	3
No. of Countries	4.7	4.22	2	3	5
Exploration Budget	23.56	62.27	0.6	2.1	11.2

Panel B: Country-Year Level (102)					
	Mean	St Dev	P25	P50	P75
No. of Commodities	20.41	9.68	12	22	28
No. of Countries Investing	15.21	7.17	10	14	22
Exploration Budget Received	388.64	514.92	34.9	135.8	579.8

Panel C: Property-Year Level (928 properties in 34 countries)					
	Mean	St Dev	P25	P50	P75
Value of Mines	53.92	13.61	2.21	7.57	26.62
CAPX/Value of Mines	0.008	0.01	0.001	0.003	0.008
Development CAPX/Value of Mines	0.005	0.009	0	0.002	0.004
Sustainable CAPX/Value of Mines	0.003	0.006	0.0003	0.002	0.003

Table 2: Correlation Matrix

The following table presents the pairwise correlation of the policy uncertainty index of the countries in our sample

	AUS	BRA	CAN	CHL	CHN	FRA	DEU	IND	ITA	JPN	MEX	RUS	ESP	SWE	GBR	USA
AUS	1.00															
BRA	0.05	1.00														
CAN	0.46	0.47	1.00													
CHL	0.15	0.60	0.36	1.00												
CHN	0.27	0.74	0.86	0.41	1.00											
FRA	0.56	0.66	0.83	0.47	0.80	1.00										
DEU	0.67	0.64	0.83	0.51	0.81	0.93	1.00									
IND	0.85	-0.14	0.29	0.03	0.05	0.42	0.43	1.00								
ITA	0.67	-0.05	0.40	0.27	0.10	0.55	0.55	0.65	1.00							
JPN	0.90	0.25	0.42	0.24	0.37	0.56	0.71	0.69	0.54	1.00						
MEX	0.00	-0.29	-0.30	-0.20	-0.24	-0.41	-0.31	-0.19	-0.15	-0.05	1.00					
RUS	0.13	0.68	0.64	0.77	0.61	0.74	0.64	0.11	0.28	0.16	-0.62	1.00				
ESP	0.63	0.37	0.54	0.50	0.53	0.63	0.75	0.27	0.55	0.60	0.31	0.31	1.00			
SWE	0.49	0.48	0.89	0.68	0.73	0.79	0.82	0.32	0.48	0.46	-0.34	0.79	0.59	1.00		
GBR	0.40	0.77	0.78	0.45	0.91	0.91	0.90	0.14	0.32	0.51	-0.28	0.66	0.66	0.72	1.00	
USA	0.85	0.29	0.78	0.19	0.63	0.77	0.81	0.63	0.59	0.78	0.02	0.31	0.71	0.69	0.68	1.00

Table 3: Cell Specific Summary Statistics

The following table provides summary statistic at the cell level. Each cell is an artificially drawn boundary with the area 55 × 55 km^2. I plot the mines in our sample in such cells. I also compute the night-time light that each cells receive and other measures like rainfall, time period of drought among others.

	Mean	St Dev	P25	P50	P75
No. of Mines (M>0)	2.59	3.82	1	1	3
No. of Countries (M>0)	1.57	0.95	1	1	2
Pr(M>0)	0.15	0.36	0	0	0
Pr(M>1)					
All Cells	0.06	0.25	0	0	0
M>0	0.46	0.49	0	0	1
Pr(F>0)					
All Cells	0.1	0.31	0	0	0
M>0	0.71	0.46	0	1	1
Night time Light					
All Cells	15.62	21.69	0	4	27
Mines	21.11	22.63	0	11	41
Foreign Mines	20.35	20.2	0	10	39
Precipitation (in mm)					
All cells	20.12	17.71	8.31	15.37	26.60
Mines	21.11	19.14	8.48	15.39	27.21
Foreign Mines	22.35	20.86	8.24	15.91	29.14
Drought (Proportion of months)					
All Cells	0.07	0.11	0	0	0.125
Mines	0.07	0.1	0	0	0.1
Foreign Mines	0.07	0.1	0	0	0.1

Table 4: Effect of local shocks versus shocks at the parent location

In this table I present the the differential effects of local economic shock vs. shock at the parent location (foreign economic shocks). I use two different kind of economic shocks: economic policy uncertainty and gdp decline. I multiply GDP growth with -1, to have an interpretation of negative shocks. The table reports the result from the following regression specification:
$Log(ExplorationExpend_{ijt}) = \beta_1 Log(EPU_{j,t-1}) \times Foreign_{ji} + \beta_2 Log(EPU_{i,t-1}) + \beta_3 GDPgrowth_{j,t-1} \times Foreign_{ji} + \beta_4 GDPgrowth_{i,t-1} + \beta_{ji} + \epsilon_{jit}$
In the first column I include local and foreign policy uncertainty index. In the second I add local and foreign GDP growth. The idea is to see how local and foreign shocks to uncertainty have opposite effects while local and foreign shocks to GDP growth have similar effects. The standard errors are clustered at the level of the the firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

	Share of Expenditure	Share of Expenditure	log(1+Expenditure)	log(1+Expenditure)
	(1)	(2)	(3)	(4)
Local Log(EPU)	-0.034***	-0.031***	-0.122***	-0.076**
	(0.007)	(0.007)	(0.031)	(0.031)
Foreign Log(EPU)	0.022**	0.025***	0.186***	0.261***
	(0.009)	(0.009)	(0.056)	(0.056)
Local GDP decline		-0.059***		-0.457***
		(0.016)		(0.073)
Foreign GDP decline		-0.021		-1.135***
		(0.013)		(0.074)
Firm × Country FE	Yes	Yes	Yes	Yes
Adj.-R^2	0.698	0.698	0.565	0.572
Obs.	27106	27099	27106	27099

Table 5: Firms' Decision to Allocate Investment During Policy Uncertainty

In this table I present the impact of domestic political uncertainty on the allocation of exploration expenditure among the domestic and foreign economies. In panel A, the exploration budget by every mining company located in a country is aggregated and the analysis is done at the country level. While in panel B, the analysis is done at the firm level. Policy uncertainty is measured as the natural logarithm of the yearly average of news-based economic policy uncertainty index. The table below report the estimation using the following regression specification:

$Y_{jt} = \beta_1 Log(EPU_{j,t-1}) + \beta_j \beta_t + \epsilon_{jt}$

In columns 1 the main dependent variable is share of expenditure in foreign economies. In columns 3 and 4 and 5 the dependent variable is log (1+exploration expenditure) spend in foreign countries, domestic countries and overall respectively. The standard errors are clustered at the level of firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

Panel A: Country-Year Panel

	Share of Foreign	Foreign	Domestic	Total
	(1)	(2)	(3)	(4)
$Log(EPU_{t-1})$	0.072^{**}	0.156^{***}	-0.243^{***}	-0.071
	(0.030)	(0.054)	(0.088)	(0.080)
Country FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Adj.-R^2	0.804	0.686	0.866	0.872
Obs.	270	303	303	303

Panel B: Firm-Year Panel

	Share of Foreign	Foreign	Domestic	Total
	(1)	(2)	(3)	(4)
$Log(EPU_{t-1})$	0.035^{**}	0.033^{**}	-0.081^{***}	-0.024
	(0.017)	(0.013)	(0.026)	(0.025)
Firm	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Adj.-R^2	0.674	0.749	0.669	0.671
Obs.	12494	12494	14508	18285

Table 6: Effect of Policy Uncertainty on Exploration Expenditure of Firms

In this table I present the impact of policy uncertainty originating in foreign countries and exploration budget received from a firm headquartered in that country. The identification comes from comparing exploration expenditure received from firms varying in their exposure to policy uncertainty by the virtue of being headquartered in different countries. Policy Uncertainty is measured as the natural logarithm of economic policy uncertainty index. The table below presents the estimate from the following regression specification:

$Y_{jit} = \beta_1 Log(EPU_{j,t-1}) \times Foreign_{ji} + \beta_{jt} + \beta_{ji} + \beta_{it} + \epsilon_{jit}$

Here j, i and t represents firm, country of operation and time respectively. In columns 1 and 2 the dependent variable is the logarithm of 1+budget expenditure). In coulmn 3 and 4 the dependent variable is the share of expenditure of firm j in country i in time t. In columns 1,3 I do not include Firm × year FEs while in columns 2 and 4 I include them. The standard errors are clustered at the level of the firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

	log(1+Expenditure)	log(1+Expenditure)	$\frac{Expenditure}{\sum Expenditure}$	$\frac{Expenditure}{\sum Expenditure}$
	(1)	(2)	(3)	(4)
Foreign × $Log(EPU_{t-1})$	0.219**	0.666***	0.017**	0.101***
	(0.108)	(0.183)	(0.008)	(0.026)
Firm × Destination Country FE	Yes	Yes	Yes	Yes
Destination Country × Year	Yes	Yes	Yes	Yes
Firm × Year	No	Yes	No	Yes
Adj.-R^2	0.586	0.679	0.620	0.632
Obs.	32080	32080	32080	32080

Table 7: Effect of Policy Uncertainty on mine Level Investment

In this table I present the impact of policy uncertainty originating in foreign countries and establishment level investment from a firm headquartered in that country. The identification comes from comparing exploration expenditure received from firms varying in their exposure to policy uncertainty by the virtue of being headquartered in different countries. Policy Uncertainty is measured as the natural logarithm of economic policy uncertainty index. The table below presents the estimate from the following regression specification:

$Y_{jp(i)t} = \beta_1 Log(EPU_{j,t-1}) \times Foreign_p + \beta_{jt} + \beta_p + +\beta_{ji} + \sum_c \beta^c_{it} + \epsilon_{jpt}$

Here p, j, i and t represents mining establishment, firm, country of operation and time respectively. The main dependent variable in columns 1 and 2 is the share of total capital expenditure to the value of mines. I group this further into development capital expenditure (columns 2 and 3) and sustainable capital expenditure (columns 4 and 5). In columns 1,3 and 5 I do not include Firm × year FEs while in columns 2, 4 and 6 I include them. The standard errors are clustered at the level of the firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels. The standard errors are clustered at the level of the home country of firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels. Robust t-statistics in brackets

	$\frac{capex_{it}}{Value_{it-1}}$ (1)	$\frac{capex_{it}}{Value_{it-1}}$ (2)	$\frac{Devcapex_{it}}{Value_{it-1}}$ (3)	$\frac{Devcapex_{it}}{Value_{it-1}}$ (4)	$\frac{Sustcapex_{it}}{Value_{it-1}}$ (5)	$\frac{Sustcapex_{it}}{Value_{it-1}}$ (6)
Foreign × $Log(EPU_{t-1})$	0.002**	0.006***	0.001*	0.004**	0.001	0.001
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)
Destination Country × Commodity × Year	Yes	Yes	Yes	Yes	Yes	Yes
Firm × Destination Country	Yes	Yes	Yes	Yes	Yes	Yes
Mine	Yes	Yes	Yes	Yes	Yes	Yes
Firm × Year	No	Yes	No	Yes	No	Yes
Adj.-R^2	0.586	0.735	0.509	0.635	0.588	0.786
Obs.	6054	6054	6054	6054	6054	6054

Table 8: Effect of Policy Uncertainty on Property Level Output

In this table I present the impact of policy uncertainty originating in foreign countries and establishment level output of a firm headquartered in that country. The identification comes from comparing exploration expenditure received from firms varying in their exposure to policy uncertainty by the virtue of being headquartered in different countries. Policy Uncertainty is measured as the natural logarithm of economic policy uncertainty index. The table below presents the estimate from the following regression specification:

$Y_{jp(i)t} = \beta_1 Log(EPU_{j,t-1}) \times Foreign_p + \beta_{jt} + \beta_p + +\beta_{ji} + \sum_c \beta^c_{it} + \epsilon_{jpt}$

Here p, j, i and t represents mining establishment, firm, country of operation and time respectively. The standard errors are clustered at the level of the firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

	Production	Log(Output)	Log(1+Output)	Log(Output Value)	Log(1+Output Value)
	(1)	(2)	(3)	(4)	(5)
Foreign × $Log(EPU_{t-1})$	0.007	0.163**	0.048	0.198**	0.210
	(0.034)	(0.081)	(0.267)	(0.100)	(0.301)
Destination Country × Commodity × Year	Yes	Yes	Yes	Yes	Yes
Firm × Destination Country	Yes	Yes	Yes	Yes	Yes
Mine	yes	yes	yes	yes	yes
Firm × Year FE	Yes	Yes	Yes	Yes	Yes
Adj.-R^2	0.588	0.895	0.634	0.858	0.643
Obs.	37313	18772	37313	17944	35792

Table 9: Financial Constraint and Investment

In this table I present the heterogeneity in the impact of policy uncertainty originating in foreign countries and establishment level investment of a firms varying in their degree of financial constraint. The table below presents the estimate from the following regression specification:

$$\left(\frac{CAPEX_{jp(i)t}}{Value_{jp(i)t-1}}\right) = \beta_1 Log(EPU_{j,t-1}) \times Foreign_{ji} \times HighConstrained_{it-1} + \beta_2 Log(EPU_{j,t-1}) \times Foreign_{ji} \times LowConstrained_{it-1} + \beta_{jt} + \beta_{ji} + \beta_p + \sum_c \beta^c_{it} + \epsilon_{jit}$$

Here p, j, i and t represents mining establishment, firm, country of operation and time respectively. The main dependent variable are capital expenditure to the value of mines and development capital expenditure. In columns 1 and 2 financial constrained is proxied by previous period's leverage. In columns 3 and 4 financial constraint is proxied by size and in columns 5 and 6 financial constraint is proxied by size-age index. The standard errors are clustered at the level of the firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

	Leverage		Size		Size-Age	
	$\frac{capex_{it}}{Value_{it-1}}$	$\frac{Devcapex_{it}}{Value_{it-1}}$	$\frac{capex_{it}}{Value_{it-1}}$	$\frac{Devcapex_{it}}{Value_{it-1}}$	$\frac{capex_{it}}{Value_{it-1}}$	$\frac{Devcapex_{it}}{Value_{it-1}}$
	(1)	(2)	(3)	(4)	(5)	(6)
High Constrained × Foreign × $Log(EPU_{t-1})$	0.008***	0.006***	0.013***	0.011***	0.012***	0.010***
	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Low Constrained × Foreign × $Log(EPU_{t-1})$	0.001	0.001	0.003*	0.002	0.004*	0.003
	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)
Difference (1- 2)	0.007***	0.005**	0.010***	0.008***	0.007**	0.006**
Destination Country × Commodity × Year	Yes	Yes	Yes	Yes	Yes	Yes
Firm × Destination Country	Yes	Yes	Yes	Yes	Yes	Yes
Mine	Yes	Yes	Yes	Yes	Yes	Yes
Firm × Year	Yes	Yes	Yes	Yes	Yes	Yes
Adj.-R^2	0.736	0.635	0.736	0.635	0.742	0.636
Obs.	6054	6054	6054	6054	5647	5647

Table 10: Effect of Policy Uncertainty on Establishment Level Investment and Role of Institution

In this table I investigate if firms invest more in countries which provide a better institutional set up to operate as a response to policy uncertainty in their home country. The table below presents the estimate from the following regression specification:

$$\left(\frac{CAPEX_{jp(i)t}}{Value_{jp(i)t-1}}\right) = \beta_1 Log(EPU_{j,t-1}) \times Foreign_{ji} \times BIT_{jit} + \beta_2 Log(EPU_{j,t-1}) \times Foreign_{ji} \times NoBIT_{jit} + \beta_3 BIT_{jit} + \beta_{jt} + \beta_{ji} + \beta_p + \sum_c \beta^c_{it} + \epsilon_{jit}$$

Here p, j, i and t represents mining establishment, firm, country of operation and time respectively. The main dependent variable are capital expenditure to the value of mines and development capital expenditure. BIT_{jit} is a dummy if the country of the headquarter of firm j has a signed bilateral treaty with the country i in time t. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

	$\frac{capex_{it}}{Value_{it-1}}$ (1)	$\frac{Devcapex_{it}}{Value_{it-1}}$ (2)	$\frac{Sustcapex_{it}}{Value_{it-1}}$ (3)
BIT × Foreign × $Log(EPU_{t-1})$	0.009***	0.009***	-0.000
	(0.003)	(0.003)	(0.002)
No BIT × Foreign × $Log(EPU_{t-1})$	0.004**	0.004**	0.000
	(0.002)	(0.002)	(0.001)
Difference (1-2)	0.005*	0.005*	0.000
Destination Country × Commodity × Year	Yes	Yes	Yes
Firm × Destination Country	Yes	Yes	Yes
Mine	Yes	Yes	Yes
Firm × Year	Yes	Yes	Yes
Adj.-R^2	0.736	0.635	0.786
Obs.	6054	6054	6054

Table 11: Impact on Economic Activity Around Mines

In this table I investigate if policy uncertainty in a country impact economic activity around the mining operations in foreign economies. I measure economic activity using night light density. The unit of observations are cells, which are a standardized spatial grid structure with global coverage at a resolution of 0.5 × 0.5 decimal degrees (55 × 55 sq.km). For each cell I know if it has a mine, whether the mine is owned by a company in another country and the political uncertainty index for the foreign country. The table provides the estimate from the following regression specification:

$Y_{kjt} = \beta_1 Log(EPU_{i,t-1}) \times Foreign_k + \beta_{jt} + \beta_i + \epsilon_{kjt}$ The first two columns include all the cells. Columns 3 and 4 are for for subset of cells with mines in them. The standard errors are clustered at the level of the home country of firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

	Log(1 + NightLight) (1)	Log(1 + NightLight) (2)	Log(1 + NightLight) (3)	Log(1 + NightLight) (4)
Foreign × $Log(EPU_{t-1})$	0.056***	0.044***	0.016**	0.016**
	(0.005)	(0.006)	(0.008)	(0.008)
Home Country × Year	Yes	Yes	Yes	Yes
Cell	Yes	Yes	Yes	Yes
Control	No	Yes	No	Yes
Adj.-R^2	0.955	0.955	0.946	0.946
Obs.	828884	488010	130228	96316

Table 12: IMPACT OVER TIME

In this table I present the impact of economic policy uncertainty in period t on investment share of firms in foreign establishment in period t to t+4. I run the baseline specification with the the main explanatory variable if logarithm of policy uncertainty index interacted with foreign dummy. var***, **, * represents statistical significance at the 1%, 5% and 10% levels. Robust t-statistics in brackets

	$\frac{capex_{it}}{Value_{it-1}}$				$\frac{Devcapex_{it}}{Value_{it-1}}$			
	t	t+1	t+2	t+3	t	t+1	t+2	t+3
Foreign × $Log(EPU)$	0.002	0.006***	0.007**	0.003	0.002	0.004**	0.003*	-0.003
	0.002	(0.002)	(0.003)	(0.003)	0.002	(0.002)	(0.001)	(0.002)
Destination Country × Commodity × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm × Destination Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mine	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj.-R^2	0.735	0.735	0.744	0.753	0.635	0.635	0.639	0.660
Obs.	6054	6054	5556	5054	6054	6054	5556	5054

Table 13: Control for Business and Consumer Sentiment

In this table I present the impact of policy uncertainty originating in foreign countries and establishment level investment from a firm headquartered in that country. In addition to the main variable of interest, in the following table I include measures of business sentiment and composite leading indicators of different countries. Both the indices are obtained from OECD database. The idea is to control for any change in sentiment/perception that periods of uncertainty might cause. The table reports result from the following regression specification.

$$\left(\frac{CAPEX_{jp(i)t}}{Value_{jp(i)t-1}}\right) = \beta_1 Log(EPU_{j,t-1}) \times Foreign_{ji} + \beta_2 BusSent_{j,t-1} \times Foreign_{ji} + \beta_2 CompIndic_{j,t-1} \times Foreign_{ji} + \beta_{jt} + \beta_{ji} + \beta_p + \sum_c \beta^c_{it} + \epsilon_{jit}$$

Here p, j, i and t represents mining establishment, firm, country of operation and time respectively. $BusSent_{j,t-1}$ is the business sentiment indicator of the country that firm j is headquartered in the period t-1. $CompIndic_{j,t-1}$ is the composite leading indicator of the country that firm j is headquartered in the period t-1. In the regression specification I standardize all the main variables for comparability. The main dependent variable are capital expenditure to the value of mines and development capital expenditure. The standard errors are clustered at the level of the home country of firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels. Robust t-statistics in brackets

	$\frac{capex_{it}}{Value_{it-1}}$ (1)	$\frac{capex_{it}}{Value_{it-1}}$ (2)	$\frac{capex_{it}}{Value_{it-1}}$ (3)
Foreign × $Log(EPU_{t-1})$	0.005**	0.005*	
	(0.002)	(0.003)	
Foreign × $Resid(EPU_{t-1})$			0.002**
			(0.001)
Foreign × $Positive(CompInd_{t-1})$	-0.000		
	(0.002)		
Foreign × $Positive(BusSent_{t-1})$	0.001		
	(0.002)		
Foreign × $Standardized(BusSent_{t-1})$		0.000	
		(0.001)	
Foreign × $Standardized(CompInd_{t-1})$		-0.001	
		(0.001)	
Foreign × $GDPGrowth_{t-1}$	0.005	0.011	
	(0.008)	(0.010)	
Destination Country × Commodity × Year	Yes	Yes	Yes
Firm × Destination Country	Yes	Yes	Yes
Mine	Yes	Yes	Yes
Firm × Year	Yes	Yes	Yes
Adj.-R^2	0.735	0.735	0.735
Obs.	6054	6054	6054

Table 14: Effect of Policy Uncertainty on Property Level Investment - positive sentiment versus Negative Sentiment

In this table I group policy uncertainty as positive and negative based on the business sentiment that follows the year of the uncertainty. The idea is to see if the impact is just from uncertainty or the sentiment. If the impact is driven only by uncertainty, I should not find any difference between positive or negative uncertainty. To test this I run the following regression specification.

$$\left(\frac{CAPEX_{jp(i)t}}{Value_{jp(i)t-1}}\right) = \beta_1 Log(EPU_{j,t-1}) \times Foreign_{ji} \times Positive_{j,t} + \beta_2 Log(EPU_{j,t-1}) \times Foreign_{ji} \times Negative_{j,t} \beta_{jt} + \beta_{ji} + \beta_p + \sum_c \beta^c_{it} + \epsilon_{jit}$$

Here p, j, i and t represents mining establishment, firm, country of operation and time respectively. $Positive_{j,t}$ is a dummy variable that takes a value 1 if the country in which firm j is headquartered has business sentiment greater than 100 in period t (i.e. one period following the policy uncertainty). The main dependent variable are capital expenditure to the value of mines and development capital expenditure. The standard errors are clustered at the level of the firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels. Robust t-statistics in brackets

	$\frac{capex_{it}}{Value_{it-1}}$ (1)	$\frac{capex_{it}}{Value_{it-1}}$ (2)	$\frac{Devcapex_{it}}{Value_{it-1}}$ (3)	$\frac{Devcapex_{it}}{Value_{it-1}}$ (4)	$\frac{Sustcapex_{it}}{Value_{it-1}}$ (5)	$\frac{Sustcapex_{it}}{Value_{it-1}}$ (6)
Positive × Foreign × $Log(EPU_{t-1})$	0.002**	0.005**	0.001*	0.004**	0.000	0.001
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)
Negative × Foreign × $Log(EPU_{t-1})$	0.002**	0.005**	0.001*	0.004**	0.000	0.000
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)
Destination Country × Commodity × Year	Yes	Yes	Yes	Yes	Yes	Yes
Firm × Destination Country	Yes	Yes	Yes	Yes	Yes	Yes
Mine	Yes	Yes	Yes	Yes	Yes	Yes
Firm × Year	No	Yes	No	Yes	No	Yes
Adj.-R^2	0.586	0.735	0.509	0.635	0.588	0.786
Obs.	6054	6054	6054	6054	6054	6054

Table 15: Robustness: Alternate Measure of Policy Uncertainty - Close Elections

In this table I present the impact of policy uncertainty originating in foreign countries and establishment level investment from a firm headquartered in that country. The identification comes from comparing exploration expenditure received from firms varying in their exposure to policy uncertainty by the virtue of being headquartered in different countries. Policy Uncertainty is considered to be high during periods prior to national elections and particularly when the elections are difficult to predict. The table below presents the estimate from the following regression specification:

$Y_{jp(i)t} = \beta_1 Election \times Foreign_p + \beta_{jt} + \beta_p + +\beta_{ji} + \sum_c \beta^c_{it} + \epsilon_{jpt}$

Here p, j, i and t represents mining establishment, firm, country of operation and time respectively. The main dependent variable in columns 1, 2 and 3 is the share of capital expenditure while in columns 4, 5 and 6 the main dependent variable if the share of development capital expenditure. In columns 1 and 4 the main explanatory variable is the interaction of election and foreign dummy. In columns 2 and 5 elections are grouped between high and low uncertainty based on the difference in vote share. In columns 3 and 6 I group elections as high low uncertainty based on effective number of parties (ENOP). The standard errors are clustered at the level of the home country of firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels. Robust t-statistics in brackets

	$\frac{capex_{it}}{Value_{it-1}}$ (1)	$\frac{capex_{it}}{Value_{it-1}}$ (2)	$\frac{capex_{it}}{Value_{it-1}}$ (3)	$\frac{Devcapex_{it}}{Value_{it-1}}$ (4)	$\frac{Devcapex_{it}}{Value_{it-1}}$ (5)	$\frac{Devcapex_{it}}{Value_{it-1}}$ (6)
Foreign $\times$ $Election_{it+1}$	0.003*			0.003**		
	(0.002)			(0.001)		
Foreign $\times$ $UncElection_{it+1}$		0.004**			0.005***	
		(0.002)			(0.002)	
Foreign $\times$ $NonUncElection_{it+1}$		0.002			0.002	
		(0.002)			(0.001)	
Foreign $\times$ $High\,ENOP_{it+1}$			0.006***			0.004**
			(0.002)			(0.002)
Foreign $\times$ $Low\,ENOP_{it+1}$			-0.001			0.002
			(0.002)			(0.001)
Destination Country $\times$ Commodity $\times$ Year	Yes	Yes	Yes	Yes	Yes	Yes
Firm $\times$ Destination Country	Yes	Yes	Yes	Yes	Yes	Yes
Mine	Yes	Yes	Yes	Yes	Yes	Yes
Firm $\times$ Year	Yes	Yes	Yes	Yes	Yes	Yes
Adj.-R^2	0.747	0.747	0.747	0.641	0.641	0.641
Obs.	5937	5937	5937	5937	5937	5937

Table 16: Robustness - Residual Policy Uncertainty from Global Uncertainty

In this table I define policy uncertainty by regressing policy uncertainty on global policy uncertainty index and obtain the residual. I then standardize the residual and use it as a measure of policy uncertainty ($StdEpu_{t-1}$). In columns 1, 2 and 3 the dependent variable is the share of capital expenditure while in columns 4, 5 and 6 the dependent variable is development capital expenditure. In columns 1 and 4 the main variable of interest is Foreign × $StdEpu_{t-1}$. In columns 2 and 5, I look at difference in the effect of BIT and NoBIT. In columns 3 and 6 I look at difference in financial and non-financial constraint. The standard errors are clustered at the level of the firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

	$\frac{capex_{it}}{Value_{it-1}}$ (1)	$\frac{capex_{it}}{Value_{it-1}}$ (2)	$\frac{capex_{it}}{Value_{it-1}}$ (3)	$\frac{Devcapex_{it}}{Value_{it-1}}$ (4)	$\frac{Devcapex_{it}}{Value_{it-1}}$ (5)	$\frac{Devcapex_{it}}{Value_{it-1}}$ (6)
Foreign × $StdEpu_{t-1}$	0.002**			0.001**		
	(0.001)			(0.001)		
BIT × Foreign × $StdEpu_{t-1}$		0.006**			0.004**	
		(0.003)			(0.002)	
No BIT × Foreign × $StdEpu_{t-1}$		0.002			0.001	
		(0.002)			(0.002)	
High Constrained × Foreign × $StdEpu_{t-1}$			0.004***			0.003***
			(0.001)			(0.001)
Low Constrained × Foreign × $StdEpu_{t-1}$			0.001			0.001
			(0.001)			(0.001)
Destination Country × Commodity × Year	Yes	Yes	Yes	Yes	Yes	Yes
Firm × Destination Country	Yes	Yes	Yes	Yes	Yes	Yes
Mine	Yes	Yes	Yes	Yes	Yes	Yes
Firm × Year	Yes	Yes	Yes	Yes	Yes	Yes
Adj.-R^2	0.744	0.744	0.745	0.636	0.636	0.636
Obs.	5272	5272	5272	5272	5272	5272

Table 17: Robustness - Alternate Location

In this table I present the impact of policy uncertainty originating in foreign countries and establishment level investment from a firm with major operations in that country. The identification comes from comparing exploration expenditure received from firms varying in their exposure to policy uncertainty by the virtue of have majority of operations in different countries. Policy Uncertainty is measured as the natural logarithm of economic policy uncertainty index. The table below presents the estimate from the following regression specification:

$Y_{jp(i)t} = \beta_1 Log(EPU_{j,t-1}) \times Foreign_p + \beta_{jt} + \beta_p + +\beta_{ji} + \sum_c \beta^c_{it} + \epsilon_{jpt}$
Here p, j, i and t represents mining establishment, firm, country of operation and time respectively. The standard errors are clustered at the level of the firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels. Robust t-statistics in brackets

	$\frac{capex_{it}}{Value_{it-1}}$ (1)	$\frac{capex_{it}}{Value_{it-1}}$ (2)	$\frac{capex_{it}}{Value_{it-1}}$ (3)	$\frac{capex_{it}}{Value_{it-1}}$ (4)
Foreign $\times$ $Log(EPU_{t-1})$	0.002**	0.007**		
	(0.001)	(0.003)		
Foreign $\times$ $StdEpu_{t-1}$			0.001**	0.002**
			(0.000)	(0.001)
Destination Country $\times$ Commodity $\times$ Year	Yes	Yes	Yes	Yes
Firm $\times$ Destination Country	Yes	Yes	Yes	Yes
Mine	Yes	Yes	Yes	Yes
Firm $\times$ Year	Yes	Yes	Yes	Yes
Adj.-R^2	0.473	0.574	0.461	0.564
Obs.	6542	6542	5498	5493

Table 18: Robustness - Largest Operation vs. Funding Source

In this table I group firms between whether the head quarter is the place where the largest operations. I run the following specifications separately for the two groups of firms

$Y_{jp(i)t} = \beta_1 Log(EPU_{j,t-1}) \times Foreign_p + \beta_{jt} + \beta_p + +\beta_{ji} + \sum_c \beta^c_{it} + \epsilon_{jpt}$
Here p, j, i and t represents mining establishment, firm, country of operation and time respectively. The standard errors are clustered at the level of the firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels. Robust t-statistics in brackets

	$\frac{capex_{it}}{Value_{it-1}}$ (1)	$\frac{capex_{it}}{Value_{it-1}}$ (2)
Foreign × $Log(EPU_{t-1})$	0.002**	0.000
	(0.001)	(0.002)
Destination Country × Commodity × Year	Yes	Yes
Firm × Destination Country	Yes	Yes
Property	Yes	Yes
Adj.-R^2	0.625	0.603
Obs.	4714	1134

Table 19: External Validity Using Compustat Geographic Segment

In this table I present the the effect of US policy uncertainty on the investment expenditure of firms in the foreign countries relative to domestic economies. In column 1 the dependent variable is the segment level (natural logarithm of) capital expenditure. The main explanatory variable is foreign $\times$ log(US EPU_{t-1}). I include segment and industry $\times$ year fixed effects. In column 2 and 3 I group firms based on their size as a proxy of financial constraint. Finally in column 4 the main dependent variable is the share of capital expenditure in foreign countries. The standard errors are clustered at the level of the the firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

	Log(Capex) (All)	Log(Capex) (Fin Conc)	Log(Capex) (Unconstrained)	Capex Share
Foreign $\times$ $Log(EPU_{t-1})$	0.267***	0.480**	0.218	
	(0.096)	(0.236)	(0.144)	
$Log(EPU_{t-1})$				0.025*
				(0.014)
Segment	Yes	Yes	Yes	No
Industry $\times$ Year	Yes	Yes	Yes	No
Firm	No	No	No	Yes
Adj.-R^2	0.933	0.830	0.945	0.850
Obs.	100790	31861	20225	17989

Internet Appendix

IA.1 Additional Tables

In this section I provide results of some additional tests which provides support to the robustness of our primary result. In table 7 the main dependent variable is capex shares (and different versions of it). However, in table IA.1 I present the result of the main regression specification of the paper with the dependent variable as the natural logarithm of (1+) capital expenditure. This provides support for the assertion that the rise is led by the amount of capital expenditure and not by any possible change in the value of mines.

A possible concern with the primary analysis is that the results that I obtained are driven by particular companies or by the timing of the financial crisis. I try to address this concern by dropping the the countries (one by one) where the firms are headquartered and also dropping the year of financial crisis. The result is reported in table IA.2. I find that dropping the individual countries does not have much effect on the coefficient.[30]

The analysis so far have highlighted that policy uncertainty in foreign country spills over in a positive way to other countries through multinational firms. However, a flip side of the argument is that if policy uncertainty in a foreign country decreases then the firm might shift its investment towards its headquarter thereby having a negative spillover. Consequently, in this section I investigate the symmetry in the impact of policy uncertainty on investment in foreign establishments. That is, I want to test if increase in uncertainty and decrease have similar impact on foreign investments. To test this I estimate our primary regressions specification (2) separately for the periods when policy uncertainty is rising and policy uncertainty is declining. I also estimate the following variation of our main regression equation.

$$\begin{aligned}\left(\frac{CAPEX_{jp(i)t}}{Value_{jp(i)t-1}}\right) \quad = \quad & \beta_1 Log(EPU_{j,t-1}) \times Foreign_{ji} \times Increase_{j,t-1} + \\ & \beta_2 Log(EPU_{j,t-1}) \times Foreign_{ji} \times Decrease_{j,t-1} \\ & + \beta_{jt} + \beta_{ji} + \beta_p + \sum_c \beta^c_{it} + \epsilon_{jit} \qquad \text{(A-1)}\end{aligned}$$

In the above equation, $Increase_{jt-1}$ takes a value 1 if policy uncertainty index increases in a country j in time period t-1 and 0 otherwise. Meanwhile $Decrease_{jt-1}$ takes a value 1 if policy uncertainty index in a country j decreased in time period t-1 and 0 otherwise. Column 1 of Table IA.3 shows that when policy uncertainty increases, 100% change leads to 1 percentage point change in the share of capital expenditure to value of mines. How-

[30]The only aberation to this is that on dropping Australia the magnitude of the observed impact increases. Australia is a large producer of commodities and hence policy uncertainty in Australia could be a demand related shock and could drive down investment in other economies as well

ever, when policy uncertainty decrease, 100% change in policy uncertainty leads to 30 basis points change in capex. In column 2 the main variable of interest is development capex, I find that as policy uncertainty increases in the country of headquarter firms invest more in foreign establishments. However, when policy uncertainty decreases there is no reduction in investment in development capital. In columns 3 and 4 I restrict the sample to instances of rise in policy uncertainty and find that as policy uncertainty doubles share of capital expenditure to the value of mines increase by 1.2 percentage points. However, in columns 5 and 6, where I restrict the sample to instances of decrease in policy uncertainty, I do not find any statistically significant effect. The results thus points that policy uncertainty has an asymmetric effect and our observed impacts are driven primarily by increase in policy uncertainty.

In our primary analysis I looked at the role of institutional quality in determining firm's choice in shifting investment when faced with policy uncertainty. The institutional quality was measured using Bilateral Investment Treaty (BIT). Here I use an alternative way to measure institutional quality. The measure that I use is from world bank's polity IV data base. I use the index of regulation quality. The countries above the median regulation quality is classified as good institution while countries with less than median is classified as bad institution. The results are reported in table IA.6. I find qualitatively similar result, that better institutional quality allows a country to receive more investment when a foreign country is subject to elevated levels of policy uncertainty.

In the chart IA.1 I group countries in 1) High Group: share of total investment that comes from US is greater than median. 2) Low group: share of total investment that comes from US is greater than median. Following which I run a VAR of investment growth on OECD countries and US economic policy uncertainty. The idea is that if the multinationals act as stabilizer then it would mute the effect of US policy uncertainty on other countries. In line with this argument I find that for countries with low share of investment from US multinationals gets negatively affected while investment in countries with high share of US multinationals are affected less.

Table IA.1: Effect of Policy Uncertainty on Establishment Level Investment

In this table I present the impact of policy uncertainty originating in foreign countries and establishment level investment from a firm headquartered in that country. The identification comes from comparing exploration expenditure received from firms varying in their exposure to policy uncertainty by the virtue of being headquartered in different countries. Policy Uncertainty is measured as the natural logarithm of economic policy uncertainty index. The table below presents the estimate from the following regression specification:

$$Y_{jp(i)t} = \beta_1 Log(EPU_{j,t-1}) \times Foreign_p + \beta_{jt} + \beta_p + +\beta_{ji} + \sum_c \beta^c_{it} + \epsilon_{jpt}$$

Here p, j, i and t represents mining establishment, firm, country of operation and time respectively. The main dependent variable in columns 1 and 2 is the share of total capital expenditure to the value of mines. I group this further into development capital expenditure (columns 2 and 3) and sustainable capital expenditure (columns 4 and 5). In columns 1,3 and 5 I do not include Firm × year FEs while in columns 2, 4 and 6 I include them. The standard errors are clustered at the level of the firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels. The standard errors are clustered at the level of the home country of firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels. Robust t-statistics in brackets

	Log(1+Capex) (1)	Log(1+Capex) (2)	Log(1+DevCapex) (3)	Log(1+DevCapex) (4)	Log(1+SustCapex) (5)	Log(1+SustCapex) (6)
Foreign × $Log(EPU_{t-1})$	0.257***		0.327***		0.077	
	(0.093)		(0.085)		(0.064)	
Foreign × $StdEpu_{t-1}$		0.092**		0.104**		0.033
		(0.038)		(0.042)		(0.021)
Destination Country × Commodity × Year	Yes	Yes	Yes	Yes	Yes	Yes
Firm × Destination Country	Yes	Yes	Yes	Yes	Yes	Yes
Mine	Yes	Yes	Yes	Yes	Yes	Yes
Firm × Year	Yes	Yes	No	No	No	No
Adj.-R^2	0.844	0.842	0.723	0.720	0.889	0.888
Obs.	6054	5272	6054	5272	6054	5272

Table IA.2: Effect of Policy Uncertainty on Establishment Level Investment - Removing Countries

In this table I present the impact of policy uncertainty originating in foreign countries and establishment level investment from a firm headquartered in that country. The identification comes from comparing exploration expenditure received from firms varying in their exposure to policy uncertainty by the virtue of being headquartered in different countries. Policy Uncertainty is measured as the natural logarithm of economic policy uncertainty index. The table below presents the estimate from the following regression specification:

$Y_{jp(i)t} = \beta_1 Log(EPU_{j,t-1}) \times Foreign_p + \beta_{jt} + \beta_p + +\beta_{ji} + \sum_c \beta^c_{it} + \epsilon_{jpt}$

Here p, j, i and t represents mining establishment, firm, country of operation and time respectively. The main dependent variable in columns is the share of total capital expenditure to the value of mines. In columns 1 I drop USA, in column 2 I drop Australia, in column 3 I drop Canada, in column 4 I drop China, in column 5 I drop UK and in column 6 I drop the year 2008. The standard errors are clustered at the level of the firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels. The standard errors are clustered at the level of the home country of firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels. Robust t-statistics in brackets

	USA	Australia	Canada	China	UK	2008
	(1)	(2)	(3)	(4)	(5)	(6)
Foreign × $Log(EPU_{t-1})$	0.004*	0.015***	0.003*	0.006***	0.006**	0.005**
	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)
Destination Country × Commodity × Year	Yes	Yes	Yes	Yes	Yes	Yes
Firm × Destination Country	Yes	Yes	Yes	Yes	Yes	Yes
Mine	Yes	Yes	Yes	Yes	Yes	Yes
Firm × Year	Yes	Yes	Yes	Yes	Yes	Yes
Adj.-R^2	0.751	0.745	0.772	0.736	0.749	0.738
Obs.	5194	5182	4393	5997	5088	5683

Table IA.3: Increase in Policy Uncertainty vs. Decrease in Policy Uncertainty

In this table I present the heterogeneity in the impact of increase vs. decrease in policy uncertainty originating in foreign countries and establishment level investment of firms. The table below presents the estimate from the following regression specification:

$$\left(\frac{CAPEX_{jp(i)t}}{Value_{jp(i)t-1}}\right) = \beta_1 Log(EPU_{j,t-1}) \times Foreign_{ji} \times Increase_{jt-1} + \beta_2 Log(EPU_{j,t-1}) \times Foreign_{ji} \times Decrease_{jt-1} + \beta_{jt} + \beta_{ji} + \beta_p + \sum_c \beta^c_{it} + \epsilon_{jit}$$

Here p, j, i and t represents mining establishment, firm, country of operation and time respectively. The main dependent variable are capital expenditure to the value of mines and development capital expenditure. In columns 1 and 2 the regression specification is performed on the entire sample. In columns 3 and 4 the sample is restricted to the period of increase while in columns 5 and 6, the sample is restricted to the period of decrease. The standard errors are clustered at the level of the firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

	All		Increase		Decrease	
	$\frac{capex_{it}}{Value_{it-1}}$	$\frac{capex_{it}}{Value_{it-1}}$	$\frac{capex_{it}}{Value_{it-1}}$	$\frac{capex_{it}}{Value_{it-1}}$	$\frac{capex_{it}}{Value_{it-1}}$	$\frac{capex_{it}}{Value_{it-1}}$
	(1)	(2)	(3)	(4)	(5)	(6)
Increase × Foreign × $Log(EPU_{t-1})$	0.010**	0.011**				
	(0.004)	(0.004)				
Decrease × Foreign × $Log(EPU_{t-1})$	0.003*	0.001				
	(0.002)	(0.002)				
Foreign × $Log(EPU_{t-1})$			0.013***	0.012***	0.003	0.003
			(0.004)	(0.004)	(0.002)	(0.002)
Destination Country × Commodity × Year	Yes	Yes	Yes	Yes	Yes	Yes
Firm × Destination Country	Yes	Yes	Yes	Yes	Yes	Yes
Mine	Yes	Yes	Yes	Yes	Yes	Yes
Firm × Year	Yes	Yes	Yes	Yes	Yes	Yes
Adj.-R^2	0.735	0.635	0.717	0.663	0.868	0.695
Obs.	6054	6054	3977	3977	1750	1750

Table IA.4: World Uncertainty Index as a measure of Policy Uncertainty

In this table I use an alternate measure of policy uncertainty index for each country using IMF country reports. I perform the baseline specifications using this alternate measure. Given that world uncertainty index is obtained for a large section of countries, I can use all the countries in the sample. In columns 1 and 2, I restrict my sample to the ones used in the primary specification. While in columns 3 and 4 I use the weighted average of the policy uncertainty index of all the other countries that the firm is operating as a measure of foreign policy uncertainty.

	$\frac{capex_{it}}{Value_{it-1}}$ (1)	$\frac{Devcapex_{it}}{Value_{it-1}}$ (2)	$\frac{capex_{it}}{Value_{it-1}}$ (3)	$\frac{Devcapex_{it}}{Value_{it-1}}$ (4)
Foreign × $Log(WUI_{t-1})$	0.003^{**}	0.003^{**}		
	(0.001)	(0.001)		
Mean(WUI_{t-1})			0.004^{**}	0.003^{*}
			(0.002)	(0.002)
Destination Country × Commodity × Year	Yes	Yes	Yes	Yes
Firm × Destination Country	Yes	Yes	Yes	Yes
Mine	Yes	Yes	Yes	Yes
Firm × Year	Yes	Yes	No	No
Adj.-R^2	0.738	0.636	0.501	0.402
Obs.	6032	6032	8607	8607

Table IA.5: Financial Constraint and Investment

In this table I present the heterogeneity in the impact of policy uncertainty originating in foreign countries and establishment level investment of a firms varying in their degree of financial constraint. The table below presents the estimate from the following regression specification:

$$\left(\frac{CAPEX_{jp(i)t}}{Value_{jp(i)t-1}}\right) = \beta_1 Log(EPU_{j,t-1}) \times Foreign_{ji} \times HighConstrained_{it-1} + \beta_2 Log(EPU_{j,t-1}) \times Foreign_{ji} \times LowConstrained_{it-1} + \beta_{jt} + \beta_{ji} + \beta_p + \sum_c \beta_{it}^c + \epsilon_{jit}$$

Here p, j, i and t represents mining establishment, firm, country of operation and time respectively. The main dependent variable are capital expenditure to the value of mines and development capital expenditure. In columns 1 and 2 financial constrained is proxied by Kaplan Zingales index of financial constraint. In columns 3 and 4 financial constraint is proxied by Whited Wu index of financial constraint. The standard errors are clustered at the level of the firms. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

	KZ Index		WW Index	
	$\frac{capex_{it}}{Value_{it-1}}$	$\frac{Devcapex_{it}}{Value_{it-1}}$	$\frac{capex_{it}}{Value_{it-1}}$	$\frac{Devcapex_{it}}{Value_{it-1}}$
	(1)	(2)	(3)	(4)
High Constrained × Foreign × $Log(EPU_{t-1})$	0.011***	0.007***	0.027***	0.022***
	(0.004)	(0.002)	(0.002)	(0.004)
Low Constrained × Foreign × $Log(EPU_{t-1})$	0.003	0.003	0.004*	0.003
	(0.002)	(0.003)	(0.002)	(0.002)
Destination Country × Commodity × Year	Yes	Yes	Yes	Yes
Firm × Year	Yes	Yes	Yes	Yes
Firm × Destination Country	Yes	Yes	Yes	Yes
Mine	Yes	Yes	Yes	Yes
Adj.-R^2	0.736	0.636	0.736	0.636
Obs.	6054	6054	6054	6054
Difference (1- 2)	0.008**	0.004**	0.023***	0.019***

Table IA.6: Effect of Policy Uncertainty on Establishment Level Investment and Role of Institution - Regulatory Quality Index

In this table I investigate if firms invest more in countries which provide a better institutional set up to operate as a response to policy uncertainty in their home country. The table below presents the estimate from the following regression specification:

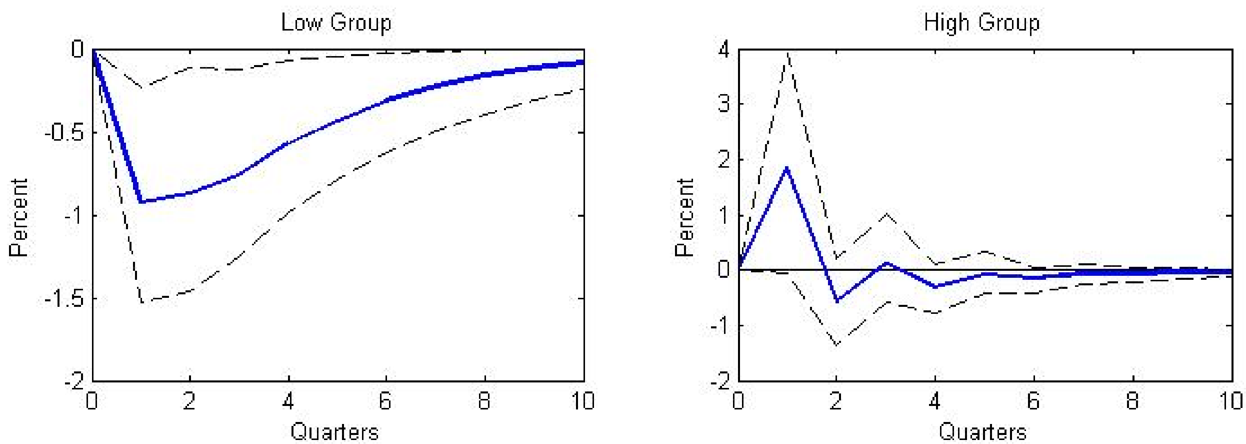
$$\left(\frac{CAPEX_{jp(i)t}}{Value_{jp(i)t-1}}\right) = \beta_1 Log(EPU_{j,t-1}) \times Foreign_{ji} \times HighReg_i + \beta_2 Log(EPU_{j,t-1}) \times Foreign_{ji} \times LowReg_i + \beta_{jt} + \beta_{ji} + \beta_p + \sum_c \beta^c_{it} + \epsilon_{jit}$$

Here p, j, i and t represents mining establishment, firm, country of operation and time respectively. The main dependent variable are capital expenditure to the value of mines and development capital expenditure. $HighReg_i$ is a dummy that takes 1 if the country of operation has high regulation measured as the regulatory quality index. ***, **, * represents statistical significance at the 1%, 5% and 10% levels.

	$\frac{capex_{it}}{Value_{it-1}}$ (1)	$\frac{Devcapex_{it}}{Value_{it-1}}$ (2)	$\frac{Sustcapex_{it}}{Value_{it-1}}$ (3)
High Regulation × Foreign × $Log(EPU_{t-1})$	0.006***	0.005**	0.002**
	(0.002)	(0.002)	(0.001)
Low Regulation × Foreign × $Log(EPU_{t-1})$	0.003	0.003	-0.002
	(0.004)	(0.003)	(0.004)
Destination Country × Commodity × Year	Yes	Yes	Yes
Firm × Destination Country	Yes	Yes	Yes
Mine	Yes	Yes	Yes
Firm × Year	Yes	Yes	Yes
R^2	0.735	0.635	0.786
Obs.	6054	6054	6054

Figure IA.1: Impulse response function

The following figure plots the impulse response function of a 1 standard deviation shock in US EPU and the reaction in countries with a relatively small share of US multinationals (left panel) and a large share of US multinationals (right panel)



IA.2 Other detail on data

In this section I provide some additional details of the data. In table IA.7 I present the exploration budget that firms headquartered in a country spends on all other countries. In most cases I find that on an average a country spend the largest in exploiration expenditure in the country of their headquarters. Similarly table IA.8 shows the location of mines in a country and the country that owns those mines.

Table IA.7: Location of Exploration Budget

The following table gives an overview of the share of mining budget that the countries where the firms belong to spend in different countries.

	ARG	AUS	BRA	CAN	CHL	CHN	COD	COL	ESP	IND	IDN	KAZ	MEX	MNG	NAM	PER	PHL	RUS	SWE	USA	VEN	ZAF
AUS	1.02	54.23	1.28	4.44	6.45	0.37	1.42	0.59	0.46	0.12	3.75	0.07	0.38	0.55	1.03	1.51	1.43	0.09	0.54	1.51	0.01	0.67
BRA	3.48	2.78	46.23	18.58	3.94	0.15	1.14	0.12	0.00	0.00	5.57	0.38	0.27	0.61	0.00	5.86	0.82	0.12	0.00	0.53	0.13	0.44
CAN	2.52	2.85	2.53	34.14	4.41	1.24	1.80	1.70	0.20	0.00	0.44	0.32	8.30	3.17	0.45	3.29	0.41	0.89	0.32	11.94	0.27	0.46
CHL	0.26	0.00	0.00	0.00	75.33	0.00	0.00	1.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00
CHN	0.28	2.91	0.11	4.22	0.00	82.27	2.74	0.00	0.00	0.00	0.39	0.00	0.00	0.50	0.28	0.80	0.11	0.69	0.00	0.00	0.15	0.00
DEU	0.00	11.11	0.00	18.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	0.00	0.00
ESP	0.00	17.78	0.00	0.00	0.00	0.00	0.00	0.00	82.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FRA	0.97	6.64	0.00	28.35	0.00	0.01	0.13	0.00	0.00	0.00	9.69	7.53	0.00	8.40	0.26	0.00	0.00	1.15	0.00	0.00	0.00	0.20
GBR	3.15	5.44	2.59	5.08	13.18	0.86	1.46	0.31	0.11	1.45	1.36	3.85	1.16	1.69	0.83	7.68	0.85	9.73	0.29	9.61	0.02	1.59
IND	0.00	1.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	80.28	0.00	0.00	0.00	0.00	8.12	0.00	0.00	0.00	0.00	0.00	0.00	8.00
JPN	0.93	8.98	1.91	9.30	18.84	0.00	0.00	0.00	0.00	0.36	4.10	0.55	0.60	1.79	0.00	6.20	2.63	0.00	0.00	19.41	0.00	1.05
MEX	0.64	0.21	0.08	0.10	1.71	0.00	0.00	0.09	0.07	0.00	0.00	0.00	88.51	0.00	0.00	8.20	0.00	0.00	0.00	0.22	0.01	0.00
RUS	0.00	0.82	0.00	0.71	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.77	0.00	0.00	0.23	0.00	0.00	90.80	0.00	0.00	0.00	0.28
SGP	0.00	43.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SWE	0.00	0.00	0.00	1.51	0.98	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	4.44	77.52	0.09	0.00	0.00
USA	2.83	8.24	0.87	5.26	5.55	0.03	3.96	0.00	0.01	0.00	6.24	0.06	9.93	0.00	0.00	6.20	0.75	0.12	0.01	32.93	0.90	0.00

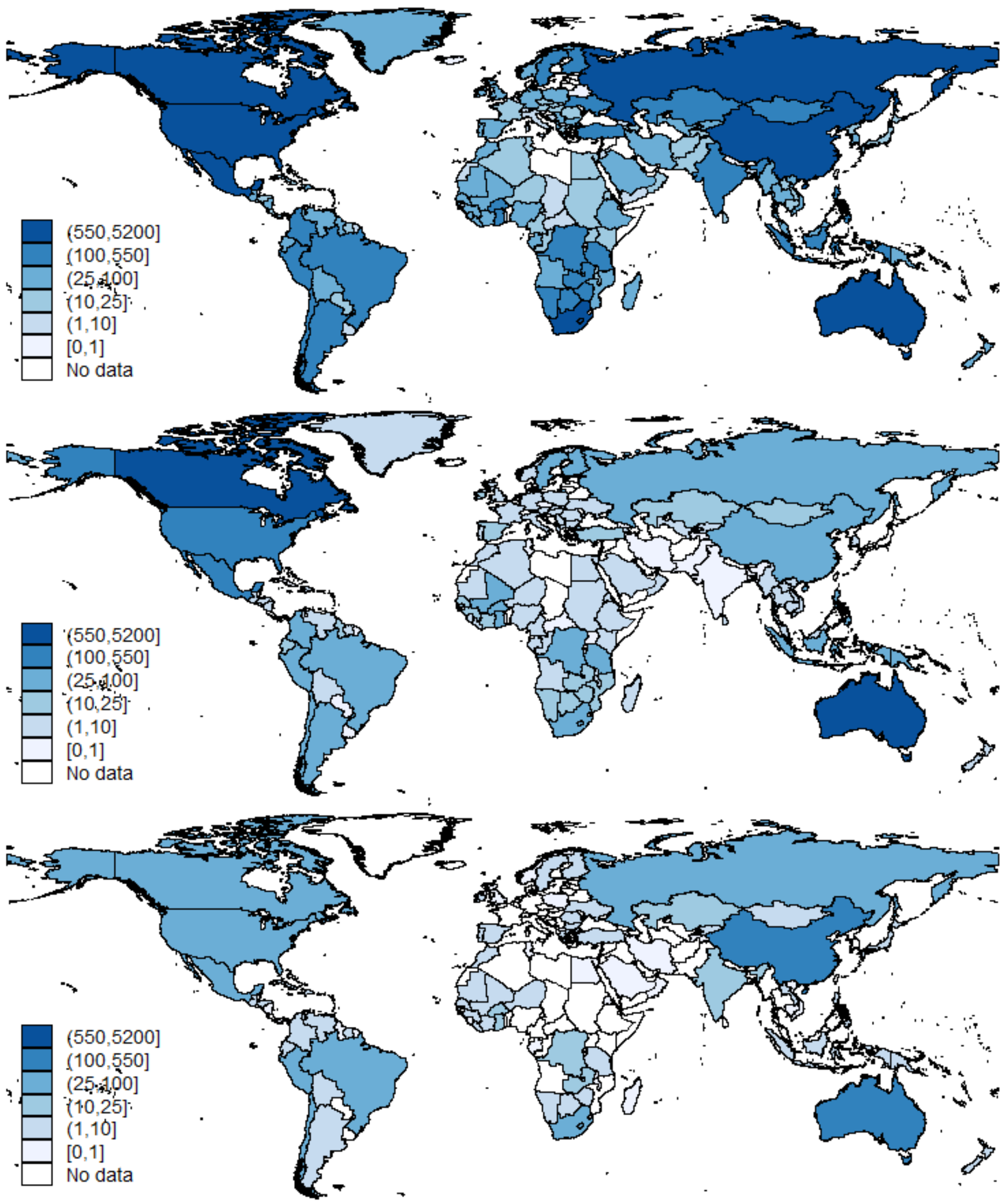
Table IA.8: Location of Mining Properties

The following table gives an overview of the location mining properties of firms located in a particular country

	ARG	AUS	BRA	CAN	CHL	CHN	COD	COL	ESP	IND	IDN	KAZ	MEX	MNG	NAM	PER	PHL	RUS	SWE	USA	VEN	ZAF
AUS	39	3076	102	164	111	27	25	15	10	132	22	12	28	26	50	38	40	4	37	170	1	133
BRA	3	7	249	16	2	2	0	5	1	5	0	1	0	0	0	7	0	0	0	4	0	0
CAN	190	202	155	4806	154	101	39	96	25	37	4	10	564	55	35	229	30	37	52	1275	28	61
CHL	2	0	1	0	166	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
CHN	2	132	3	43	8	1245	8	1	0	7	0	0	2	11	6	7	3	8	0	6	0	13
DEU	0	5	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2
ESP	0	0	0	0	0	0	0	0	29	0	0	0	0	0	0	1	0	0	0	3	0	0
FRA	1	6	2	16	0	0	0	0	0	1	0	1	0	5	1	0	0	0	0	3	0	7
GBR	21	158	43	99	52	4	29	11	14	16	9	69	22	4	14	39	13	137	8	76	2	103
IND	0	12	1	8	0	0	0	0	0	6	421	0	0	0	1	0	0	0	0	12	0	5
JPN	0	55	9	12	7	0	0	0	0	0	0	0	3	0	0	6	0	0	0	15	0	2
MEX	0	0	0	0	1	0	0	0	1	0	0	0	195	0	0	6	0	0	0	10	0	0
RUS	1	12	0	3	0	0	0	0	0	0	0	15	0	0	1	0	0	682	0	12	0	1
SGP	0	9	0	4	0	3	0	0	0	30	0	0	0	6	0	0	1	0	0	0	0	1
SWE	0	0	0	4	2	0	2	0	2	0	0	0	0	0	0	0	0	16	59	0	0	1
USA	33	157	40	265	65	18	7	15	3	9	0	4	150	23	1	53	6	17	0	2409	8	13

Figure IA.2: Distribution of Properties Across Countries

The following picture shows the number of properties across the globe. The first panel are all the properties. The second panel are the properties for which there is investment announcement and the third panel are the distribution of properties for which there are property level investment data



IA.3 Regression Specification With Shares

The primary dependent variable being transformed to shares helps me to mitigate concern that the estimate is biased upward due to substitution of budget spent in one country to the other and thereby there can be an overestimation of the intended impact. Consider the following system of equations of investment by a firm b in business unit i in time t :

$$\begin{aligned} Y_{ibt} &= \gamma_{ib} + \gamma_{it} + \gamma_{bt} + \beta_1 Policyuncertainty_{(bt)} + \epsilon_{ibt} \\ Y_{i'bt} &= \gamma_{i'b} + \gamma_{i't} + \gamma_{bt} - \beta_2 Policyuncertainty_{(bt)} + \epsilon_{i'bt} \end{aligned} \tag{A-2}$$

Differencing the equations in A-2 I get,

$$\Delta Y_{bt} = \gamma_{ib} - \gamma_{i'b} + \gamma_{it} - \gamma_{i't} + (\beta_1 + \beta_2) Policyuncertainty_{(bt)} + \epsilon_{ibt} - \epsilon_{i'bt} \tag{A-3}$$

Thus I can see from the above equation A-3 that the difference can lead to bias as the investment can be switched from location i to location i', consequently leading to an upward bias in the coefficient β_1 to $\beta_1 + \beta_2$. Transforming the the variables to shares, as in our case helps me to mitigate this concern. Consider the following transformed set of equations:

$$\begin{aligned} \frac{Y_{ibt}}{\sum_i Y_{ibt}} &= \eta_{ib} + \eta_{it} + \eta_{bt} + \beta Policyuncertainty_{(bt)} + \epsilon_{ibt} \\ \frac{Y_{i'bt}}{\sum_i Y_{i'bt}} &= \eta_{i't} + \gamma_{i't} + \gamma_{bt} - \beta Policyuncertainty_{(bt)} + \epsilon_{i'bt} \end{aligned} \tag{A-4}$$

Differencing the equations in A-4 and since $\frac{Y_{ibt}}{\sum_i Y_{ibt}} = 1 - \frac{Y_{i'bt}}{\sum_i Y_{ibt}}$ I get,

$$\frac{Y_{ibt}}{\sum_i Y_{ibt}} = \frac{1}{2} + \frac{\eta_{ib} - \eta_{i'b}}{2} + \frac{\eta_{it} - \gamma_{i't}}{2} + \beta Policyuncertainty_{(bt)} + \frac{\epsilon_{ibt} - \epsilon_{i'bt}}{2} \tag{A-5}$$

Equation A-5 can be re-written as:

$$\frac{Y_{ibt}}{\sum_i Y_{ibt}} = \beta_0 + \beta_b + \beta_t + \beta Policyuncertainty_{(bt)} + \varepsilon_{bt} \tag{A-6}$$

Thus I see that through the transformation I get the unbiased coefficient β. It is also important to note that the specification through a non-parametric way controls for firm-quarter specific shocks (η_{bt}).

IA.4 Quantify Bias Using Shares of All Operations

Running the regression with sample including operations in all countries (i) by a firm (b) at time (t). The dependent variable (Y) is share of exploration budget by a firm in each country. For clarity in understanding the bias let me consider policy uncertainty as a dummy variable.

$$Y_{ibt} = \beta_0 + \beta_1 Foreign_{ib} + \beta_2 Policyuncertainty_{(bt)} + \beta_3 Foreign_{ib} \times Policyuncertainty_{(bt)} + \eta_{ibt} \tag{A-7}$$

$$E(Y_{foreign=0,policyuncertainty=0}) = \beta_0 \tag{A-8}$$

$$E(Y_{foreign=1,policyuncertainty=0}) = \beta_0 + \beta_1 \tag{A-9}$$

combining A-8 and A-9 I get,

$$\beta_1 = E(Y_{foreign=1,policyuncertainty=0}) - E(Y_{foreign=0,policyuncertainty=0}) \tag{A-10}$$

$$E(Y_{foreign=0,policyuncertainty=1}) = \beta_0 + \beta_2 \tag{A-11}$$

combining A-8 and A-11 I get,

$$\beta_2 = E(Y_{foreign=0,policyuncertainty=1}) - E(Y_{foreign=0,policyuncertainty=0}) \tag{A-12}$$

$$E(Y_{foreign=1,policyuncertainty=1}) = \beta_0 + \beta_1 + \beta_2 + \beta_3 \tag{A-13}$$

Replacing β_0, β_1 and β_2 from equations A-8,A-10 and A-12 respectively I get:

$$\begin{aligned} E(Y_{foreign=1,policyuncertainty=1}) \quad = \quad & E(Y_{foreign=0,policyuncertainty=0}) + E(Y_{foreign=1,policyuncertainty=0}) \\ & -E(Y_{foreign=0,policyuncertainty=0}) + E(Y_{foreign=0,policyuncertainty=1}) \\ & -E(Y_{foreign=0,policyuncertainty=0}) + \beta_3 \end{aligned} \tag{A-14}$$

$$\begin{aligned} \Rightarrow \beta_3 \quad = \quad & E(Y_{foreign=1,policyuncertainty=1}) - E(Y_{foreign=1,policyuncertainty=0}) \\ & +E(Y_{foreign=0,policyuncertainty=0}) - E(Y_{foreign=0,policyuncertainty=1}) \end{aligned} \tag{A-15}$$

Rearranging I get,

$$\begin{aligned} \beta_3 &= [E(Y_{foreign=1,policyuncertainty=1}) - E(Y_{foreign=1,policyuncertainty=0})] \\ &\quad -[E(Y_{foreign=0,policyuncertainty=1}) - E(Y_{foreign=0,policyuncertainty=0})] \end{aligned} \tag{A-16}$$

Let $[E(Y_{foreign=1,policyuncertainty=1})-E(Y_{foreign=1,policyuncertainty=0})] = \delta$, i.e Let there be a total of 'n+1' countries, of which 1 group is non-foreign and n groups are foreign. So increase in δ units of 'n' foreign groups is same as decline of δ units of all the other 'n' group combined. So on an average the increase for each foreign group is $\frac{\delta}{n}$. Consequently,

$$[E(Y_{foreign=1,policyuncertainty=1}) - E(Y_{foreign=1,policyuncertainty=0})] = \frac{\delta}{n}$$

Thus the equation (A-16) can be expressed as

$$\beta_3 = \frac{\delta}{n} - (-\delta) = \delta + \frac{\delta}{n} = \frac{n+1}{n}\delta \tag{A-17}$$

$$\lim_{n\to\infty} \beta_3 = \delta$$

IA.5 Conceptual Framework and Motivation

In the discussion that follows, I will lay out the comparative statistics from a simple model that illustrates how multi-country firms allocate resources in response to shocks in policy related uncertainty. As I have discussed before policy uncertainty can manifest itself either through a rise in risk or through reduction in cash flow. Through this model I will highlight that shock to risk and shock to cash flow in one region could have different effect o investment decisions in other regions.

Consider a firm operating in n regions with each firm using k_i amount of capital to transform into production using the production function $f_i(k_i)$. The production function satisfies the standard regularity conditions, i.e. $f_i'(k_i) > 0$, $f_i''(k_i) < 0$ and $f_i(0) = 0 \; \forall$ i. The inada conditions are satisfied. The price of input and output at each unit/ region of production is exogenously given to firms as r_i and p_i respectively. The revenue that firms generate in the next period is discounted using a discount factor of θ_i. θ_i captures the risk in a region. Higher the uncertainty, higher is the discount rate ρ_i and consequently lower is θ_i. Firms utilizes their cash $(C_i)$to pay for their inputs in each region. The firm makes a centralized decision to allocate capital in its different units by reallocating budget from one production unit to the other (Williamson (1975), Gertner, Scharfstein, and Stein (1994), Giroud and Mueller (2017) among others). It is also important to note that given the decision making is at the headquarter of firms, budget constraint at the overall firm level and not at the individual unit level binds. A firm's optimization problem thus takes the following form:

$$\mathcal{L} = \sum_i \theta_i P_i f_i(k_i) + \lambda\big(\sum_i C_i - \sum_i r_i k_i\big) \tag{A-18}$$

λ is the lagrange multiplier and is interpreted as the shadow cost of the constraints. The Kuhn-Tucker conditions are:

$$\theta_i P_i f_i'(k_i) = r_i(\lambda) \quad \forall i \tag{A-19}$$

$$\sum_i C_i - \sum_i r_i k_i = 0 \tag{A-20}$$

$$\lambda\big(\sum_i C_i - \sum_i r_i k_i\big) = 0 \tag{A-21}$$

Policy uncertainty in a region can either increases the risk of operation in that region or reduce the total available cash to pay the factors of production. Consequently, for the purpose of this paper I are interested in studying the effect of change in θ_i on k_j and change in C_i on k_j.

IA.5.1 Effect of change in θ_i on k_j

Differentiating (A-19) w.r.t θ_i I get

$$P_i f_i'(k_i) + \theta_i P_i f_i''(k_i)\frac{\delta k_i}{\delta \theta_i} = r_i \frac{\delta \lambda_i}{\delta \theta_i} \tag{A-22}$$

Differentiating (A-19) w.r.t θ_j I get

$$\theta_i P_i f_i''(k_i)\frac{\delta k_i}{\delta \theta_j} = r_i \frac{\delta \lambda_i}{\delta \theta_j} \tag{A-23}$$

Differentiating (A-20) w.r.t θ_j I get

$$\sum_{i \neq j} r_i \frac{\delta k_i}{\delta \theta_j} + r_j \frac{\delta k_j}{\delta \theta_j} = 0 \tag{A-24}$$

Using $\frac{\delta k_i}{\delta \theta_i}$ and $\frac{\delta k_i}{\delta \theta_j}$ from (A-22) and (A-23) in (A-24) I get:

$$\frac{\delta \lambda}{\delta \theta_j} = \frac{\frac{r_j f_j'(k_j)}{\theta_j f_j''(k_j)}}{\sum_i \frac{r_i^2}{\theta_i P_i f_i''(k_i)}} > 0 \quad \forall i$$

$$\frac{\delta k_j}{\delta \theta_j} = -\frac{r_j f_j'(k_j)}{\theta_j f_j''(k_j)} \frac{\sum_{i \neq j} \frac{r_i}{\theta_i f_i''(k_i)}}{\sum_i \frac{r_i^2}{\theta_i P_i f_i''(k_i)}} > 0$$

$$\frac{\delta k_i}{\delta \theta_j} = \frac{r_j f_j'(k_j)}{\theta_j f_j''(k_j)} \frac{\frac{r_i}{\theta_i f_i''(k_i)}}{\sum_i \frac{r_i^2}{\theta_i P_i f_i''(k_i)}} < 0$$

Given $\theta_j = \frac{1}{1+\rho_j}$, $\frac{\delta \theta_j}{\delta \rho_j} = -\frac{1}{(1+\rho_j)^2}$. This implies:

$$\frac{\delta k_j}{\delta \rho_j} < 0 \,\&\, \frac{\delta k_i}{\delta \rho_j} > 0$$

Thus I find that if policy uncertainty leads to rise in risk of operation in a region, firms tend to invest less in that region and invests relatively more in other region. The idea being that as policy uncertainty increases, firms find it risky to invest, consequently it frees up resource to invest in other regions.[31] It is crucial to note that: 1) all the units of the firms produces final

[31]It is important to mention that the underlying assumption of binding budget constraint highlights that the firms were not operating at optimum in all its region else there would be no impact of uncertainty on capital investments in other region.If the budget constraint does not bind then $\lambda = 0$. This implies from

output and not intermediary products, and 2) there is no input-output linkages between the output of different plants of the firm. If either of the above would be true then I might not get the results obtained above. The intuition is that if there is an uncertainty shock in region i, investment in region i decreases. If this output is an input in the production function of the region j then investment and consequently output may also reduce. Mining sector fulfills both these criterion as each mines produces the final output of a mining company and the resource extracted from one mine is not used as an input for the other mine. Thus mining sector provides me a good laboratory for our empirical investigation.

IA.5.2 Effect of change in C_i on k_j

Policy uncertainty can also manifest itself as real economic shock to the wealth / cash flow of the firm in a region i could have a negative spillover and lead to reduction in investment in all other units $j \neq i$ (Giroud and Mueller (2017)).

Differentiating A-19 and A-20 with respect to C_i

$$\frac{\delta\lambda}{\delta C_i} = \frac{1}{\sum_i \frac{r_i^2}{\theta_i P_i f_i''(k_i)}} < 0$$

$$\frac{\delta K_j}{\delta C_i} = \frac{r_j}{\theta_i P_j f_j''(k_j)} \frac{\delta\lambda}{\delta C_i}$$

$$\Rightarrow \frac{\delta K_j}{\delta C_i} = \frac{r_i}{\theta_j P_j f_j''(k_j)} \frac{1}{\sum_i \frac{r_i^2}{\theta_i P_i f_i''(k_i)}} > 0 \quad \forall i$$

Thus I see that as cash flow in a region decreases, firms reduces their investment from all regions. Consequently I see a difference in the effect of uncertainty shock or a negative cash flow shock in a region i on the investment in region j. While the former implies positive impact on investment in region j, the latter indicates negative spillover.

Thus, I see that while $\frac{\delta K_j}{\delta C_i} < 0$, $\frac{\delta k_j}{\delta \rho_i} > 0$. Hence, the impact of policy uncertainty in one region and its impact on the other region through the allocation decision making of the firm is not clear. This motivates the empirical investigation of the paper.

equation (A-23) $\theta_i P_i f_i''(k_i) \frac{\delta k_i}{\delta \theta_j} = 0$. i.e $\frac{\delta k_i}{\delta \theta_j} = 0$