Unpacking Policy Uncertainty: Evidence from European Firms

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Abstract: The intensifying nature of policy uncertainty makes it a popular explanation for recent weak economic performance and puzzles. However, the empirical literature is limited in its ability to make causal claims because it largely relies on macro-level measures of policy uncertainty and treats the concept as homogenous but indeterminate. This research addresses these limitations by exploiting variation in firms' exposure to external markets to construct a firm-level measure of policy uncertainty. The approach both highlights a new channel for policy uncertainty and allows for stronger causal identification of the effects of policy uncertainty on economic performance. As part of this effort, I refine prior approaches to measuring policy uncertainty and distinguish between generic, fiscal, monetary, and trade policy uncertainty. I find that firms with greater exposure to external markets tend to experience larger declines in investment, sales, profits, and employment when fiscal and monetary policy uncertainty increase. Unexpectedly, increases in trade policy uncertainty appear to have a positive impact on exports for exposed firms. Both sets of findings can be rationalized in a standard model of firm investment under uncertainty. In particular, I present evidence that exposed firms may perceive increased uncertainty around trade agreement negotiations as a signal that negative outcomes are less likely in the near-term, incentivizing immediate investments.

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"Business leaders from kitchen-table start-ups to vast multi-nationals are already telling me that the uncertainty over the [British EU] referendum result is causing them to delay investment decisions, to think twice about creating new jobs." - *The Telegraph*, 14 May 2016

1 Introduction

In the wake of the Great Recession, economic policy uncertainty has increased across the globe (see Figure 1). The intensifying nature of policy uncertainty makes it a popular explanation for recent economic puzzles: sluggish recoveries; the outsized trade collapse during the crisis; and disconnects between the real effective exchange rate (REER) and exports.[1] At the micro-level, firms have long cited policy uncertainty as a primary impediment to doing business (Smith & Hallward-Driemeier, 2005).

Despite its ubiquity as an explanation for negative outcomes, there are limitations in our understanding of the consequences of policy uncertainty. First, firm-level analyses are rare in the literature. Most empirical investigations of policy uncertainty employ vector autoregression or cointegration approaches at the macro-level, limiting the ability to control for confounding factors. The difficulty in measuring vulnerability to policy uncertainty at the firm-level is a primary reason for the popularity of macro analyses. Second, policy uncertainty is largely treated as a homogenous, rather indeterminate concept.[2] Little is known about what types of policy uncertainty are particularly detrimental and how the impact of policy uncertainty varies across firms (e.g., how fiscal policy uncertainty impacts a Ford factory relative to a mom-and-pop grocer).[3]

This paper seeks to address these limitations by analyzing the impact of different types of policy uncertainty at the firm-level. To do so, I construct a novel and rich database of disaggregated measures of policy uncertainty that outperform prior measures based on several metrics. Second, I exploit variation in export shares to create firm-specific measures of exposure to external vs. domestic policy uncertainty, allowing for a stronger causal identification

[1]The United States, Canada, Germany, Italy, the United Kingdom, France, India, and China all experienced historically high policy uncertainty in the period since 2009 (Baker, Bloom, & Davis, 2016). Some attribute the muted U.S. recovery to domestic policy uncertainty (e.g., Baker, Bloom, & Davis, 2012; Taylor, 2014; and Bordo, Duca, & Koch, 2016), while Hlatshwayo & Saxegaard (2016) find that policy uncertainty contributes to the REER-export disconnect.

[2]For instance, Stock & Watson (2012), Colombo (2013), Sum (2013), and Bordo, Duca, & Koch (2016) all use generic measures of economic policy uncertainty without examining the time-varying sources of such policy uncertainty.

[3]Where policy uncertainty is disentangled into particular types, analysis focuses on the most straightforward of relationships—trade policy uncertainty on trade outcomes (Handley & Limao, 2013, 2015; Pierce & Schott, 2016) or healthcare and defense policy uncertainty on healthcare and defense firms (Baker et al., 2016).

of policy uncertainty's effect on economic outcomes. Finally, I explore whether there is variation in firm responses to fiscal, monetary, and trade policy uncertainty. Policy uncertainty is both an impulse and propagation mechanism for broader economic uncertainty. However, relative to economic uncertainty, policy uncertainty is of particular interest because it can be moderated, if not altogether avoided, by governments.

The choice to employ firms' trade exposure as the central margin of variation reflects recent findings in the literature. For example, Colombo (2013) finds that shocks to U.S. economic policy uncertainty generate drops in European industrial production, suggesting an important role for external policy uncertainty in driving domestic outcomes. Intuitively, the macroeconomic developments of trading partner countries are likely to be important for a firm's outcomes if its revenues are largely export sales. While I use export shares in an effort to get at the cross-country channel for policy uncertainty, export exposure also reflects other linkages. Large exporters also tend to be large importers (Amiti, Itskhoki, & Konings, 2014) and bilateral trade flows are a key determinant of how financial market shocks are transmitted across countries (Forbes & Chinn, 2004).

There is a growing literature on how to measure policy uncertainty (e.g., Alexopoulos & Cohen, 2009; Gunnemann, 2014; Redl, 2015; and Baker et al., 2016). Traditionally, policy uncertainty was proxied for by measures of economic uncertainty (e.g., stock market volatility, strikes, and mentions of uncertainty in central banks' statements) due to lack of better alternatives. The advent of news aggregators allows for more nuanced measurement of policy uncertainty, capturing the nature and magnitude of policy uncertainty in a way that is most salient for businesses.[4] While useful, these measures can also fall prey to bias and noise stemming from incorrectly specified and overly broad search algorithms. This paper builds and improves on prior approaches by adopting a multi-stage refinement process for constructing the search algorithms, leveraging the expertise of journalists and professors of journalism to discipline the algorithm. Altogether, I construct 308 novel "news chatter" type-specific, time-varying measures of policy uncertainty across 44 countries.[5]

The new measures perform well with respect to multiple benchmarks: accuracy; variation; and differentiation from measures of economic uncertainty. Across the sample period and with a high level of accuracy, the measures pick up increases in type-specific policy uncertainty with little overlap across measures. The new measures also show a large degree of variation across time and across countries.[6] Finally, the measures are not highly correlated

[4]The use of the narrative approach in capturing policy shocks was championed in earlier work (e.g., Romer & Romer, 1989, 2004).

[5]The types include: generic, trade, fiscal, monetary, a measure for the resolution of uncertainty, and two additional trade policy uncertainty measures.

[6]The exception is trade policy uncertainty, which varies greatly across time but far less so across countries.

with traditional measures of economic uncertainty (e.g., the VIX, deviations in professional growth forecasts, or stock market volatility), indicating that these measures of policy uncertainty, while related, are not merely proxies for economic uncertainty or negative economic outcomes.

To examine the effects of the various types of policy uncertainty, I use Bureau Van Dijk's Amadeus database of firms across four European countries—the United Kingdom, Greece, Turkey, and France—over the period from 2003 to 2015. At the firm-level, "effective" policy uncertainty is the ratio of external policy uncertainty relative to domestic policy uncertainty interacted with firm export shares to measure exposure. I find that firms with greater exposure to external markets tend to experience larger declines in investment, sales, profit, and employment when effective fiscal and monetary policy uncertainty increase. This finding fits with the predictions of real options theory. A model of firm choice under uncertainty suggests that rising policy uncertainty associated with increases in potentially negative outcomes should lower current investment as firms increasingly opt to "wait and see" with respect to investments that feature sunk or partially irreversible costs.[7] Increases in external policy uncertainty relative to domestic policy uncertainty signal an increased likelihood of bad outcomes for firms that are highly exposed to external markets, causing such firms to delay investments.

Unexpectedly, increases in effective trade policy uncertainty appear to have the opposite effect. Firms with greater exposure to external markets see increases in sales—specifically exports—in response to increases in effective trade policy uncertainty. A series of checks confirm that this result is robust across sectors and across firm characteristics (e.g., tenure and size). One might argue that this result could reflect the relative importance of domestic policy uncertainty (and non-importance of external policy uncertainty) for exporters. In this case, the ratio of external to domestic policy uncertainty would not be the right measure to examine exporters' sensitivity to trade policy uncertainty; one would want to look solely at responsiveness to domestic trade policy uncertainty. However, disentangling external from domestic trade policy uncertainty reveals that firms with greater export exposure "lean into the wind" when faced with increases in external trade policy uncertainty while there is no significant evidence of differential impacts in response to increases in domestic trade policy uncertainty.

At first glance, this result does not seem to fit with the predictions of real options theory;

Given that three of the four countries are in a common market together (and the fourth has a free trade agreement and was attempting accession over the sample period), this result is in line with expectations.

[7]Investments are not limited to the choice to participate in a given market or launch an additional product; they can include the choice to expand facilities, scale up employment, conduct research & development, and adjust production lines to meet changing consumer preferences.

however, a closer look at the timing of trade policy uncertainty reveals that spikes often occur near expected conclusion dates for negotiations. This suggests that exposed firms may associate increased news chatter with the resolution of a trade agreement—associated with greater market access or a decline in trade costs—or as a signal of the protracted continuation of the status quo. In either case, decreases in the probability or potential magnitude of bad news should increase the incentive to immediately invest under the real options framework. I test this assertion using two new trade policy uncertainty measures—one that measures protectionist uncertainty and another that measures trade negotiation uncertainty. I find evidence that exposed firms respond negatively to uncertainty around protectionism and positively to trade negotiation uncertainty. These results indicate that exposed firms may interpret increased uncertainty around trade negotiations as a signal that negative outcomes are less likely or smaller in the near-term, incentivizing immediate investments.

The paper is structured into seven parts. The next section discusses the connections the research has with the policy uncertainty literature; Section 3 presents a stylized model of firm choice under uncertainty to motivate my empirical approach; Section 4 details construction and performance of the policy uncertainty measures; Section 5 presents the empirical results; Section 6 explores the result on trade policy uncertainty in more depth; and Section 7 concludes, suggesting directions for future research and relating the findings back to the aggregate "puzzles" mentioned above.

2 Connections and Contributions to the Literature

The study of the relationship between policy uncertainty and negative economic outcomes rests in the real options literature, which also informs a broader economic uncertainty literature. Under a highly uncertain policy environment and in the presence of fixed, irreversible costs, the value of delay rises, hindering firm performance (e.g., Bernanke, 1983; Baldwin & Krugman, 1989; Rodrik, 1991; and Dixit & Pindyck, 1994). Bloom (2009) revived the uncertainty literature by constructing a quantitative real business cycle model of firms facing uncertainty and non-convex labor and capital adjustment costs. The model features a zone of inaction for investment and hiring, which increases in size as uncertainty increases. This results in pro-cyclical growth in productivity, a stylized fact of business cycles. Several studies relate firm uncertainty, often proxied by stock price volatility (e.g., Leahy & Whited, 1996 and Bloom, Bond, and Van Reenen, 2007) or business survey results (e.g., Guiso & Parigi, 1997 and Bachmann, Elstner, & Sims, 2013) to negative outcomes in investment and

production.[8]

Within the literature directed particularly at *policy* uncertainty, the research relates to four broad areas: the measurement of policy uncertainty; the impact of policy uncertainty using firm-level variation; analyses of type-specific policy uncertainty; and the cross-country effects of economic policy uncertainty.

Examples of modern measures of policy uncertainty include the use of political proxies. Both Durnev (2010) and Julio & Yook (2012) use election year dummies. While election years can be associated with increases in policy uncertainty, this relationship is not deterministic. For instance, if a strong incumbent has a clear and stable lead throughout an election season there is no reason to think that economic agents would anticipate a change in policy regime. On a related point, if one party (or one coalition) has long held power, election seasons would be less reflective of policy uncertainty and more reflective of within party/coalition power dynamics. Finally, focusing on election years misses important variation in non-election year policy uncertainty—especially in response to shocks that do not have a domestic origin.[9] Baker et al. (2016) greatly improved on this literature by employing "news chatter" measures of policy uncertainty.[10] The approach allows for far more nuance in approximating time-varying policy uncertainty. Moreover, as mentioned above, "news chatter" picks up policy uncertainty that is most salient to economic agents. Others have followed suit in creating news-based measures (e.g., Shoag & Veuger (2013) at the U.S. state level and Redl (2015) for the South African case).

While Baker et al. (2016) take great care in constructing their measures, a human audit reveals that there is still considerable noise in their baseline algorithm.[11] One shortcoming of their approach is related to the limited number of newspaper sources they run their search algorithm on—two sources in most instances. To the extent that the selected newspapers have particular political slants, the constructed measures will be politically biased. A more problematic shortcoming is the non-restrictive nature of the search algorithms. The "triple" of mentions related to uncertainty, the economy, and policy can appear anywhere in an article, generating many false positives. Methodologically, my construction of policy uncertainty most closely connects with Gunnemann (2014). We both employ more restrictive algorithms,

[8] Additional connections with the empirical literature on economic uncertainty: Romer, 1990; Ramey & Ramey, 1995; and Alexopolous & Cohen, 2009.

[9] Shelton & Falk (2016) address many of these concerns by using term-limits as instruments for electorally-related policy uncertainty in the context of U.S. gubernatorial elections.

[10] In earlier versions of the paper, they paired their news index with in concert with the present value federal tax codes set to expire and deviations in professional forecasting. However, to extend the measure to multiple countries and across time, they restrict their analysis to the "news chatter" approach.

[11] By choosing a policy word set that minimizes false negatives and positives, they likely reduce much of this noise when it comes to their chosen policy uncertainty measure. However, without an additional audit on the final algorithm, it is unclear how much noise is reduced.

with far more sources (>36,000 in my case), and across a number of countries. My work differs from his in that I rely on journalistic standards and input to select the phrasing and number of words that can separate the "key word" mentions. I also exclude mentions of decreases in policy uncertainty, words related to equity markets, and impose a minimum word count. The latter two are to reduce the counts of "news ticker" articles that relate to summaries of a day's events and typical equity market fluctuations. Finally, I also create type-specific policy uncertainty measurements.[12]

Firm-level analyses of policy uncertainty offer better causal identification relative to aggregate studies, but are rare. The paper that most closely connects with my approach is Baker et al. (2016). They use of variation in exposure to domestic government purchases as a proxy for firms' vulnerability to domestic policy uncertainty, where exposure is measured at the 3-digit sector level in their main specifications. They find that firms in sectors with more exposure to government purchases see larger declines in investment and employment growth and larger increases in stock price volatility in response to increases in domestic policy uncertainty. They also find evidence that sector-specific uncertainty measures—healthcare, national security, and defense—outperform the generic policy uncertainty measure in predicting the outcomes of firms in those industries. Julio & Yook's (2012) use their election year proxy in a firm analysis, finding that increases in policy uncertainty are associated with declines in firm investment, but, again, this approach misses non-election variation in policy uncertainty. Stein & Stone (2012), who examine economic uncertainty more broadly, also leverage cross-firm variation in sensitivity—drawing identification from industries' relative sensitivity to changes in energy and exchange rates. They use this variation to identify firm-specific uncertainty, which they find is associated with drops in capital investment.

Historically, explicit research on policy uncertainty was rare and often directed at particular types of policy (Friedman, 1968; Rodrik, 1991; Higgs, 1997; Hasset & Metcalf, 1999; Gorodnichenko & Shapiro, 2007).[13] As policy uncertainty spiked in the wake of the Great Recession, there has been renewed interest in understanding its impacts. Analysis has largely focused on generic policy uncertainty (e.g., Stock & Watson, 2012, and Bordo, Duca, & Koch, 2016). However, there is also a nascent literature that examines specific types of policy uncertainty. Handley and Limao (2013) consider the specific role of trade policy uncertainty in trade outcomes and build a general equilibrium model allowing for export entry and upgrading with impact on importer price indices. They show that a reduction in trade policy uncertainty following China's World Trade Organization (WTO) accession generated larger

[12]More detail on the construction of these measures in Section 4.

[13]Unlike other papers in this area, Gorodnichenko & Shapiro (2007) examine the beneficial implications of monetary policy certainty. See Gunnemann (2014) or Bloom (2014) for more discussion of this earlier body of work.

export growth in industries that faced higher potential profit losses should most-favored nation status have been lost. Their work is empirically supported by Pierce and Schott (2016). Handley & Limao (2015) build a dynamic trade model with heterogenous firms, uncertainty, and fixed costs where firms make entry and trade decisions. The model predicts that firms will limit investment and entry into new export markets under conditions of high trade policy uncertainty. They test this using Portugal's accession to the European Community in the late 1980s, finding that the reduction of trade policy uncertainty led to increases in exports.[14] My research also examines the impact of trade policy uncertainty on trade outcomes, but differs in that I focus my analysis at the firm-level rather than the sector-level and I allow exporting firms to face both domestic and foreign trade-related policy uncertainty.

Finally, my analysis relates to research on the cross-country interactions between policy uncertainty and outcomes. Sum (2013) examines the relationship between U.S. and European economic policy uncertainty, finding strong evidence of co-integration. Colombo (2013) employs a structural VAR approach to show that U.S. economic policy uncertainty reduces European industrial production more than European policy uncertainty reduces it. Arguably, a cross-country channel could operate through either trade or financial linkages. However, recent fallout from the U.K.'s European Union (EU) referendum points to the importance of the trade channel. Eichengreen, Gupta, & Ospino (2016) find early evidence that the U.K.'s vote to leave the EU affected emerging markets through a trade channel, where countries with higher export shares to the EU—not merely the U.K.—experienced more negative effects. The work of Wolfers & Zitzewitz (2016) supports this finding; they show that countries with U.S. free trade agreements see large exchange rate movements in response to news about the 2016 presidential election. The inclusion of external policy uncertainty in this research is motivated by this body of work and I build on this literature by conducting a firm-level analysis of how differences in exposure to exporting translate into differences in the impact of policy uncertainty across firms.

3 Motivating Theory

In an environment with rising policy uncertainty and sunk costs, there can be benefits to delaying costly decisions under real options theory. To illustrate this in a straight-forward manner and motivate my empirical approach, I present a firm choice model with uncertainty over payoffs from a firm's action—for example, this "action" could be building a factory,

[14] While this paper uses firm-level data, it is not a panel. Therefore extensive margin effects are examined at the sector-level.

expanding an existing facility, making a capital investment, or hiring employees.[15] There are two goals of the model: (1) to provide intuition for why firms might delay costly choices in the face of uncertainty and (2) to expose the asymmetry between good and bad news in driving such choices.

3.1 A Two-Period Firm Choice Model

A price-taking manager is deciding whether or not to take action on a project that will produce one additional unit of a good each period, with zero per-period operating costs. Let $F > 0$ be a sunk cost of such an action and $r > 0$ be the interest rate.

The additional value received from action in period $t = 0$ is P_0. From period $t = 1$ it will be:

$$P_1 = \begin{cases} (1+\mu)\, P_0 \textit{ with probability } A \\ (1-\delta)\, P_0 \textit{ with probability } B \\ P_0 \textit{ with probability } C = 1 - A - B, \end{cases} \tag{1}$$

where $A,\ B,\ C,\ \delta,\ \mu \in (0,1)$ and $A + B + C = 1$.

As a preliminary step, assume that the opportunity to act can only occur in period 0. Let V_0 be the expected present value from taking action. Then the net payoff of acting in $t = 0$, Ω_0, solves $max\left[V_0 - F, 0\right]$. Now allow for action to remain an option in the second period. Then in period $t = 1$, for each of the potential P_1 outcomes, the firm would invest if $V_1 > F$, with a net payoff of $\Gamma_1 = max\left[V_1 - F, 0\right]$. At period $t = 0$, P_1 is not known, making V_1 and Γ_1 random variables. Let E_0 be the expectation at $t = 0$. Then $E_0\left[\Gamma_1\right]$ is the continuation value associated with waiting until period $t = 1$ to act. Returning to the $t = 0$ decision, the firm can take action immediately and get $V_0 - F$. If it decides to postpone, it gets one-period discounted $E_0\left[\Gamma_1\right]$. So the net payoff of the action becomes $\mathit{\Gamma}_0 = max\left\{V_0 - F, \frac{1}{1+r} E_0\left[\Gamma_1\right]\right\}$. For full details, see Appendix I.I.

The difference between the two cases—the now-or-never option or the option to act in the second period ($\mathit{\Gamma}_0 - \Omega_0$) is the value of the option to postpone action. The ability to wait allows for the ability to base firm action on different contingencies, offering extra value from "waiting and seeing." To illustrate the trade-off, see Figure 2.

For some initial $P_0 < \underline{P_0}$, firms will never act (i.e., both V_0 and V_1 are less than F). Intuitively, $\underline{P_0}$ is lower for the "wait and see" value since you are able to reject action should there be a price decrease in $t = 1$ (i.e., with the option to delay you are less vulnerable).[16]

[15] This model is an extension of Dixit & Pindyck's (1994) "investment under uncertainty" model.

[16] To see this formally, see Appendix I.II. For the "wait and see" option, $\underline{P_0} = \frac{r(CF+AF)}{C(1+r)+A(1+\mu)(1+r)}$.

The slope for the "wait and see" option is lower since, in delaying, you forego $t = 0$ P_0.[17] Let $\overline{P_0}$ be the critical price such that for $P_0 > \overline{P_0}$ firms are better off acting immediately rather than waiting (i.e., the cost of waiting exceeds the gains from waiting). For $P_0 > \overline{P_0}$, the cost of waiting outweighs the gain from waiting; the net present value is always positive. For $P_0 \in \left(\underline{P_0}, \overline{P_0}\right)$, it is worthwhile to act only if the price increases or stays the same in period $t = 1$. Within this price range, the net present value of the project becomes negative should a price decrease occur.

By comparing the net present value to acting now versus waiting one period to act, one can solve for $\overline{P_0}$ (see Appendix I.III):

$$\overline{P_0} = \left(\frac{r}{1+r}\right) F \frac{(r+B)}{r+B(1-\delta)} \tag{2}$$

In Equation (2), increases in the magnitude of potential bad news, δ, or the probability of bad news, B, increase $\overline{P_0}$, increasing the incentive to delay firm actions (see Appendix I.III). In the context of this work, an increase in the probability of a downward price movement is associated with an increase in policy uncertainty.[18]

This core implication—that firms "wait and see" as a way to avoid later regretting a choice—is an insight built into other models of policy uncertainty (e.g., Bernanke, 1983; Bloom, Bond, Van Reenen, 2007; Bloom, 2009; Bloom, Floetotto, Jaimovich, Saporta-Eksten, & Terry, 2012; and Handley & Limao, 2015). Equation (2) also illuminates an important asymmetry—while bad news increases the likelihood of delaying action, $\overline{P_0}$ does not depend directly on μ or A, the magnitude of good news *or* the probability of good news.

3.2 From the Model to the Empirics

To examine whether the theory is borne out by the data, I use annual firm-level data across four European countries—the United Kingdom, France, Greece, and Turkey.[19] The theory suggests that both the magnitude of potential bad news, δ, and the probability of bad news, B, increase the likelihood that firms will delay action. However, both parameters also impact the first moment of policy, $E_0(P_1)$, which will have an impact on firm outcomes (e.g., sales).[20]

[17] To see this formally, see Appendix I.II.

[18] $\overline{P_0}$ is also increasing in F, so larger sunk costs will be associated with higher likelihood of adopting "wait and see" behavior; however, I do not find evidence in the literature that sunk costs associated with specific investment actions are time-varying in real terms.

[19] The countries were chosen because their firm-level data include reporting of both domestic and export sales.

[20] $E_0(P_1) = A(1+\mu)P_0 + B(1-\delta)P_0 + CP_0$. An increase in either δ or B decrease the first moment. The latter effect is because $A + B + C = 1$; an increase in B is offset by either a decrease in A and/or C. In

In order to get at the isolated impact of δ and B on outcomes through their impact on changes in $\overline{P_0}$, the first moment of policy must be controlled for in the empirical specifications. The constructed measures of policy uncertainty proxy the both the magnitude of potentially bad news and the probability of bad news—the more news chatter about potentially negative news there is, the worse the impact of that potentially negative news and the more likely that outcome is. In the context of this research, an increase in the probability of bad outcomes is also dependent on a firm's relative exposure to different markets (domestic vs. external). Thus, increases in external policy uncertainty *relative to* domestic policy uncertainty signal an increased likelihood of bad outcomes, B, for firms that are more exposed to external markets, causing such firms to delay investments.

The model assumes that the probabilities and magnitudes of outcomes are known by the manager when she makes choices.[21] This mandates that timing be an important consideration in taking the model to the data. I will assume that managers have an information set at the beginning of t that includes its lagged firm-time characteristics (e.g., its amount of fixed assets and prior success) and knowledge of lagged policy uncertainty when choices must be made. The manager uses $t-1$ policy uncertainty to make assumptions about the probability of bad news, B, occurring in t in deciding to delay or undertake costly actions in t.[22]

Finally, I choose to focus on a number of intensive margin outcomes in my empirical analysis (e.g., sales, employment, and investment) since firm actions are not limited to entry choices or purely capital investments. Any actions that feature sunk costs will be delayed in context of the model—the choice to expand facilities, scale up employment, reach new market segments, conduct market research, or adjust production lines to meet changing consumer preferences.[23] Firms are also linked to one another via supply chains. Firms that provide

all cases, $E_0(P_1)$ falls when B increases.

[21] Policy uncertainty is often distinguished from more traditional notions of risk. This research conceives of policy uncertainty as closer to Knightian uncertainty—"a fundamental lack of knowledge about the future." As Bernanke (1983) points out, Knightian uncertainty is reducible if one simply waits. This differs from parametric uncertainty, which is irreducible and typically associated with risk around expected returns. In the model presented, the probabilities and magnitudes are assumed to be known. However, one can relax the assumption that B is perfectly calibrated. Even if B is "fuzzy," in what follows, I assume that firms know whether it is generally increasing or decreasing based on the news they read. Examples of fuzzy, but useful information around probabilities of outcomes are election polls. While they are often noisy, with time-varying error bands, they still prove useful in gauging the probability of an outcome.

[22] An alternative view is that investments that feature sunk costs also feature "time to build" so that policy uncertainty impacts investment choices concurrently, but they only show up in outcomes with a lag. In Section 5.5 I test the robustness of this assumption using alternative timing specifications.

[23] Any non-convex costs—sunk or partially irreversible—will generate an incentive to delay investment in the face of high policy uncertainty (Bloom, 2014). Cooper and Haltiwanger (2006) show that investment adjustment costs, even when small, matter for firm investment choices. Bloom (2009) estimates a number of labor and capital adjustment costs: in his preferred specification, capital has an estimated resale loss of

inputs to other firms' activities are vulnerable to downstream firms' "waiting-and-seeing." Lastly, for the dataset I employ, I do not observe export destinations.[24] It may be that destination market choices are being made (i.e., the decision to stop serving a particular market), but they only show up on the intensive margin. Indeed, most firm actions will impact firm outcomes along the intensive margin, but will not show up as a binary choice (e.g., the choice to export or sell domestically).

4 Data

4.1 Measuring Policy Uncertainty

Policy uncertainty captures more than uncertainty about the specifics of what economic policies will be adopted. The concept also reflects uncertainty about the economic impacts of policy actions (e.g., uncertainty about the impact of an agreed upon trade deal); uncertainty over who will make policy choices; uncertainty created by policy inaction (e.g., the choice to delay decisions on the federal budget); and uncertainty about policy responses to non-economic shocks (e.g., a natural disaster). Unlike traditionally-used measures of economic uncertainty (e.g., strike days or exchange rate volatility), "news chatter" policy uncertainty indices pick up economic volatility as well as the threat of volatility related to policy uncertainty, whether or not it comes to fruition. Business confidence surveys are similar, however they tend to be ambiguous with respect to the underlying source of uncertainty (e.g., a common question is "are you worried about the direction of the economy over the medium-term?").

To construct policy uncertainty indices for fiscal, monetary, and trade policy uncertainty, as well as a more general "generic" policy uncertainty index, I designed and ran search algorithms on Dow Jones's Factiva news aggregator. Factiva covers over 36,000 sources in 28 languages. These sources include almost 700 newswires (e.g., the Associated Press and Reuters) and all major newspapers. In addition to digitized newspaper inclusion dating back to the 1980s, newspapers' online websites (e.g., The Guardian Online, The New York Times Online) are also included. The news aggregator allows for filtering of results by language, source location, geographic coverage, company/industry, and a select group of subjects.

34 percent, while fixed investment, partially irreversible hiring and firing costs, and fixed costs of hiring and firing are all estimated to be roughly 2 percent. As he notes, there is a large degree of variation (depending on approach and/or data) in the literature in the estimation of such costs. For instance, Nickell (1986) finds labor adjustment costs in the range of 8 to 25 percent of annual wages.

[24] More detail on how I link firms' exports to destinations can be found in Section 4.1.2.

4.1.1 Developing Type-Specific Policy Uncertainty Search Algorithms

The search algorithm counts articles that meet a quadruple metric: mention of a policy type within the same paragraph as uncertainty, which must be within eight words of a country reference, and contain no mention of excluded terms.[25] To develop the algorithms, I first compiled word banks related to policy types—trade, monetary, and fiscal—using Baker et al. (2016) as a base, reading articles on economic policy via Google News, and collecting word suggestions from graduate students with expertise in each area.[26] Next, I consulted with two journalists that write and report on economics-related news to ensure that the search algorithms pick up policy uncertainty in a way that journalists write about policy uncertainty, as opposed to the way economists might write about policy uncertainty.[27] Particular attention was placed on generating the set of uncertainty-related terms that are used in association with negative increases in policy uncertainty (e.g., concern, doubt, worry, anxiety, etc.). Finally, to ascertain journalistic standards around sentence length and construction, I spoke with two professors of journalism to understand how "leads" are covered and to select the number of words that might fall between core search terms.[28] Factiva also has some foreign language sources. To include these sources in my searches, I relied on translations by native-speaking economic graduate students, who also offered adjustments based on language and country context for certain terms.[29]

The algorithms are both more flexible and more restrictive than those used in the prior literature. One one hand, I allow many terms to vary in how they are presented (e.g., import tariffs can also by picked up as tariffs on imports). On the other hand, to ensure that type-specific uncertainty measures are not merely proxies for other types of policy uncertainty, the search algorithms reject articles that mention other types of uncertainty (e.g, fiscal policy uncertainty's algorithm picks up articles that meet the fiscal search terms, but excludes articles that meet trade or monetary policy search terms). In an additional effort to ensure that the algorithms pick up news related to the country in question, I applied Factiva's country-specific filters. Articles are also required to be longer than 99 words so that tickers and news summaries are less likely to be included in the count. Finally, the algorithms also exclude references to an absence of uncertainty (e.g., "without doubt" or "no

[25]See Appendix II for more detailed examples of the search algorithms.

[26]For terms related to trade policy, common words from WTO trade arbitrations for the four countries were also included in the word bank.

[27]I thank Sam Fleming—US Economics Editor at the Financial Times—and Juliana Goldman—CBS News Correspondent, formerly at Bloomberg News—for their time and contributions.

[28]I thank Douglas Foster—Northwestern University, Medill School of Journalism—and Kenichi Serino—University of Witswatersrand School of Journalism—for their time and contributions.

[29] I thank Yusuf Mercan (Turkish), Caroline Le Pennec (French), and Eric Avis (French) for their time and contributions. Factiva does not allow for searches in Greek.

uncertainty") and references to equity market volatility, which occurs rather frequently and is often unrelated to policy uncertainty.

4.1.2 Constructing Policy Uncertainty Indices

Country-Level Domestic Policy Uncertainty. By type-year, the policy uncertainty measure is the count of the number of articles that match the criteria of the search algorithm divided by the count of articles that match a normalization search algorithm. The normalization algorithm is meant to pick up changes in source coverage over time and counts articles that include the term "today" within eight words of the country name. When policy uncertainty spikes, general coverage of the country spikes (e.g., the attempted Turkish coup of 2016), diluting the measure of policy uncertainty in periods of high policy uncertainty. In order to alleviate this, I define the normalizer as the average of general mentions in the current year and one year ahead. In general, source coverage is increasing over time, so this is a conservative approach for the normalizer (relative to an average that includes any prior data). Finally, each country's uncertainty measures are standardized to have unit standard deviations and normalized to have a mean of 100, with larger values reflecting higher policy uncertainty. Figure 3 shows the domestic policy uncertainty measures for the U.K., Greece, France, and Turkey.[30]

[30]For detail on the events that lead to spikes in policy uncertainty, see the online appendix.

Firm-Specific Policy Uncertainty Firms that participate in exporting are also vulnerable to external policy uncertainty within their exporting markets. To account for this:

1. I identify the top export destinations for both goods and services at one-digit SITC and EBOPS levels over the full period from 2003 to 2015 for each of the four countries.[31]

2. For 44 unique top-export countries, I constructed type-specific policy uncertainty measures in the same manner as the domestic policy uncertainty measures—176 additional indices.[32]

3. I then calculate the mean country-sector export shares θ_{mcs} at the 4-digit NAICS level for goods and 3-digit NAICS level for services over the sample period for each of the 44 markets, m.[33] Despite only constructing policy uncertainty measures for the 44 top-export countries, across sectors the average coverage for services is 91 percent to service exports, with standard deviation of .05. For goods, average coverage of total exports is 84 percent, with a standard deviation of .08. For each sector, period, and uncertainty-type, the measures are constructed as follows:

$$External\ Policy\ Uncertainty_{cst} = \sum_{m=44} \theta_{mcs} Uncertainty\ Type_{mt}.$$

4. Finally, at the firm-level, initial export share is used to create a weighted average of domestic and external policy uncertainty for a firm in a country and sector at time t:

$$Firm\ Policy\ Uncertainty_{icst} = \\ \alpha_i External\ Policy\ Uncertainty_{cst} + (1 - \alpha_i) Domestic\ Policy\ Uncertainty_{ct},$$

   where α_i is a firm's export share in its initial period in the sample. For instance, if a firm exports 60 percent of sales in its initial period of entry into the sample, it faces 60 percent external uncertainty and 40 percent domestic policy uncertainty; if it exports zero percent of sales, it only faces domestic policy uncertainty.[34]

[31] Comtrade's service data only extends to 2014 and does not include services export data by destination for Turkey.

[32] Only English language search algorithms are used for the construction of the external uncertainty indices. The countries are: Albania; Australia; Azerbaijan; Belgium; Brazil; Bulgaria; Canada; China; Cyprus; Egypt; Finland; France; Germany; Gibraltar; Greece; Hungary; India; Iran; Iraq; Ireland; Israel; Italy; Japan; Luxembourg; Macedonia; Malta; Morocco; Netherlands; Nigeria; Norway; Oman; Poland; Romania; Russia; Saudi Arabia; Singapore; South Africa; Spain; Switzerland; Syria; Turkey; U.K.; U.S.; and the United Arab Emirates.

[33] For insight on why mean shares are preferable to median or initial sample period exports, see Appendix IV.

[34] 12 percent of firms in the sample export. A histogram of α_i conditional on exporting can be found in Appendix VI.

4.2 Performance of the Search Algorithms: Human Audit

To assess the performance and content of the policy uncertainty measures, I conducted a partial human audit of the measures using research assistants. To train the research assistants, I relied on Baker et al.'s (2016) extensive "coding guide" manual on how to conduct human audits of news chatter measures. I also offered supplemental training on policy implementation (e.g., how modern central banks conduct monetary policy).[35] A random sample of 10 percent of articles for fiscal, monetary, and trade policy uncertainty and two percent of the generic policy uncertainty articles were audited.[36] The audit was conducted on the search algorithms for the United Kingdom. To ensure accuracy in the auditing process, the research assistants had a portion of overlapping audit assignments; conducted re-audits of each other's results; and any non-agreements were discussed and addressed.

4.2.1 Accuracy, by Type

Several metrics are employed to assess accuracy: the percent of articles that reference the correct type of policy uncertainty; whether correct reference to a type of policy uncertainty varies over time in a way that systemically biases the measures; whether articles are about increases or decreases in policy uncertainty; if policy uncertainty is related to domestic issues or foreign issues; and how much overlap there is between the various measures of type-specific policy uncertainty.

Amongst the generic policy uncertainty articles, 71.8 percent of articles referenced generic economic policy uncertainty; 1.8 percent referenced declines in economic policy uncertainty; and 6.5 percent of articles were mainly about foreign countries (see Table 1).[37]

Amongst the type-specific policy uncertainty audits, over 70 percent of the audited articles reference the correct type-specific policy uncertainty; over 80 percent are about increases in type-specific policy uncertainty; over 90 percent of audited articles relate to domestic policy uncertainty; and there is little overlap across article types (see Table 2).

One might worry that the accuracy of the measures vary over time in a way that could bias their interpretation (namely, if periods of high policy uncertainty were associated with low accuracy then changes in the measure would reflect changes in its noise). Figure 4 displays the percent of audited articles that relate to type-specific policy uncertainty over the sample period. While there is fluctuation in accuracy for the measures, accuracy is

[35]The 66-page training manual can be found here: http://www.policyuncertainty.com/research.html. The audit template and raw results are available from the author upon request.

[36]Two percent amounts to 500 articles. As I refined the algorithms, additional rounds of partial audits were conducted. Altogether, we audited almost 3,000 articles across the four policy uncertainty types and 1,300 in the final round of audits.

[37]I excluded counts of audits I conducted in these calculations.

generally high across the measures. For fiscal policy uncertainty, the lowest accuracy (57 percent) occurs in 2004, a low uncertainty year for fiscal policy; in 2010—a high fiscal policy uncertainty period—accuracy is at 82 percent. The lowest period of accuracy for monetary policy uncertainty falls in 2015 (64 percent), but on the whole, accuracy is high throughout the sample period. Finally, 2009 is a low accuracy year for trade policy uncertainty, however it is also a low year with respect to the trade policy uncertainty indices.

4.2.2 How similar are the measures to measures of economic uncertainty?

Some argue that measures for economic policy uncertainty are simply proxies for economic uncertainty. Table 3 displays the average coefficients of non-determination ($1 - R^2$) across the four sample countries for country-specific regressions of the policy uncertainty measures on traditional measures of economic uncertainty—CBOE Volatility Index (VIX); stock market volatility (SMV); the interquartile of average probability distributions for EU real GDP growth from professional forecasters (ECB I); and the standard deviations of professional forecasts for real GDP growth (ECB II). The coefficients of non-determination reveal a large degree of variation in the policy uncertainty measures that is not explained by economic uncertainty measures. For the country-specific coefficients of non-determination, see Appendix III.

4.2.3 On the temporal nature of policy uncertainty

Real options theory relies on the assumption that certainty can be attained by waiting. This suggests that policy uncertainty must be temporary in nature in order for firms to have incentive to respond to it (Bernanke, 1983). A benefit of "news chatter" measures is that newspapers tend to cover "new" news, suggesting that the indices are more likely to capture temporary uncertainty (e.g., policy uncertainty associated with an upcoming election or a budget approval process) as opposed to long-standing, structural uncertainty. Moreover, examination of the above indices reveals spikes in the policy uncertainty measures followed by low policy uncertainty periods, pointing to resolution of prior uncertainty.

Greece's recent debt crisis offers a useful example. Figure 5 plots Greece's fiscal policy uncertainty index and debt as a percent of GDP. The debt crisis began in 2009, but policy uncertainty around leadership's response to it only amplified in 2010. Between 2010 and 2012, Greece cycled through multiple heads of state, the threat of referendums on bailout deals, and the rise of fringe anti-austerity political parties. However, in late 2012, ECB President, Mario Draghi, made his now infamous comment that the Bank would "do whatever it takes to preserve the euro," followed with the introduction of bond-buying programs targeted at Greece and a less restrictive bailout deal.

Despite still rising debt and an ongoing economic crisis, policy uncertainty surrounding

the debt crisis was all but resolved during 2013 and 2014. This period of relative policy stability ended in 2015 when snap elections brought the anti-austerity Syriza party to power; government defaulted on a payment to the IMF; discussions were held about Greece's potential exit from the eurozone; and Greek citizens voted against new austerity measures in a referendum. This example not only illustrates that policy uncertainty can be resolved, but also that such resolution can take place in the face of ongoing economic uncertainty.

4.2.4 How much overlap is there across the measures?

Given that three of the four countries are in the European Union and the fourth is in the accession process, it was not clear ex-ante that fluctuations in policy uncertainty would vary dramatically across the same countries. However, the measures show substantial variation. The average cross-country correlation for generic policy uncertainty is .41. For the fiscal, monetary, and trade policy uncertainty, the average cross-country correlations are .24, .21, and .90, respectively. Figure 6 is a heat-map of the country-measure specific correlations. Red cells represent correlations higher than .75; yellow cells are correlations between .67 and .75; and green cells represent correlations lower than .67.

There is sizable variation both across time and countries across the measures, with the exception of trade policy uncertainty. This is not unexpected given that the European Commission of the EU is responsible for trade agreements for member countries and Turkey has a customs union agreement with the EU.

4.3 Firm-Level Data

The Bureau Van Dijk's Amadeus database includes firms across European countries covering the 13-year period from 2003 to 2015. While the dataset covers 43 economies, I utilize firm data from the U.K., Greece, Turkey, and France. Selection was based on the provision of export data by entities in these countries. The dataset is based on local records compiled from regulatory filings. The database contains the most recent ten years of data for each firm. In order to avoid reverse causality between firms' outcomes and policy uncertainty, I exclude the top percentile of firms, based on sales, from the sample. The total number of firms in the sample is 1.5 million with a total of 8.9 million observations. Annual exporting participation varies between 10-15 percent of firms over the sample period.

The firm-level time-varying variables include: sales; number of employees; staff costs (for the U.K. and France); materials costs (for the U.K. and France); total cost of goods (for Greece and Turkey); fixed assets; depreciation; and firm age. I also construct a measure that proxies within-market externalities arising from the presence of other firms within an

industry in a given country and year. As discussed by Bernard & Jensen (2004), the presence of other firms may reduce production costs or costs of accessing new markets. All value-based measures are deflated using country consumer price indices.

Table 4 shows the descriptive statistics. In line with expectations, exporters tend to be larger, older, and more productive. However, non-exporters have more fixed assets in this database. With the exception of the investment specifications (where fixed assets is used to measure investment rates), controls for fixed assets and age are used throughout as firm-time controls.

5 Empirical Analysis

5.1 Specification and Interpretation

A central benefit of constructing a firm-based policy uncertainty measure is that it allows for the control of country-sector-time effects, capturing a multitude of confounding variables—such as, country-sector business cycles (e.g., Afonso & Furceri, 2009) as well as relative prices, sector productivity trends, and various other shocks. Since the firm policy uncertainty measure accounts for exposure to external markets, a first moment control for policy must also account for external markets. To do so, I follow a similar approach to that used to construct external policy uncertainty but use external real $t-1$ GDP forecasts for t from the IMF's Spring World Economic Outlook historical databases: $External\ Forecasts_{cst-1} = \sum_{m=1}^{44} \theta_{mcs} Forecast_{mt-1}$, where θ_{mcs} are mean country-sector export shares, as discussed above. The first moment control is: $Firm\ Specific\ Forecasts_{icst-1} = \alpha_i External\ Forecasts_{cst-1} + (1-\alpha_i) Domestic\ Forecast_{ct-1}$. α_i is the initial export share of firm i. My baseline specification is:

$$Outcome_{icst} =$$
$$\gamma_i + \mu_{cst} + \beta \times Firm\ Policy\ Uncertainty\ Type_{icst-1} + \mathbf{Z}_{it-1} + \ Forecasts_{icst-1} + \varepsilon_{isct},$$

where γ_i are firm fixed effects; μ_{cst} are country-sector-time fixed effects; $\mathbf{Z}_{it-1}$ is a vector of lagged firm-time characteristics; and $Forecasts_{icst-1}$ is the firm-level first moment control for policy. The variables are log-transformed.

With the inclusion of country-sector-time fixed effects, μ_{cst}, β is a coefficient that measures sensitivity across firms with different levels of exposure. Re-arranging the firm policy uncertainty (PU) measure yields: $Firm\ PU_{icst} = \alpha_i \left(External\ PU_{cst} - Domestic\ PU_{ct}\right) + Domestic\ PU_{ct}$.[38] The final term is absorbed by the country-sector-time fixed effects. Thus,

[38]Recall, external policy uncertainty is the sector-specific weighted average of each country's (i.e., U.K., France, Greece, and Turkey) trading partners' uncertainty and domestic policy uncertainty is a country-time varying measure.

β estimates the sensitivity across firms to changes in relative policy uncertainty (i.e., the ratio of external to domestic policy uncertainty), where sensitivity varies based on initial export shares, α_i. I use the term "effective policy uncertainty" to refer to the interaction between α_i and the ratio of policy uncertainties.

Finally, as discussed in Section 4, the measures of monetary, fiscal, and trade policy uncertainty have minimal overlap with respect to content (i.e., based on the audits, fiscal, monetary, and trade articles have overlap with other types of 1.7, .4, and 0 percent, respectively). However, in reality, periods of high fiscal policy uncertainty tend to overlap with periods of high monetary policy uncertainty for firms—an additional finding of this research (see Table 5).

While horse-race styled specifications are instructive with respect to the relative importance of different policy uncertainty types, such specifications will also suffer from multicollinearity when including both fiscal and monetary policy uncertainty. Given the high degree of correlation between fiscal and monetary policy uncertainty, I create a composite "macro" policy uncertainty which is the simple mean of fiscal and monetary policy uncertainty.

5.2 Baseline Results

Firms' sales, profits, capital investment, and employment fall in response to increases in effective policy uncertainty (see Table 6). The impact of effective policy uncertainty varies widely across firms with different export exposure. In response to a standard deviation percent increase in generic effective policy uncertainty, a firm with an initial export share at the 75th percentile sees sales decline by 1.4 percent while a firm with the median export share sees sales decline by .3 percent (see Table 7). The coefficients on capital investment and employment are quite similar. In response to a standard deviation increase in effective policy uncertainty, a firm at the 75th percentile of exposure sees capital investment and employment fall by .9 percent while a firm at the median sees capital investment and employment fall by .2 percent.

5.3 Type-Specific Policy Uncertainty Results

Turning to the type-specific indices, effective fiscal and monetary policy underlie the negative relationship between exposure and sales outcomes, with significant coefficients of -.06 (see columns (2) - (3) of Table 8). Unexpectedly, effective trade policy uncertainty has the

opposite sign and is significant, with a coefficient of .09. In the horserace specification with both effective macro and trade policy uncertainty, the negative magnitude of the average of fiscal and monetary policy uncertainty increases to -.08 while the coefficient on effective trade policy decreases to .07; the coefficients remain significant.

Effective fiscal and monetary policy uncertainty similarly lower profits, investment, and employment for more highly exposed firms (see Table 9). For profits and employment, effective trade policy uncertainty is no longer statistically significant despite still having a positive coefficient. However, for capital investment and average wages, increases in effective trade policy uncertainty tend to increase investment and average wages for firms with higher export shares. If increases in trade policy uncertainty induce rather than delay investment, the result on average wages could reflect compositional shifts, where more exposed firms skill-upgrade by hiring more expensive and better quality workers, while firing low quality workers.[39] For individual type-specific results, see Appendix VII.

5.4 Decomposition

There are three sources of variation in the firm-based policy uncertainty measure—the treatment of exporters relative to non-exporters; the variation in across country-sectors in the construction of shares for external policy uncertainty; and the continuous variation across α_i initial shares. To assess the relative importance of these sources of variation, I relax my baseline approach by perturbing the firm-based measure to uncover the source of identifying variation in the results for sales.

5.4.1 Binary Export Exposure

To examine how reliant the results are on the continuity of the alpha measure along initially exporting firms, I replace the continuous alpha with binary initial export status (i.e. so that now $\alpha_i = 1$ if a firm exports in the initial period; 0 otherwise). The magnitude of the coefficients on policy uncertainty fall across the different outcomes, particularly for effective macro policy uncertainty, and the coefficient on capital investment becomes statistically insignificant (see Table 10). The positive result on effective trade policy uncertainty is again significant and robust in the horse-race specification for sales, but loses its significance for capital investment and average wages.[40] The large decrease in the magnitude of the

[39] Average wage results are based on firms in the U.K. and France; labor bill data was not provided by Greek or Turkish firms.

[40] The results by type-specific policy uncertainty for sales can be found in the online appendix.

coefficients and the loss of significance on capital investment points to the importance of continuous variation in initial share in driving the baseline results.

5.4.2 Perturbing External Policy Uncertainty

Equal Shares

The first perturbation of external policy uncertainty is to allow shares to be equal across trade partners, over time, and across sectors. In the baseline, external policy uncertainty (EPU) was $EPU_{cst} = \sum_{m=1}^{44} \theta_{mcs} Uncertainty_{mt}$, where θ_{mcs} was the mean market-county-sector share. This becomes $EPU_t^{Perturb\ I} = \sum_{m=1}^{44} \bar{\theta} \times Uncertainty_{mt}$, where $\bar{\theta} = \frac{100}{44}$. The coefficients on effective macro policy uncertainty do not change dramatically; however, the adjustment strengthens the statistical significance and the magnitude of the coefficients for effective trade policy uncertainty across outcomes, with the exception of average wages (see Table 11).

One possible explanation for the stronger results on trade is that most of the 44 countries are "potential" trading partner countries for firms in the four sample countries, regardless of their particular mean share over the period. In this case, the external policy uncertainty across both realized and "potential" partners would have bearing on firm choice. To test this, it would be ideal to have information about destinations at the firm-level, which is missing from the Amadeus dataset. With such data, I could construct a measure of the likelihood that a market is a potential trading partner based on other firms' export destinations at the country-sector level and weight trading countries based on potential.

Random Re-assignment of Shares Across Markets

The second perturbation of external policy uncertainty is to random re-assign the shares across the 44 export market destinations. External policy uncertainty now becomes $EPU_{cst}^{Perturb\ II} = \sum_{m=1}^{44} \theta_{ncs \neq mcs} Uncertainty_{mt}$, where θ_{ncs} is a random other country's mean market-county-sector share. The result on effective macro policy uncertainty strengthens for capital investment and falls for sales, profits, and employment (see Table 12). For effective trade policy uncertainty, the coefficients fall in magnitude for sales, investment, and average wages, where statistically significance falls away for the latter two outcomes. At the same time, the coefficients for profits and employment rise and become significant relative to the baseline horse-race specifications.

Based on the perturbations of external policy uncertainty's construction, one might conclude that use of specific country-sector trade weights are not central to firms' responses (i.e., it is not the construction of the Comtrade trade-shares that is driving the results). However, it would be erroneous to conclude that the specific set of trading partners included

in the weighted average of external policy uncertainty does not matter. More than half of the 44 external markets are European countries. It may be that exposure to a particular European country is proxied by exposure to other European countries.[41]

Together, the switch to a binary alpha and the perturbations of external policy uncertainty do not change the qualitative reactiveness to effective policy uncertainty—the takeaway is still that increases in effective macro policy uncertainty harms more exposed firms, while increases in effective trade policy uncertainty help more exposed firms. The most important margin of variation appears to be the continuity of alpha, the initial share, based on the large falls in magnitude of the coefficients on both macro and trade policy uncertainty across several outcomes.

5.5 Robustness

There are a number of remaining potential concerns about the identification strategy. First, one might worry that the first moment control used in the baseline is not accurately capturing the first moment of policy. In this case, the coefficients on policy uncertainty would be capturing the impact of both the first moment and changes in $\overline{P_0}$ on outcomes. A second issue could be that the estimated coefficients on policy uncertainty reflect differences in shocks across firm-types that are not attributable to policy uncertainty. Third, the selection of initial export share as the exposure measure helps avoid endogeneity issues, but one might wonder how much the results change if I allow for time-varying export shares in constructing effective policy uncertainty. Fourth, the outcome variables are likely to be serially correlated, suggesting that I should control for pre-existing trends by adding lagged dependent variables. Finally, I make a timing assumption that a one-period lag on policy uncertainty is the most appropriate choice to reflect firm choices in period t. It could be that alternative lags or concurrent policy uncertainty also influence firm choices.

To address these concerns and assess the robustness of the baseline results, I examine the use of other first moment policy controls; add controls for group-time trends; allow the exposure measure to vary over time; add lagged dependent variables to the baseline specification; and allow for different timing effects of policy uncertainty on firm outcomes.

The use of IMF's WEO forecasts in the baseline follows the rest of the literature in using forecasts as a control for the first moment of policy (see column (1) of Appendix VIII.I for the

[41] To test this assertion, one could allow total Europe or EU as its own "market" and construct amorphous "European" policy uncertainty measures, followed by re-weighting the external policy uncertainty measure based on the new European share relative to non-Europe markets. Alternatively, one could add random countries' policy uncertainty measures (i.e., construct measures for countries that the sectors do not trade with ever over the sample and substitute these uncertainty measures for trading partner's policy uncertainty measures).

baseline result across different outcomes). However, the baseline results are also robust to the use of two alternative firm-specific first moment controls—realized real GDP and WEO $t-1$ real GDP growth revisions (i.e., the revisions in t growth forecasts from the spring to the fall releases), where both are constructed in a similar manner as the firm-specific forecast control (see columns (2)-(3) in Appendix VIII.I). In particular, the robustness of the coefficients to the use of the growth revisions is encouraging as $t-1$ revisions could occur in response to a rise in policy uncertainty in related countries muting the impact of the policy uncertainty measures.[42]

The estimated coefficients on effective policy uncertainty could be picking up some difference in firm-type (i.e., exporter vs. non-exporter) responses that is not attributable to fluctuations in policy uncertainty. For instance, relative to non-exporters, exporting firms also face "additional upfront sunk and fixed outlays specific to international trade": meeting regulatory requirements in both source and destination countries; setting up distribution networks abroad; conducting destination-specific research; and meeting destination-specific preference and capacity requirements (Chor & Manova, 2012). In the context of the model, higher fixed costs also lead to a higher incentive to delay investment. Thus, a firm's higher exposure to external markets (as proxied by export share) makes it more vulnerable to increases in external policy uncertainty, while its ex-ante participation in exporting activities could also be associated with a greater incentive to delay investments. Columns (4) - (7) add controls for firm types interacted with time variables: initial status with country-sector-time; initial share interacted with country-time and sector-time, separately; initial shares interacted with time; and per-period export shares. Adding such controls allows for the time trend of exporters to be different, while still allowing effective policy uncertainty to retain some identifying variation (e.g., for initial status interacted with country-sector-time fixed effects, the identifying variation on effective policy uncertainty comes from the continuity of alpha).

The coefficients on effective policy uncertainty for sales, profits, and capital investment are robust to these checks and the magnitudes on the coefficients increase (see Appendix VIII.I). For employment, the coefficient falls in magnitude but remains significant for the control that interacts initial status with country-sector-time, but loses significance with the additional group-time controls. For average wages, the inclusion of the group-time controls increase the magnitude of the coefficients on effective policy uncertainty, but only the result on the initial status control remains insignificant (in line with the baseline).

As firms increasingly export more or less of their sales, their exposure/vulnerability to

[42]For robustness of the sales results by type-specific policy uncertainty, see the online appendix available at www.sandile.com.

effective policy uncertainty should fluctuate. Moreover, it could be that the initial sample entry period for firms is a systemically biased year with respect to exporting shares (e.g., if exporters tend enter the sample small and then scale up their exporting). To check for this, I re-construct the firm policy uncertainty measures using export share, α_{it}, instead of initial entry export share, α_i. However, this introduces endogeneity as changes in firm export share over the sample could also be determined by the relationship between policy uncertainty and the outcome variables. To address this, I instrument the time-varying export share uncertainty with the initial share firm uncertainty. Across the outcomes, the core results hold (see column (8) across outcomes in Appendix VIII.I).

To examine the robustness of the result to the inclusions of controls for pre-existing trends, I run dynamic specifications that include lagged dependent variables. The inclusion of lagged dependent variables lead to inconsistent estimates that are also biased. However, as Bernard & Jensen (2004) note, a specification in levels that includes the fixed effects provides a lower bound on the coefficient for the lagged dependent variables. To address the inconsistency, I also use an Arellano-Bond difference GMM approach using lagged levels as instruments as an additional check. The results are robust to both approaches for controlling for lagged dependent variables (see Appendix VIII.II).

Finally, in the baseline I assume that lagged policy uncertainty impacts current firm sales, but do not allow for more persistent impacts in the specification. I also do not allow for concurrent impacts of policy uncertainty on outcomes. To examine both possibilities, I follow Jordà (2005) by using local projections of lagged policy uncertainty on sales (see Appendix VIII.III). Concurrent effective policy uncertainty has a negative impact on sales, however the coefficient is smaller in magnitude than the baseline. This likely reflects issues related to timing aggregation. If a rise in policy uncertainty occurs early in the year, managers may delay firm actions within that same year. Additionally, not all firms use calendar years as fiscal years. Both possibilities would explain concurrent effects of policy uncertainty. However, in support of my approach, the magnitude of the coefficient increases for sales in t. It remains at a similar magnitude for $t+1$, and $t+2$ sales before losing significance. This exercise points to persistent effects of policy uncertainty on firm outcomes.

In summary, the baseline results are robust and the qualitative results continue to hold when substituting other first moment policy controls; including group-time trends; substituting alpha for time-varying export shares; including lagged dependent variables to control for pre-existing trends in outcomes; and allowing for different timing assumptions.

6 A new puzzle for trade policy uncertainty?

The results of Section 5.3 suggest that rising effective trade policy uncertainty tends to be associated with higher sales, capital investment, and average wages for firms with higher export shares. At first glance, this finding appears to contradict the literature that shows positive impacts on outcomes from the reduction of trade policy uncertainty (e.g., Handley & Limao, 2015). In what follows, I run a series of tests in an effort to explore this result.

6.1 A Deeper Look at the Trade Policy Uncertainty Results

To uncover whether a particular component of sales is driving the positive result, I separate total firm sales into domestic sales and exports. In addition, to examine the importance of the extensive margin (i.e., entry), I use the inverse hyperbolic sine (IHS) transformation to allow for zeros in these separate specifications. The IHS transformation is defined as $ln(x + (x^2 + 1)^{\frac{1}{2}})$. It both allows for zeros in the estimation and behaves like the traditional log transformation for reasonable values of x (Zhang, Fortney, Tilford, & Rost, 2000).[43] Large differences between the non-IHS results and the IHS results indicate an important role for the extensive margin. Table 13 shows that the positive result is driven by exposed firms' exports increasing in response to increases in effective trade policy uncertainty, not domestic sales (columns (2) and (3)). For a firm with initial exporting share of 25 percent (roughly, the mean share amongst exporters), a one standard deviation percent increase in lagged firm trade policy uncertainty increases export growth by an average of 2.8 percent in column (4) and by 18.4 percent with the IHS specification in column (5).

The difference between the IHS results and standard results for exports show that increases in sales in response to effective trade policy uncertainty are being driven, in part, by export participation (i.e, a binary choice to participate or not participate at all in a period), not just investment related to increases along the intensive margin. This is confirmed by running an export participation linear probability model—à la Bernard & Jensen (2004)—with the addition of policy uncertainty (see Appendix IX.I).

6.2 What does not explain the positive coefficient on trade policy uncertainty for exports?

There are a number of possible explanations for the positive coefficients on trade policy uncertainty with respect to exports. For example, it could be that particular sectors are driving the outcome or that exporters are concerned about domestic trade policy uncertainty,

[43] The extensive effects of trade policy uncertainty can also be estimated directly using a nonlinear model (see Appendix IX.I).

not external trade policy uncertainty. However, in what follows, I debunk many of these hypotheses.

Explanation 1: Sector, firm, or crisis period characteristics?

To assess whether particular sector, firm, or crisis period characteristics are driving the result on exports, I estimate coefficients across different sectors separately before turning to specifications that include interactions for firm and period characteristics. Both goods and service sectors have a positive coefficient on effective trade policy uncertainty, although the magnitude is larger for the services sector (see Appendix IX.II). At the one-digit level, there is not a particular sector responsible for the positive coefficient. Moreover, traditionally non-tradable industries like education, health-care, and other services do not have statistically significant results (which is in line with expectations since firms in non-tradable industries should not be impacted by trade policy uncertainty). To examine if there are specific firm characteristics or crisis observations driving the outcome, I construct dummies for the European debt crisis year (2009-2012); above median firm size and tenure; or if firm is in the goods sectors. The result is not explained by firm size, tenure, or whether the firm is in a goods or services sector (although larger and older firms seem to have slightly less positive coefficients) (see Appendix IX.II).

Explanation 2: Is trade policy uncertainty asymmetric to other types of policy uncertainty when it comes to exporters?

Recall that the coefficients on effective policy uncertainty reflect the effect of interactions between the initial export share and the ratio of external to domestic policy uncertainty. An alternative way of interpreting the result is to take the inverse of the ratio of external policy uncertainty relative to domestic policy uncertainty: exports fall as the domestic policy uncertainty increases relative to external policy uncertainty. It could be that domestic trade policy uncertainty is more important than external trade policy uncertainty for exporter choices. This would suggest that trade policy uncertainty should be treated asymmetrically to fiscal and monetary policy uncertainty with respect to exposure/vulnerability to policy uncertainty.

If I construct interactions between alpha—the initial export share—on domestic trade policy uncertainty and foreign trade policy uncertainty, separately, I find that the coefficients on both the external and domestic trade policy uncertainty interactions are positive, but only the coefficient on the external trade policy uncertainty is significant (Table 14).[44] This suggests that the positive responses of largely exposed firms to increasing excess policy

[44]For the non-IHS results, see Appendix IX.III.

uncertainty are reflective of such firms "leaning into the wind" with respect to foreign trade policy uncertainty.

In summary, the positive result on effective trade policy uncertainty is robust across traded sectors, firm characteristics, and cannot be explained by focusing solely on domestic trade policy uncertainty.

6.3 Does trade policy uncertainty reflect a decline in the probability of bad news?

In the context of the model, the empirical results on effective trade policy uncertainty are indicative of a decrease in the magnitude and/or likelihood of negative outcomes. When the probability of bad news, B, or the magnitude of potentially bad news, δ, decrease, the incentive to wait falls and firms take immediate action to expand, hire new employees, invest in new capital, etc. For a moment, assume that δ is fixed.[45] A decline in B could be offset by either an increase in the probability of good news, A, or an increase in the probability that the status quo will prevail, C.[46] Increases in A and/or C could result from firms' perception that increases in effective trade policy uncertainty are signals that resolutions of trade agreements are nearing (whether or not such resolutions actually occur in the near-term) or signals that trade negotiations will stall indefinitely, preserving the status quo. In the context of this research, I am unable to disentangle A from C; even a preservation of the status quo could be a positive signal to a European firm worried about trade diversion due to its trading partners' new trade agreements.

It may seem counterintuitive to conceptualize trade policy uncertainty as ever reflecting a strictly positive signal for an exporter (i.e., that it reflects improved market access or fewer barriers to trade). However, two arguments support this.[47] First, European firms' priors for resolution are likely to be positive with respect to contentious trade agreement negotiation outcomes since the overarching narrative for Western countries in the past 30 years has been

[45] This assumption is not unreasonable in the context of trade agreement negotiations where counterfactuals to payoffs associated with a new agreement are known and fixed (see Handley & Limao, 2015). In the context of trade policy uncertainty associated with protectionism, both δ and B are likely to increase, which I will discuss below.

[46] A decline in B implies that B was some strictly positive value. One might argue that there is no positive probability of a negative outcome in the context of trade agreements (i.e., that B is zero). However, recall that effective policy uncertainty compares external to domestic policy uncertainty; exporting firms have reason to worry about the potential for trade diversion if its trading partners enter agreements with other countries (e.g., European firms and the U.S.-Asia TPP negotiations). Theoretically, recall that $\overline{P_0} = \left(\frac{r}{1+r}\right) F \frac{(r+B)}{r+B(1-\delta)}$. If B is zero, the bad news principle falls away completely, as the impact of bad news through δ also falls away. In this case, changes in A or C would impact firms through the first moment channel. Empirically, I would expect to see insignificant coefficients on effective trade policy uncertainty after controlling for the first moment of policy uncertainty if B was zero–which is not the case.

[47] Although, I anticipate Brexit to be an exception to this rule.

towards greater, not lesser integration, especially in Europe. Figure 7 displays the cumulative number of trade agreements reached by the European Commission over the period from 1951 to 2014. With the exception of a slowdown in the number of new agreements in the 1980s, there have been consistent increases over time.[48]

Moreover, before major trade agreements often come "dramatic" moments of uncertainty. This relates to the trade negotiation process—while the parameters of negotiations (e.g., agriculture, intellectual property, etc.) are typically made public during the process, the details of deals are only released once agreement between the negotiating parties has been reached.[49] Once details are known, this can generate intense backlash as particular firms and sectors that believe they will be negatively affected lobby to block the deal's approval. "Losing" sectors and factions can generate considerable press attention during these periods. In an October 2014 *Financial Times* piece, Pascal Lamy, former Director-General of the WTO, lamented that "[a] loud minority is managing to convince consumers they will have to eat chlorinated chicken and genetically modified food." This implies that spikes in trade policy uncertainty, which represent increases in potentially negative news based on the human audit results of Section 4.2, overlap with a timing signal that resolution of trade negotiations is near. That is, just as news chatter about the negative potential implications of trade deals is rising, exporters—the majority of which are likely to benefit from such a deal—may be given signals that resolution of agreements are near.[50] The Uruguay Round of the World Trade Organization began in 1986 and provides a useful example. Figure 8 shows the evolution of a constructed Uruguay Round uncertainty index over the period from 1985 to 2000 (the Doha Round began in 2001). Chatter about uncertainty increased right before the round's conclusion in 1994.

The constructed trade policy uncertainty measure includes news chatter about uncertainty around trade agreement negotiations as well as protectionism. Increases in policy uncertainty about protectionist sentiments should signal increases in both the potential for

[48]Based on data from Dür, A., Baccini L., and Elsig M. (2014). The Design of International Trade Agreements: Introducing a New Dataset. The Review of International Organizations, 9(3): 353-375.

[49]From the EU's rules: "The draft texts of the negotiations are not made public during the negotiations. Even when certain chapters (or topics) are 'closed', the negotiation is not over until everything is agreed. When negotiations reach the stage of technical finalisation, the European Parliament and the Council are informed immediately. Finalised texts are sent to the Member States and to the Parliament." Retrieved on 9/17/2016 from http://trade.ec.europa.eu/doclib/docs/2012/june/tradoc_149616.pdf.

[50]One could also interpret this result as evidence of measurement error for trade policy uncertainty. Ideally, one would want a measure that linked the details of trade agreements with the sector a firm is in. For instance, if an agreement is set to improve market access for auto manufacturers, but introduce burdensome regulation around intellectual property for software design firms, a trade policy uncertainty measure should account for the difference in "potential" impact across such sectors. However, such a refinement would require fine detail on trade agreements—some of which are still being negotiated—and a sense of the differential impact of various parameters across sectors.

bad news and the magnitude of impact for a bad news shock. To separate out the two types of trade policy uncertainty, I construct two new policy uncertainty measures: one that references uncertainty around protectionism (Firm TPU I) and another that references trade agreement uncertainty (Firm TPU II). As before, to isolate the separate impacts of each type of policy uncertainty, I exclude the other policy term sets in the search algorithm (i.e., if the search algorithm picks up terms related to protectionism uncertainty, it excludes counts of articles related to monetary, fiscal, and trade agreement uncertainty).[51]

The results for the separate measures are shown in Table 15. Increases in effective trade protectionism uncertainty are negatively associated with exports for more exposed firms, while increases in effective trade agreement uncertainty are positively associated with exports.[52] This exercise provides evidence that the positive result on the standard trade policy uncertainty measure is due to trade agreements, not protectionism, supporting the above discussion.[53] In particular, this paper's results reveal that exporting firms may view increases in effective trade policy uncertainty as a signal of a decrease in the probability of bad outcomes, B, associated with trade agreement negotiations.[54] Future work should explore if this results falls away once a measure for exporters' first moment expectations with respect to trade deals is included (e.g., based on detailed surveys of exporters' opinion

[51]Protectionism search terms: safeguard measure* or domestic content or anti-dumping or sanitary measure* or rules of origin or countervailing measure* or banana war* or dumping or quota or voluntary export restraint or local content requirement or protectionism or (trade near2 (war or controversy or dispute or polic* or restriction* or quota or sanction or content or embargo or anti or barrier* or red tape or subsid*)) or (import near2 (license or fees or duty or barrier* or tariff* or competit* or tax*)) or (export near2 (license or tax* or subsid*). Trade agreement search terms: GATT or free trade zone or customs union or WTO or World Trade Organization or Doha Round or (trade near2 (deal or delegation or bilateral or free or preferential or commission or negotiation* or agreement* or TRIPS or multilateral)).

[52]For this exercise, I cluster at the treatment level—the firm level. The results are not significant when clustering at the country-time level; a substantial number of articles are excluded when moving from the original to the separate measures. 10-25 percent of the original trade policy articles are excluded across the four sample countries. It is likely that important variation in both measures is lost due to the strict constraints imposed (e.g., if a protectionism article mentions a trade war, it cannot also mention the WTO or a trade agreement), contributing to the large standard errors on the coefficients.

[53]As an additional check, I interacted the trade policy uncertainty measures with a time dummy for the preceding year of the deadline for large-scale trade negotiations over the period–the Doha Round and the TTIP negotiations (2004 and 2014, respectively). As expected, these years account for the positive coefficient on trade protectionism (see Table 16).

[54]While this work cannot distinguish between an increase in A vs. C relative to a decrease in B, concluding that exporters see increases in effective trade policy uncertainty as a positive signal is not in contradiction with the rest of the literature (see Appendix X). There are also alternative theories of investment under uncertainty that could explain this counterintuitive outcome. The growth options literature posits that investments with bounded worst case outcomes paired with a large (or unconstrained) size of the prize will induce firms to invest in the face of increasing uncertainty. This is likely the context for trade agreements. In the worst case, current relationships are maintained (which are subject to existing WTO agreements, FTAs, bilateral agreements, regional agreements, and distribution networks). At the same time, the size of the prize is often large. The Centre for Economic Policy Research report estimates that TTIP will increase EU to U.S. exports by 28 percent with increased sales of 187 billion euros per year (Francois et al., 2013).

of trade deals across both source countries and export destinations).

7 Conclusion

Policy uncertainty is one of the most frequently cited impediments to doing business across the globe (Smith & Hallward-Driemeier, 2005). This research offers new insights into its consequences and the channels it operates through. Using a novel dataset of measures of generic, fiscal, monetary, and trade policy uncertainty, I exploit variation in firm-level exposure to external policy uncertainty to construct measures of firm-specific effective policy uncertainty. I find that firms with greater vulnerability to external policy tend to experience larger declines in investment, sales, profit, and employment when effective fiscal and monetary policy uncertainty increase. Increases in effective trade policy uncertainty have the opposite effect. If spikes in trade policy uncertainty are seen as signals that trade agreement negotiations are nearing or that the status quo will be maintained, then the prediction of standard real options theory applies: a decrease in the potential for bad news will raise the incentive to immediately take action.

Returning to the aggregate puzzles mentioned above, the results of this paper can help explain the exceptional decline in trade during the Great Recession and sluggish recoveries. The research suggests that the Great Trade Collapse largely operated through macro policy uncertainty channels, supporting the work of Chor & Manova (2012) and Bordo et al. (2016) on credit channels. When it comes to the sluggish recoveries in France and the United Kingdom, the results provide evidence that the impact of external policy uncertainty on exposed firms is muting growth. Both France and the United Kingdom have seen increases in effective macro policy uncertainty accompanied by sluggish growth since 2011 and 2009, respectively (see Appendix XI). For France, the increase in effective macro policy uncertainty was driven by a rise in external macro policy uncertainty and a fall in domestic macro policy uncertainty; for the U.K., both external and domestic macro policy uncertainty have increased, but external policy uncertainty has increased by more. In both instances, more heavily exposed firms saw larger declines in sales, profits, and investment (see Appendix XI).[55] Heavily exposed firms also tend to have higher exports indicating that exposure, in the presence of higher macro policy uncertainty, can help explain muted trade growth and, in part, the muted recovery in both France and the U.K. An implication of this finding is that governments are limited in their ability to unilaterally counter low growth by decreasing domestic policy uncertainty.

Several avenues for future research follow from this work. An initial course of action is to

[55] In France, effective trade policy uncertainty also increased during this period (with a positive offsetting effect), but not by as much as effective macro policy uncertainty.

directly explore additional margins of variation with respect to external policy uncertainty, including import exposure and exposure to cross-country financial linkages. The alternatives would suggest a meaningful role for external policy uncertainty in both exporting firms and firms that sell solely to a domestic market. Moreover, cross-country financial linkages might prove more important for monetary policy uncertainty's impact across firms. Making an explicit distinction on the effect of policy uncertainty across firms and conglomerates is another promising path for future work. In this paper, I implicitly assumed that investment choices are primarily reflected at the firm-level. However, firm choices could be made at the conglomerate-level for multi-firm conglomerates. If so, multi-firm conglomerates might engage in strategic portfolio choices in response to increases in policy uncertainty (e.g., strategic pricing) to offset the impact at the conglomerate-level.[56] Multi-firm conglomerates also vary in whether they are domestically or foreign-owned. If a domestic firm is part of a foreign-owned multi-firm conglomerate, it could be buffered from domestic policy uncertainty shocks effective to external (or headquarter) policy uncertainty shocks.[57]

This research provides new insights on the connections between policy uncertainty and firm performance. In addition to offering more nuance for policy directives, the findings of this work can help discipline future theoretical efforts to more accurately model complex dynamics in open economies by accounting for the impact of external policy uncertainty in explaining domestic outcomes via the trade channel.

[56] I find some preliminary evidence of this (see online appendix).

[57] This connects to the literature on the performance of multinationals relative to domestic firms during economically uncertain periods. For example, Desai, Foley & Forbes (2008) find that multinational affiliates tend to expand in sales and investment relative to domestic firms in response to large depreciations, leveraging access to parent firms. Garicano & Steinwender (2015) find supporting evidence that domestic firms experience larger drops in access to finance during crises relative to affiliates with foreign-located parent companies.

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Tables

Table 1: Generic Policy Uncertainty Accuracy

	Hlatshwayo (2016)
% Economic Policy Uncertainty (EPU)?	71.8
% Declines in EPU?	1.8
% Mainly About a Foreign Country or Countries?	6.5

Notes: The table shows the results from the human audit. I excluded my audits for the calculations; however, the difference when including my audit results is minimal.

Table 2: Type-Specific Accuracy (Percent)

Type Match?	**Fiscal**	**Monetary**	**Trade**
% Policy Type	72.7	77.3	89.1
Of Policy Match Articles			
% Domestic Focus?	95.1	92.9	82.7
% Increase in Uncertainty?	96.5	95	91.8
% Overlap with Other Types?	1.7	0.4	0.0

Notes: The table shows several accuracy metrics for the type-specific search results used in constructing type-specific policy uncertainty indices.

Table 3: Mean Coefficients of Non-Determination

	GPU	FPU	TPU	MPU	VIX	SMV	ECB I	ECB II
GPU	0.00							
FPU	0.37	0.00						
TPU	0.84	0.91	0.00					
MPU	0.41	0.73	0.86	0.00				
VIX	0.85	0.93	0.67	0.89	0.00			
SMV	0.79	0.86	0.75	0.81	0.45	0.00		
ECB I	0.88	0.77	0.91	0.98	0.99	0.91	0.00	
ECB II	0.76	0.71	0.63	0.76	0.92	0.82	0.68	0.00

Notes: The table shows the coefficient of non-determination (that is, the variation in policy uncertainty not explained by various economic uncertainty measures) for the types of policy uncertainty. The measures of economic uncertainty include the the CBOE Volatility Index (VIX); stock market volatility (SMV); the interquartile of average probability distributions for EU real GDP growth from professional forecasters (ECB I); and the standard deviations of professional forecasts for real GDP growth (ECB II).

Table 4: Sample Descriptive Statistics

	Exporters	**Non-Exporters**
Sales ($)	5,375,332 (15,705,167)	2,095,050 (10,352,291)
Employees	26 (93)	20 (113)
Fixed Assets ($)	1,972,723 (55,508,345)	3,362,264(134,562,785)
Age	16 (13)	12 (12)
Labor Productivity	480,944 (1,576,829)	303,243 (1,318,535)

Notes: The table contains means with standard deviations in parentheses. Sales and fixed assets are in real terms; number of employees is in units; and labor productivity is total sales divided by number of employees.

Table 5: Firm Uncertainty Correlations

	Firm GPU	Firm FPU	Firm MPU	Firm TPU
Firm GPU	1.00			
Firm FPU	0.89***	1.00		
Firm MPU	0.85***	0.64***	1.00	
Firm TPU	0.45***	0.40***	0.46***	1.00

Notes: The table shows the correlations between the firm-specific measures of policy uncertainty across types, with significance levels of *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Table 6: Firm-Specific Baseline Results

	(1) Sales	(2) Profits	(3) Investment	(4) Employment	(5) Avg Wage
Firm GPU_{t-1}	-0.082***	-0.089***	-0.049**	-0.053***	-0.002
	(0.03)	(0.02)	(0.02)	(0.02)	(0.01)
Observations	6280569	4375354	4661420	2309533	2162715
F	1148.302	556.209	44.731	768.479	151.908
R-squared	0.942	0.933	0.435	0.959	0.821
R-squared within	0.042	0.027	0.001	0.039	0.004
Firm FE?	Yes	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes	Yes
+ Firm GDP Forecasts?	Yes	Yes	Yes	Yes	Yes
Country-Sector-Time FE?	Yes	Yes	Yes	Yes	Yes

Notes: The sample period is 2003-2015. The firm-level dependent variable in: column (1) is the log of real sales; column (2) is the log of firm profits, which is sales minus costs; column (3) is the log of capital investment, which is the change in fixed assets adjusted for depreciation; column (4) is the log of employment; column (5) is the log of average wage, which is total staff costs divided by number of employees. Firm-time controls include the log of age, which is a minimum of one, and the log of fixed assets. In column (3), log of fixed assets is excluded since fixed assets are used in calculating capital investment. Standard errors are clustered at the country-time level between brackets, *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Table 7: Percent Response to a One Standard Deviation Percent Increase in Effective Policy Uncertainty

	Sales	Profits	Invest	Emp.
75th %tile of Exporters	-1.4	-1.5	-0.9	-0.9
50th %tile of Exporters	-0.28	-0.31	-0.2	-0.2
Full Sample Mean	-0.11	-0.12	-0.1	-0.1

Notes: Exposure Share at the 75th percentile (.37); 50th percentile (.08); and the Full Sample mean (.03).

Table 8: Type-Specific Policy Uncertainty

	(1) Sales	(2) Sales	(3) Sales	(4) Sales	(5) Sales
Firm GPU_{t-1}	-0.082***				
	(0.03)				
Firm FPU_{t-1}		-0.055**			
		(0.03)			
Firm MPU_{t-1}			-0.064***		
			(0.02)		
Firm Macro PU_{t-1}					-0.078***
					(0.02)
Firm TPU_{t-1}				0.091**	0.074*
				(0.04)	(0.04)
Observations	6280569	6280569	6280569	6280569	6280569
F	1148.302	1265.329	1190.700	1229.619	1042.269
R-squared	0.942	0.942	0.942	0.942	0.942
R-squared within	0.042	0.042	0.042	0.042	0.042
Firm FE?	Yes	Yes	Yes	Yes	Yes
Country-Sector-Time FE?	Yes	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes	Yes
+ Firm-Time GDP Forecasts Control?	Yes	Yes	Yes	Yes	Yes

Notes: The sample period is 2003-2015. The firm-level dependent variable is the log of real sales. Firm-time controls include the log of age, which is a minimum of one, and the log of fixed assets. Standard errors are clustered at the country-time level between brackets, *$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Profits, Investment, and Employment Results

	(1) Profits	(2) Invest	(3) Employment	(4) Avg Wage
Firm Macro PU_{t-1}	-0.078***	-0.034*	-0.050***	-0.005
	(0.02)	(0.02)	(0.01)	(0.01)
Firm TPU_{t-1}	0.040	0.110**	0.011	0.029**
	(0.05)	(0.05)	(0.03)	(0.01)
Observations	4375354	4728337	2309533	2162715
F	479.083	8.656	588.064	108.917
R-squared	0.933	0.743	0.959	0.821
R-squared within	0.027	0.000	0.039	0.004
Firm FE?	Yes	Yes	Yes	Yes
Country-Sector-Time FE?	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes
+ Firm GDP Forecasts Control?	Yes	Yes	Yes	Yes

Notes: The sample period is 2003-2015. The firm-level dependent variable in: column (1) is the log of firm profits, which is sales minus costs; column (2) is the log of capital investment, which is the change in fixed assets adjusted for depreciation; column (3) is the log of employment; column (4) is the log of average wage, which is total staff costs divided by number of employees. Firm-time controls include the log of age, which is a minimum of one, and the log of fixed assets. In column (2), log of fixed assets is excluded since fixed assets are used in calculating capital investment. Standard errors are clustered at the country-time level between brackets, *$*p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*

Table 10: Binary Results

	(1) Sales	(2) Profits	(3) Investment	(4) Employment	(5) Avg Wage
Firm Macro PU_{t-1}	-0.027*	-0.019***	-0.013	-0.028***	0.001
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Firm TPU_{t-1}	0.052**	0.031*	0.023	0.024	0.008
	(0.02)	(0.02)	(0.03)	(0.02)	(0.01)
Observations	6280569	4375354	4728337	2309533	2162715
F	985.226	504.088	3.211	594.976	117.171
R-squared	0.942	0.933	0.743	0.959	0.821
R-squared within	0.042	0.027	0.000	0.040	0.004
Firm FE?	Yes	Yes	Yes	Yes	Yes
Country-Sector-Time FE?	Yes	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes	Yes
+ Firm GDP Forecasts Control?	Yes	Yes	Yes	Yes	Yes

Notes: The sample period is 2003-2015. In these specifications, a binary measure of initial exporting status replaces the continuous initial share measure of exposure for firm-specific policy uncertainty. The firm-level dependent variable in: column (1) is the log of real sales; column (2) is the log of firm profits, which is sales minus costs; column (3) is the log of capital investment, which is the change in fixed assets adjusted for depreciation; column (4) is the log of employment; column (5) is the log of average wage, which is total staff costs divided by number of employees. Firm-time controls include the log of age, which is a minimum of one, and the log of fixed assets. In column (3), log of fixed assets is excluded since fixed assets are used in calculating capital investment. Standard errors are clustered at the country-time level between brackets, *$*p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*

Table 11: Equal Trade Share Results

	(1) Sales	(2) Profits	(3) Investment	(4) Employment	(5) Avg Wage
Firm Macro PU_{t-1}	-0.079***	-0.076***	-0.035	-0.041***	-0.016
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
Firm TPU_{t-1}	0.129***	0.112**	0.097*	0.067**	0.012
	(0.04)	(0.05)	(0.05)	(0.03)	(0.01)
Observations	6280569	4375354	4728337	2309533	2162715
F	1014.966	536.773	4.716	599.802	123.285
R-squared	0.942	0.933	0.743	0.959	0.821
R-squared within	0.042	0.028	0.000	0.039	0.004
Firm FE?	Yes	Yes	Yes	Yes	Yes
Country-Sector-Time FE?	Yes	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes	Yes
+ Firm GDP Forecasts Control?	Yes	Yes	Yes	Yes	Yes

Notes: The sample period is 2003-2015. In these specifications, instead of using mean Comtrade market shares to construct the external policy uncertainty measure, equal shares across all markets and sectors are used. The firm-level dependent variable in: column (1) is the log of real sales; column (2) is the log of firm profits, which is sales minus costs; column (3) is the log of capital investment, which is the change in fixed assets adjusted for depreciation; column (4) is the log of employment; column (5) is the log of average wage, which is total staff costs divided by number of employees. Firm-time controls include the log of age, which is a minimum of one, and the log of fixed assets. In column (3), log of fixed assets is excluded since fixed assets are used in calculating capital investment. Standard errors are clustered at the country-time level between brackets, *$*p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*

Table 12: Randomized Trade Share Results

	(1) Sales	(2) Profits	(3) Investment	(4) Employment	(5) Avg Wage
Firm Macro PU_{t-1}	-0.073***	-0.073***	-0.044**	-0.036***	0.002
	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)
Firm TPU_{t-1}	0.054***	0.058***	0.005	0.032**	-0.006
	(0.01)	(0.02)	(0.02)	(0.01)	(0.00)
Observations	6280569	4375354	4728337	2309533	2162715
F	1109.123	485.498	3.269	773.224	147.158
R-squared	0.942	0.933	0.743	0.959	0.821
R-squared within	0.042	0.028	0.000	0.039	0.004
Firm FE?	Yes	Yes	Yes	Yes	Yes
Country-Sector-Time FE?	Yes	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes	Yes
+ Firm GDP Forecasts Control?	Yes	Yes	Yes	Yes	Yes

Notes: The sample period is 2003-2015. In these specifications, instead of using mean Comtrade market shares to construct the external policy uncertainty measure, random shares across markets are used. The firm-level dependent variable in: column (1) is the log of real sales; column (2) is the log of firm profits, which is sales minus costs; column (3) is the log of capital investment, which is the change in fixed assets adjusted for depreciation; column (4) is the log of employment; column (5) is the log of average wage, which is total staff costs divided by number of employees. Firm-time controls include the log of age, which is a minimum of one, and the log of fixed assets. In column (3), log of fixed assets is excluded since fixed assets are used in calculating capital investment. Standard errors are clustered at the country-time level between brackets, *$*p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*

Table 13: Trade Policy Uncertainty Sales Breakout Results

	(1) Sales	(2) Domestic Sales	(3) IHS Domestic Sales	(4) Exports	(5) IHS Exports
Firm TPU_{t-1}	0.091**	-0.151*	-0.151*	0.308*	1.997*
	(0.04)	(0.08)	(0.08)	(0.18)	(1.08)
Observations	6280569	6242080	6361912	840670	6521693
F	1203.134	1364.719	1199	445.357	63.879
R-squared	0.942	0.932	0.937	0.884	0.763
R-squared within	0.042	0.036	0.036	0.007	0.004
Firm FE?	Yes	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes	Yes
+ Firm-Time GDP Forecasts Control?	Yes	Yes	Yes	Yes	Yes
Country-Sector-Time FE?	Yes	Yes	Yes	Yes	Yes

Notes: The sample period is 2003-2015. The firm-level dependent variable in: column (1) is the log of real total sales; column (2) is the log of firm domestic sales, which are total sales minus export sales; column (3) is the inverse hyperbolic sine transformation (IHS) of domestic sales; column (4) is the log of exports; column (5) is the IHS of exports. Firm-time controls include the log of age, which is a minimum of one, and the log of fixed assets. Standard errors are clustered at the country-time level between brackets, *$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 14: IHS Trade Policy Results Across Domestic and External Policy Uncertainty

	(1) Sales	(2) IHS Exports	(3) IHS Domestic Sales	(4) Sales	(5) IHS Exports	(6) IHS Domestic Sales
Alpha x Domestic TPU_{t-1}	0.033	1.614	-0.141			
	(0.03)	(1.07)	(0.09)			
Alpha x External TPU_{t-1}				0.060**	2.225**	-0.185**
				(0.03)	(0.87)	(0.07)
Observations	6280569	6521693	6242080	6280569	6521693	6242080
F	1265.462	91.533	1041.646	1277.875	105.008	1094.107
R-squared	0.942	0.763	0.932	0.942	0.763	0.932
R-squared within	0.042	0.004	0.036	0.042	0.005	0.036
Firm FE?	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes	Yes	Yes
+Firm-Time GDP Forecast Control?	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Time FE?	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The sample period is 2003-2015. The firm-level dependent variables are the log of real total sales (columns (1) and (4)); the IHS of exports (columns (2) and (5)); and the IHS of domestic sales, which are total sales minus export sales (columns (3) and (6)). For the interaction terms, Alpha refers to firms' initial export shares; Domestic TPU is the domestic, country-time trade policy uncertainty measure; and External TPU is the external, sector-country-time foreign trade policy uncertainty measure. Firm-time controls include the log of age, which is a minimum of one, and the log of fixed assets. Standard errors are clustered at the country-time level between brackets, *$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 15: Trade Policy Uncertainty Breakout: Protectionism vs. Trade Agreements

	(1) Exports	(2) Exports
Firm TPU I: Protectionism$_{t-1}$	-0.415***	
	(0.02)	
Firm TPU II: Trade Agreements$_{t-1}$		0.060**
		(0.03)
Observations	6308764	5694957
F	1276.897	1111.388
R-squared	0.751	0.761
R-squared within	0.004	0.004
Firm FE?	Yes	Yes
Firm-Time Controls?	Yes	Yes
+ Firm-Time GDP Forecasts Control?	Yes	Yes
Country-Sector-Time FE?	Yes	Yes

Notes: The sample period is 2003-2015. The firm-level dependent variable is the IHS of exports. For the independent variables, Firm TPU I is a firm-level measure of protectionist policy uncertainty and Firm TPU II is a measure of trade agreement policy uncertainty. Firm-time controls include the log of age, which is a minimum of one, and the log of fixed assets. Standard errors are clustered at the firm-level between brackets, *$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

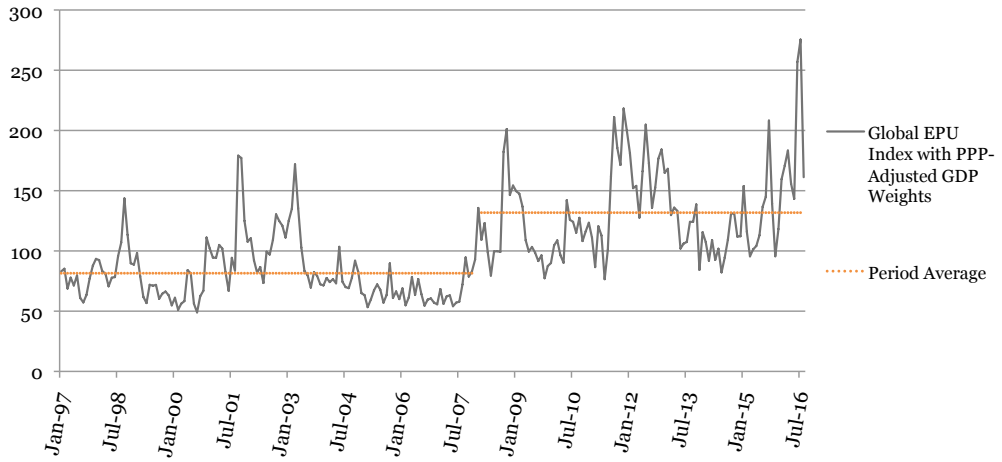
Table 16: Timing and Trade Agreement Uncertainty

	(1)
Firm TPU II$_{t-1}$	-0.193***
	(0.03)
Timing x Firm TPU II$_{t-1}$	2.207***
	(0.07)
Observations	5694957
F	911.322
R-squared	0.762
R-squared within	0.004
Firm FE?	Yes
Firm-Time Controls?	Yes
+Firm-Time GDP Forecast Control?	Yes
Country-Sector-Time FE?	Yes

Notes: The sample period is 2003-2015. The firm-level dependent variable is the IHS of exports. For the interaction term, timing refers to a dummy for 2004 and 2014. Firm-time controls include the log of age, which is a minimum of one, and the log of fixed assets. Standard errors are clustered at the firm level between brackets, *$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

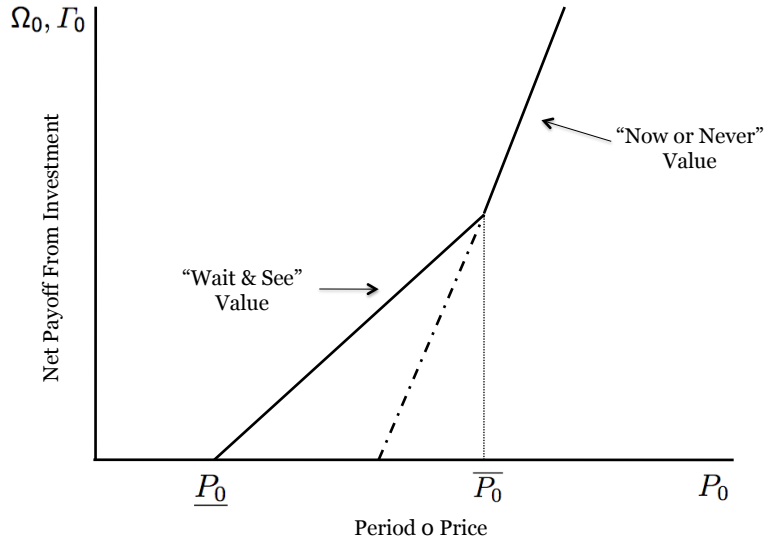
Figures

Figure 1: Global Economic Policy Uncertainty Index, January 1997-August 2016



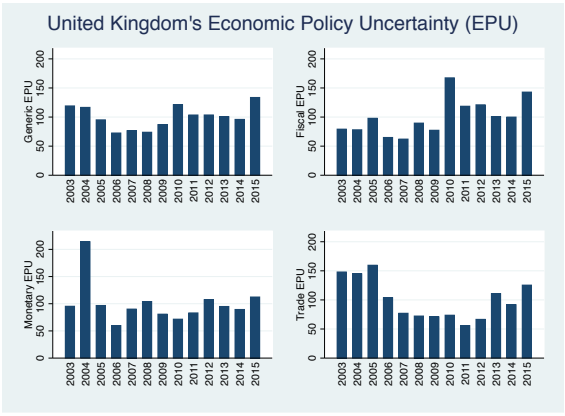
Notes: The figure shows Davis's (2016) real GDP-weighted news chatter policy uncertainty measure for 16 countries, representing two-thirds of global output. The period average for the index is 62 percent higher in the period since December 2007, the start of the Great Recession according to the NBER's Business Cycle Dating Committee. The index for each country is constructed by counting articles that match search algorithms that pick up triple mentions of uncertainty, the economy, and policy and are normalized to mean=100. More detail on the construction of such measures features in Section 4.

Figure 2: Net Payoff from Firm Action

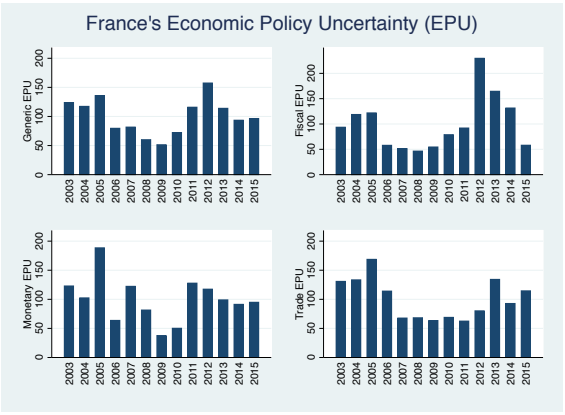


Notes: The figure shows a graphical illustration of the model of firm choice under uncertainty.

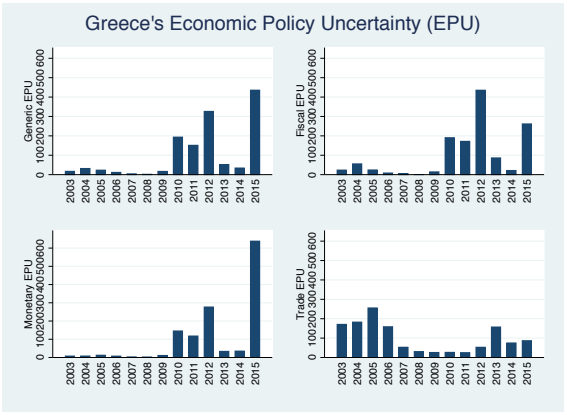
Figure 3: Domestic Policy Uncertainty Indices, 2003-2015



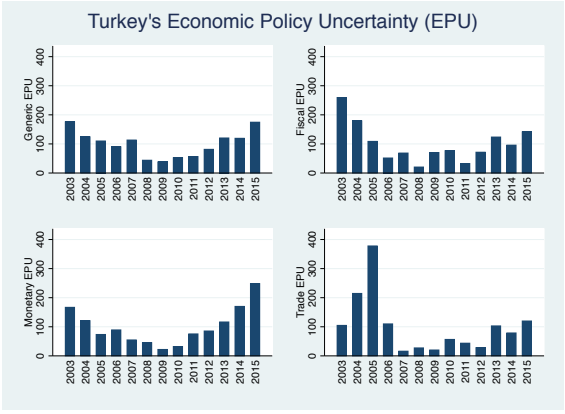
(a) U.K.



(b) France



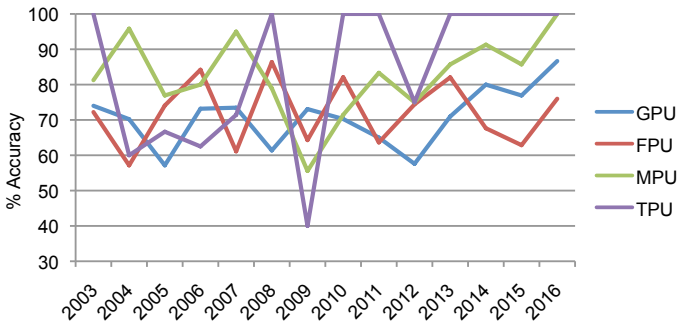
(c) Greece



(d) Turkey

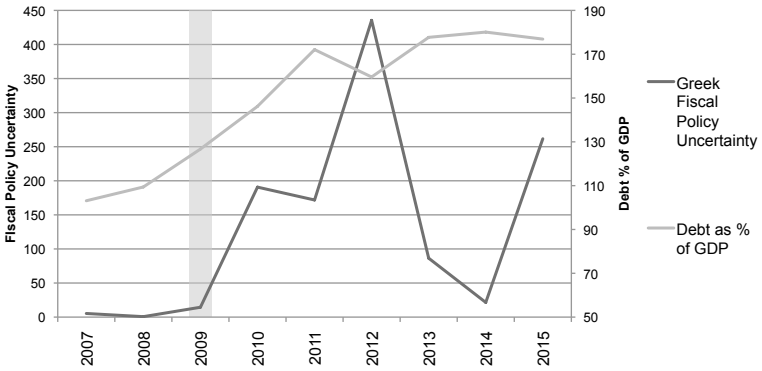
Notes: The figures show domestic policy uncertainty, by country. Each country's uncertainty measures are standardized to have unit standard deviations and normalized to have a mean of 100, with larger values reflecting higher policy uncertainty.

Figure 4: Accuracy of Policy Uncertainty Algorithms, 2003-2016



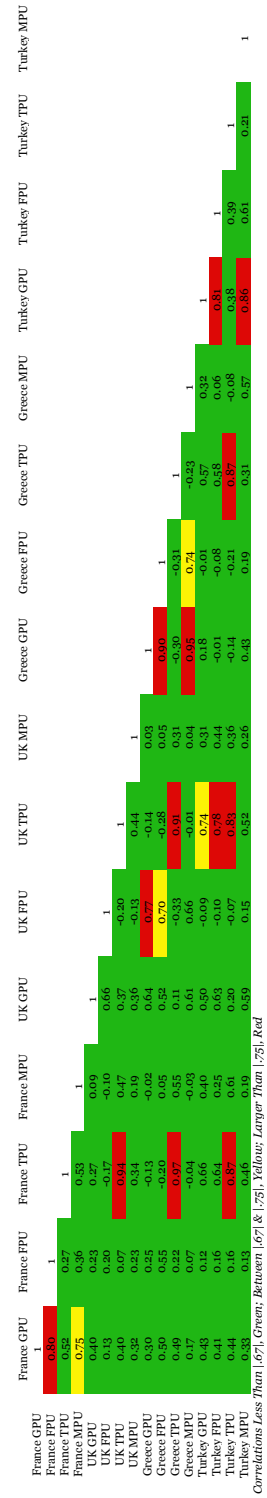
Notes: This figure displays the accuracy of the policy uncertainty algorithms over time, where accuracy is the percent of audited articles that are the correct policy uncertainty type divided by the total articles audited for each year for each type-specific algorithm. GPU is generic policy uncertainty; FPU is fiscal policy uncertainty; MPU is monetary policy uncertainty; and TPU is trade policy uncertainty.

Figure 5: Greece's Debt Crisis-Related Policy Uncertainty and Debt/GDP



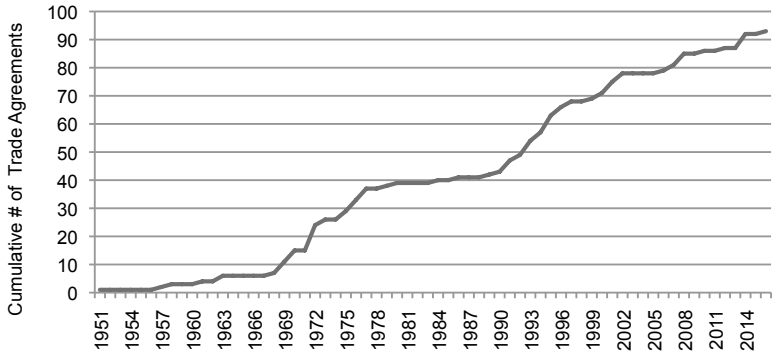
Notes: This figure shows Greece's fiscal policy uncertainty index and debt as a percent of GDP (from Eurostat) from 2007 to 2015. The grey bar denotes the start of the Greek debt crisis. The left hand axis is for the policy uncertainty index and the right hand axis is for debt as a percent of GDP.

Figure 6: Correlations Across Policy Uncertainty Measures



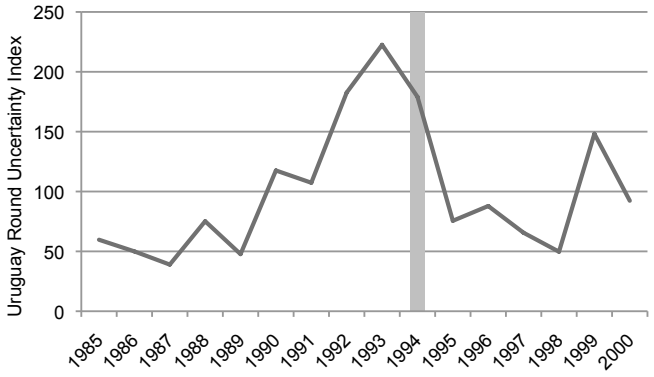
Notes: This figure is a heat-map of the country-measure specific correlations. Red cells represent correlations higher than .75; yellow cells are correlations between .67 and .75; and green cells represent correlations lower than .67.

Figure 7: European Commission's Trade Agreements, 1951-2014



Notes: Figure 7 displays the cumulative number of trade agreements reached by the European Commission over the period from 1951 to 2014. The data were sourced from Dür, Baccini, and Elsig (2014).

Figure 8: WTO Uruguay Round Policy Uncertainty Index



Notes: This figure shows an uncertainty measure associated with the Uruguay Round of the WTO and a grey bar denoting the conclusion of the round. The Uruguay Round Uncertainty Index is based on a search for (WTO or World Trade Organization or GATT or "General Agreement on Tariffs and Trade" or Uruguay Round) within the same paragraph as (uncert* or ambiguous or dubious or precarious or unpredictable or undecided or undetermined or unresolved or unsettled or concern or worr* or anxiet* or doubt* or unclear). A search for today is used as a normalizer. The resulting index is normalized to a mean of 100 over a period from 1985 to 2000.

Appendix I: Theoretical Appendix

Appendix I.I

Suppose a price-taking manager is deciding whether or not to take action on a project that will produce one additional unit of a good each period, with zero per-period operating costs. This "action" could be towards building a factory, expanding an existing facility, making a capital investment, hiring employees, sourcing additional resources to meet changing consumer preferences, or otherwise.
Let $F > 0$ be a sunk cost of such an action and $r > 0$ be the interest rate. The additional value received from action in period $t = 0$ is P_0. From period $t = 1$ onward it will be

$$P_1 = \begin{cases} (1+\mu)\, P_0 \text{ with probability } A, \\ (1-\delta)\, P_0 \text{ with probability } B \\ P_0 \text{ with probability } C = 1 - A - B \end{cases} \tag{3}$$

where $A,\ B,\ C,\ \delta,\ \mu \in (0,1),\ A + B + C = 1$, and $r,\ F > 0$.
Let V_0 be the expected present value from taking action.

$$V_0 = \underbrace{P_0}_{Current\ Revenue} + \underbrace{\left[A\,(1+\mu)\,P_0 + B(1-\delta)P_0 + CP_0\right]\left[\frac{1}{1+r} + \frac{1}{(1+r)^2} + \cdots\right]}_{Weighted\ Average\ of\ Future\ Revenues} \tag{4}$$

$$V_0 = \frac{rP_0}{r} + \frac{A\,(1+\mu)\,P_0 + B(1-\delta)P_0 + CP_0}{r} \tag{5}$$

$$V_0 = \frac{P_0\,(r + A\,(1+\mu) + B(1-\delta) + C)}{r} \tag{6}$$

$$Net\ Payoff\ for\ Immediate\ Action = V_0 - F = \frac{P_0\,(r + A\,(1+\mu) + B(1-\delta) + C)}{r} - F \tag{7}$$

Now allow for action to remain an option in the second period. The firm decision becomes: act in $t = 0$ or wait to see what happens in $t = 1$ and decide then. Suppose the firm decides not to act in period $t = 0$.
The present value of revenue streams, discounted back to period $t = 1$ is

$$V_1 = P_1 + P_1/\,(1+r) + P_1/\,(1+r)^2 + \cdots = P_1\,(1+r)\,/r. \tag{8}$$

Then in period $t = 1$, for each of the potential P_1 outcomes, the firm would invest if $V_1 > F$, with a net payoff of

$$\Gamma_1 = max\,[V_1 - F, 0]\,. \tag{9}$$

At period $t = 0$, P_1 is not known, making V_1 and Γ_1 random variables. Let E_0 be the expectation at $t = 0$. Then

$$E_0\,[\Gamma_1] = A \times max\,[(1+\mu)\,P_0\,(1+r)\,/r - F, 0] + B \times max\,[(1-\delta)\,P_0\,(1+r)\,/r - F, 0] \tag{10}$$

$$+ C \times max\left[P_0\left(1+r\right)/r - F, 0\right] \tag{11}$$

This is the continuation value associated with waiting until period $t = 1$ to act.
Returning to the $t = 0$ decision, the firm can take action immediately and get $V_0 - F$. If it decides to postpone, it gets one-period discounted $E_0\left[\Gamma_1\right]$. So the net payoff of the action becomes

$$\mathit{\Gamma}_0 = max\left\{V_0 - F, \frac{1}{1+r}E_0\left[\Gamma_1\right]\right\}. \tag{12}$$

The difference between the two cases—the now-or-never option or the option to act in the second period ($\mathit{\Gamma}_0 - \Omega_0$) is the value of the option to postpone action. The ability to wait allows for the ability to base action on different contingencies, offering extra value from "waiting and seeing." More formally, the net payoff is convex in initial price; by Jensen's inequality, the expectation of the separate maximization problem is larger than the maximum of the average expectation.

Appendix I.II

The point of indifference between taking action now versus waiting occurs in the range of P_0 where one takes action if P_0 increases or stays the same, but not if P_0 decreases. The now or never option yields a net payoff of $V_0 - F = \frac{P_0(r+A(1+\mu)+B(1-\delta)+C)}{r} - F$. If the manager delays and the price goes up or stays the same, she receives $\frac{A}{1+r}\left[P_0\frac{(1+\mu)(1+r)}{r} - F\right] + \frac{C}{1+r}\left[P_0\frac{1+r}{r} - F\right]$.
The now or never function has a lower intercept than the delay payoff since:
$-F < -\frac{FA}{1+r} - \frac{FC}{1+r} = -\frac{F}{1+r}\left(A + C\right)$ for all $A,\, C \in (0,1)$ and $r,\, F > 0$.
It also has a steeper slope since $\frac{r+A(1+\mu)+B(1-\delta)+C}{r} > \frac{A(1+\mu)+C}{r}$ for $A,\ B,\ C,\ \delta,\ \mu \in (0,1)$ and $r > 0$.
Solving for $\underline{P_0}$ for now or never yields $\underline{P_0} = \frac{rF}{r+A(1+\mu)+B(1-\delta)+C}$. $\underline{P_0}$ associated with delay and no price decrease is $\underline{P_0} = \frac{r(CF+AF)}{C(1+r)+A(1+\mu)(1+r)}$.

Appendix I.III

Setting the net payoff from the now or never option equal to the net payoff to delay, I solve for $\overline{P_0}$, the cutoff between taking action immediately and delaying:

$$\frac{P_0\left(r + A\left(1+\mu\right) + B(1-\delta) + C\right)}{r} - F = \frac{A}{1+r}\left[-F + P_0\frac{\left(1+\mu\right)\left(1+r\right)}{r}\right] + \frac{C}{1+r}\left[P_0\frac{1+r}{r} - F\right] \tag{13}$$

$$P_0\left[r + B(1-\delta)\right] = -\frac{rA}{1+r}F + rF - F\frac{rC}{1+r} \tag{14}$$

Substituting $C = 1 - A - B$,

$$P_0\left[r + B(1-\delta)\right] = rF\left(1 - \frac{(1-A-B)}{1+r} - \frac{A}{1+r}\right) \tag{15}$$

$$\overline{P_0} = \left(\frac{r}{1+r}\right)F\frac{(r+B)}{r + B(1-\delta)} \tag{16}$$

$\overline{P_0}$ does not depend on μ or A, the magnitude of good news or the probability of good news. As δ, the magnitude of potential bad news increases, $\overline{P_0}$ increases. An increase in B, the probability of bad news, also leads to an increase in $\overline{P_0}$ as $\frac{\partial \overline{P_0}}{\partial B} = \frac{\delta r^2 F}{(1+r)(B(\delta-1)-r)^2}$ which is positive for $B, \delta \in (0,1)$ and $r,\ F > 0$. This is the bad news principle: as the probability of bad news increases, the value of delay increases and firms wait to take action.

Appendix II: Example Search Algorithms

Below are the search algorithms used for the United Kingdom. The remaining algorithms are available in the online appendix.[58]

Generic: (safeguard measure* or domestic content or anti-dumping or sanitary measure* or TTIP or GATT or free trade zone or rules of origin or EFTA or customs union or countervailing measure* or banana war* or GATT* or dumping or quota or voluntary export restraint or local content requirement or WTO or World Trade Organization or protectionism or (trade near2 (war or deal or delegation or controversy or bilateral or free or preferential or dispute or polic* or restriction* or quota or commission or sanction or content or embargo or negotiation* or agreement* or anti or deal or barrier* or red tape or subsid* or TRIPS)) or (import near2 (license or fees or duty or barrier* or tariff* or competit* or tax*)) or (export near2 (license or tax* or subsid* or competit*)) or government or (spending near2 (government or public or fiscal)) or austerity or tax* or (fiscal near2 (plan or crisis or emergency or measure* or gap or discipline or consolidation or stimulus)) or (budget near2 (surplus or deficit or plan or revenue or balanced or gap)) or (debt near2 (public or national or sovereign or government)) or government revenue* or budget or deficit reduction or public revenue or entitlements or automatic stabili?er* or monetary policy or yield or interest rate or policy or regulat* or Bank of England or central bank or monetary or quantitative easing or money supply or bond purchases or overnight rate or tight money or loose money or discount rate or loose* policy or tight* policy or accomm* policy or monetary accomm* or asset purchases or open market operations) same (uncert* or ambiguous or dubious or precarious or unpredictable or undecided or undetermined or unresolved or unsettled or concern or worr* or anxiet* or doubt* or unclear) near8 (United Kingdom or UK or Brit*) not ("without doubt" or "no uncertainty" or "no doubt" or shares or equit* or stock market) and wc>99 and re=UK and date from 01/01/2003 to 06/30/2016

Fiscal: ((spending near2 (government or public or fiscal)) or austerity or tax* or (fiscal near2 (plan or crisis or emergency or measure* or gap or discipline or consolidation or stimulus)) or (budget near2 (surplus or deficit or plan or revenue or balanced or gap)) or (debt near2 (public or national or sovereign or government)) or government revenue* or budget or deficit reduction or public revenue or entitlements or automatic stabili?er*) same (uncert* or ambiguous or dubious or precarious or unpredictable or undecided or undetermined or unresolved or unsettled or concern or worr* or anxiet* or doubt* or unclear) near8 (United Kingdom or UK or Brit*) not (safeguard measure* or domestic content or anti-dumping or sanitary measure* or TTIP or GATT or free

[58]The online appendix can be accessed on www.sandile.com.

trade zone or rules of origin or EFTA or customs union or countervailing measure* or banana war* or GATT* or dumping or quota or voluntary export restraint or local content requirement or WTO or World Trade Organization or protectionism or (trade near2 (war or deal or delegation or controversy or bilateral or free or preferential or dispute or polic* or restriction* or quota or commission or sanction or content or embargo or negotiation* or agreement* or anti or deal or barrier* or red tape or subsid* or TRIPS)) or (import near2 (license or fees or duty or barrier* or tariff* or competit* or tax*)) or (export near2 (license or tax* or subsid* or competit*)) or Bank of England or central bank or monetary or monetary policy or yield or interest rate or quantitative easing or money supply or bond purchases or overnight rate or tight money or loose money or discount rate or loose* policy or tight* policy or accomm* policy or monetary accomm* or asset purchases or open market operations or "without doubt" or "no uncertainty" or "no doubt" or shares or equit* or stock market) and wc>99 and re=UK and date from 01/01/2003 to 06/30/2016

Trade: (safeguard measure* or domestic content or anti-dumping or sanitary measure* or TTIP or GATT or free trade zone or rules of origin or EFTA or customs union or countervailing measure* or banana war* or GATT* or dumping or quota or voluntary export restraint or local content requirement or WTO or World Trade Organization or protectionism or (trade near2 (war or deal or delegation or controversy or bilateral or free or preferential or dispute or polic* or restriction* or quota or commission or sanction or content or embargo or negotiation* or agreement* or anti or deal or barrier* or red tape or subsid* or TRIPS)) or (import near2 (license or fees or duty or barrier* or tariff* or competit* or tax*)) or (export near2 (license or tax* or subsid* or competit*))) same (uncert* or ambiguous or dubious or precarious or unpredictable or undecided or undetermined or unresolved or unsettled or concern or worr* or anxiet* or doubt* or unclear) near8 (United Kingdom or UK or Brit* or EU or European Union or European Commission or EC) not ((spending near2 (government or public or fiscal)) or austerity or tax* or (fiscal near2 (plan or crisis or emergency or measure* or gap or discipline or consolidation or stimulus)) or (budget near2 (surplus or deficit or plan or revenue or balanced or gap)) or (debt near2 (public or national or sovereign or government)) or government revenue* or budget or deficit reduction or public revenue or entitlements or automatic stabili?er* or Bank of England or central bank or monetary or monetary policy or yield or interest rate or quantitative easing or money supply or bond purchases or overnight rate or tight money or loose money or discount rate or loose* policy or tight* policy or accomm* policy or monetary accomm* or asset purchases or open market operations or "without doubt" or "no uncertainty" or "no doubt" or shares or equit* or stock market) and wc>99 and re=UK and date from 01/01/2003 to 06/30/2016[59]

Monetary: (monetary policy or yield or interest rate or Bank of England or central bank or monetary or quantitative easing or money supply or bond purchases or overnight rate or tight money or loose money or discount rate or loose* policy or tight* policy or accomm* policy or monetary accomm* or asset purchases or open market operations) same (uncert* or ambiguous or dubious or precarious or unpredictable or undecided or undetermined or unresolved or unsettled or concern or worr* or anxiet* or doubt* or unclear) near8 (United Kingdom or UK or Brit*) not

[59]Since trade policy is negotiated by the EU, EU search terms are included in the trade policy algorithms.

("without doubt" or "no uncertainty" or "no doubt" or shares or equit* or stock market or safeguard measure* or domestic content or anti-dumping or sanitary measure* or TTIP or GATT or free trade zone or rules of origin or EFTA or customs union or countervailing measure* or banana war* or GATT* or dumping or quota or voluntary export restraint or local content requirement or WTO or World Trade Organization or protectionism or (trade near2 (war or deal or delegation or controversy or bilateral or free or preferential or dispute or polic* or restriction* or quota or commission or sanction or content or embargo or negotiation* or agreement* or anti or deal or barrier* or red tape or subsid* or TRIPS)) or (import near2 (license or fees or duty or barrier* or tariff* or competit* or tax*)) or (export near2 (license or tax* or subsid* or competit*)) or (spending near2 (government or public or fiscal)) or austerity or tax* or (fiscal near2 (plan or crisis or emergency or measure* or gap or discipline or consolidation or stimulus)) or (budget near2 (surplus or deficit or plan or revenue or balanced or gap)) or (debt near2 (public or national or sovereign or government)) or government revenue* or budget or deficit reduction or public revenue or entitlements or automatic stabili?er*) and wc>99 and re=UK and date from 01/01/2003 to 06/30/2016

Normalizer: today and (United Kingdom or UK or Brit*) and wc>99 and re=UK and date from 01/01/2003 to 06/30/2016

Appendix III: Coefficients of Non-Determination

The below tables display the average coefficients of non-determination $(1 - R^2)$ across the four sample countries for regressions of the policy uncertainty measures on traditional measures of economic uncertainty:

- VIX: CBOE Volatility Index
- SMV: Stock market volatility
- ECB I: the interquartile of average probability distributions for EU real GDP growth from professional forecasters
- ECB II: the standard deviations of professional forecasts for real GDP growth[60]

[60]Stock market volatility is sourced from Bloomberg and measures the 360-day standard deviation of the return on the national stock market index; VIX is sourced from the Chicago Board Options Exchange, CBOE Volatility Index (retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/VIXCLS, May 5, 2016); and the standard deviations and probability distributions of professional forecasts are sourced from the ECB's Survey of Professional Forecasters database which can be found here: https://www.ecb.europa.eu/stats/prices/indic/forecast/html/index.en.html.

Table 17: U.K.'s Coefficients of Non-Determination

	GPU	FPU	TPU	MPU	VIX	SMV	ECB I	ECB II
GPU	0.00							
FPU	0.57	0.00						
TPU	0.86	0.96	0.00					
MPU	0.87	0.98	0.81	0.00				
VIX	0.99	0.99	0.77	0.98	0.00			
SMV	0.92	1.00	0.76	0.97	0.17	0.00		
ECB I	0.77	0.56	0.91	1.00	0.99	0.97	0.00	
ECB II	0.92	0.56	0.60	1.00	0.92	0.99	0.68	0.00

Table 18: France's Coefficients of Non-Determination

	GPU	FPU	TPU	MPU	VIX	SMV	ECB I	ECB II
GPU	0.00							
FPU	0.36	0.00						
TPU	0.73	0.93	0.00					
MPU	0.44	0.87	0.72	0.00				
VIX	0.73	0.77	0.61	0.82	0.00			
SMV	0.82	0.86	0.62	0.89	0.15	0.00		
ECB I	0.90	0.77	0.92	0.98	0.99	1.00	0.00	
ECB II	0.99	0.90	0.63	0.80	0.92	0.95	0.68	0.00

Table 19: Greece's Coefficients of Non-Determination

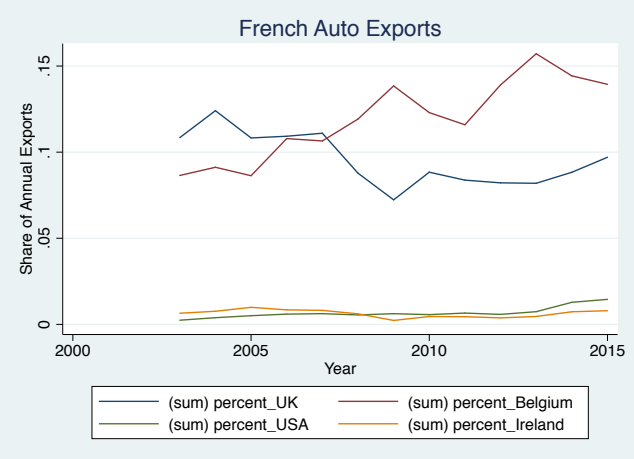
	GPU	FPU	TPU	MPU	VIX	SMV	ECB I	ECB II
GPU	0.00							
FPU	0.19	0.00						
TPU	0.91	0.90	0.00					
MPU	0.09	0.45	0.95	0.00				
VIX	1.00	1.00	0.60	1.00	0.00			
SMV	0.42	0.64	0.63	0.39	0.73	0.00		
ECB I	0.85	0.75	0.86	0.95	0.99	0.90	0.00	
ECB II	0.43	0.48	0.55	0.43	0.92	0.59	0.68	0.00

Table 20: Turkey's Coefficients of Non-Determination

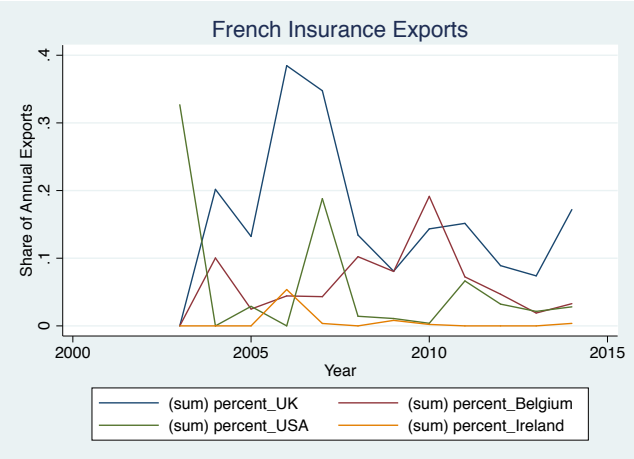
	GPU	FPU	TPU	MPU	VIX	SMV	ECB I	ECB II
GPU	0.00							
FPU	0.35	0.00						
TPU	0.85	0.85	0.00					
MPU	0.26	0.63	0.96	0.00				
VIX	0.68	0.95	0.71	0.76	0.00			
SMV	1.00	0.97	0.99	0.98	0.72	0.00		
ECB I	1.00	1.00	0.95	0.99	0.99	0.75	0.00	
ECB II	0.69	0.89	0.74	0.79	0.92	0.75	0.68	0.00

Appendix IV: Choice of Mean Share for External Policy Uncertainty Construction

There is much more variability in trade relationships for services, relative to goods trade. By taking the mean shares—rather than the median or the initial period—of the sample I account for the fact that destinations remain relevant, even if a sector is not currently exporting there. This is not very consequential for sectors with relative stability in trade partners (e.g., Autos in France).



However, examining the Insurance sector in France illuminates the importance of the mean share. If I were to only take the median, a country like the U.S. would seem altogether trivial for French insurance exports, despite accounting for a large share of such exports at the beginning of the sample. If I took the initial share it would overweight the U.S.'s overall importance and ignore the U.K.

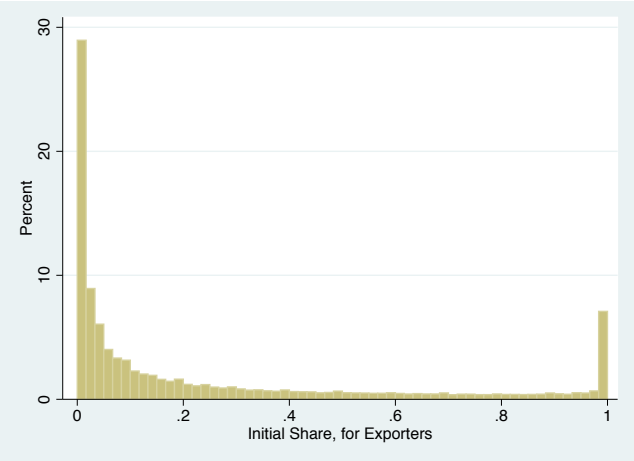


Appendix V: Correspondences

For goods, Pierce & Schott's (2012) HS to NAICS correspondence was used. For services, Erik van der Marel's 3-digit correspondence between EBOPS and NAICS was used. Much of the United Kingdom's 2003 services data by country-service is still classed as confidential/non-publishable, so

2002 data were used. Turkey does not have services data available by sector in the early portion of the sample period.

Appendix VI: Export Exposure, for Exporters



Appendix VII: Type-Specific Policy Uncertainty Results

	(1) Profits	(2) Profits	(3) Profits	(4) Profits	(5) Profits
Firm GPU_{t-1}	-0.089***				
	(0.02)				
Firm FPU_{t-1}		-0.067***			
		(0.02)			
Firm MPU_{t-1}			-0.057**		
			(0.02)		
Firm Macro PU_{t-1}					-0.078***
					(0.02)
Firm TPU_{t-1}				0.058	0.040
				(0.05)	(0.05)
Observations	4375354	4375354	4375354	4375354	4375354
F	556.209	532.234	595.658	552.509	479.083
R-squared	0.933	0.933	0.933	0.933	0.933
R-squared within	0.027	0.027	0.027	0.027	0.027
Firm FE?	Yes	Yes	Yes	Yes	Yes
Country-Sector-Time FE?	Yes	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes	Yes
+ Firm-Time GDP Forecast Control?	Yes	Yes	Yes	Yes	Yes

Standard errors are clustered at the country-time level between brackets
*$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	(1) Invest	(2) Invest	(3) Invest	(4) Invest	(5) Invest
Firm GPU_{t-1}	-0.049**				
	(0.02)				
Firm FPU_{t-1}		-0.063***			
		(0.02)			
Firm MPU_{t-1}			-0.008		
			(0.02)		
Firm Macro PU_{t-1}					-0.037*
					(0.02)
Firm TPU_{t-1}				0.082*	0.074
				(0.04)	(0.05)
Observations	4661420	4661420	4661420	4661420	4661420
F	44.731	47.102	43.668	56.340	43.752
R-squared	0.435	0.435	0.435	0.435	0.435
r2_within	0.001	0.001	0.001	0.001	0.001
Firm FE?	Yes	Yes	Yes	Yes	Yes
Country-Sector-Time FE?	Yes	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes	Yes
+ Firm-Time GDP Forecast Control?	Yes	Yes	Yes	Yes	Yes

Standard errors are clustered at the country-time level between brackets
*p < 0.10, ** p < 0.05, *** p < 0.01*

	(1) Employment	(2) Employment	(3) Employment	(4) Employment	(5) Employment
Firm GPU_{t-1}	-0.053***				
	(0.02)				
Firm FPU_{t-1}		-0.045***			
		(0.01)			
Firm MPU_{t-1}			-0.037**		
			(0.02)		
Firm Macro PU_{t-1}					-0.050***
					(0.01)
Firm TPU_{t-1}				0.024	0.011
				(0.03)	(0.03)
Observations	2309533	2309533	2309533	2309533	2309533
F	768.479	757.591	778.139	760.611	588.064
R-squared	0.959	0.959	0.959	0.959	0.959
R-squared within	0.039	0.039	0.039	0.039	0.039
Firm FE?	Yes	Yes	Yes	Yes	Yes
Country-Sector-Time FE?	Yes	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes	Yes
+ Firm-Time GDP Forecast Control?	Yes	Yes	Yes	Yes	Yes

Standard errors are clustered at the country-time level between brackets
*p < 0.10, ** p < 0.05, *** p < 0.01*

	(1) Avg Wage	(2) Avg Wage	(3) Avg Wage	(4) Avg Wage	(5) Avg Wage
Firm GPU_{t-1}	-0.002				
	(0.01)				
Firm FPU_{t-1}		0.006			
		(0.01)			
Firm MPU_{t-1}			-0.007		
			(0.01)		
Firm Macro PU_{t-1}					-0.005
					(0.01)
Firm TPU_{t-1}				0.028**	0.029**
				(0.01)	(0.01)
Observations	2162715	2162715	2162715	2162715	2162715
F	151.908	164.016	150.057	128.176	108.917
R-squared	0.821	0.821	0.821	0.821	0.821
R-squared within	0.004	0.004	0.004	0.004	0.004
Firm FE?	Yes	Yes	Yes	Yes	Yes
Country-Sector-Time FE?	Yes	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes	Yes
+ Firm-Time GDP Forecasts Control?	Yes	Yes	Yes	Yes	Yes

Standard errors are clustered at the country-time level between brackets
*$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$*

Appendix VIII: Robustness Checks

Appendix VIII.I: Robustness Checks, By Outcome

Below are robustness checks by outcome: sales, profits, investment, employment, and average wages. Column (1) is the baseline approach and includes a first moment of policy control (FMC) for WEO forecasts; Column (2) uses realized GDP as the first moment control; Column (3) uses within year WEO revisions; Column (4) - (7) add various group-time controls; and Column (8) uses time-varying export share to construct the firm-specific uncertainty measure and then instruments for it using initial export share policy uncertainty.

Sales

	(1) FMC: Forecasts	(2) FMC: GDP	(3) FMC: Revisions	(4) Status x CST	(5) Share x CT, Share x ST	(6) Share x T	(7) Time-Varying Share	(8) Exposure Instrument
Firm GPU_{t-1}	-0.082***	-0.081***	-0.067**	-0.064***	-0.128***	-0.127***	-0.125***	-0.096***
	(0.03)	(0.03)	(0.02)	(0.01)	(0.03)	(0.03)	(0.03)	(0.03)
Observations	6280569	6280569	6280569	6279614	6281097	6281146	5421083	6280569
F	1148.302	1146.236	1177.180	1137.684	108.930	108.448	119.231	1134.329
R-squared	0.942	0.942	0.942	0.942	0.999	0.999	0.934	0.942
R-squared within	0.042	0.042	0.042	0.042	0.077	0.077	0.078	0.043
First Stage F Stat?	–	–	–	–	–	–	–	221.8
Firm FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Time FE?	Yes	Yes	Yes	–	–	–	–	Yes

Standard errors are clustered at the country-time level between brackets
*$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$*

Profits

	(1) FMC: Forecasts	(2) FMC: GDP	(3) FMC: Revisions	(4) Status x CST	(5) Share x CT, Share x ST	(6) Share x T	(7) Time-Varying Share	(8) Exposure Instrument
Firm GPU_{t-1}	-0.089***	-0.091***	-0.105***	-0.082***	-0.121***	-0.120***	-0.118***	-0.099***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Observations	4375354	4375354	4375354	4374418	4375902	4375950	3682046	4375354
F	556.209	554.244	558.635	522.714	73.523	73.456	80.212	556.262
R-squared	0.933	0.933	0.933	0.933	0.999	0.999	0.924	0.933
R-squared within	0.027	0.027	0.027	0.027	0.079	0.079	0.083	0.028
First Stage F Stat?	–	–	–	–	–	–	–	440.4
Firm FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Time FE?	Yes	Yes	Yes	–	–	–	–	Yes

Standard errors are clustered at the country-time level between brackets
*$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$*

Investment

	(1) FMC: Forecasts	(2) FMC: GDP	(3) FMC: Revisions	(4) Status x CST	(5) Share x CT, Share x ST	(6) Share x T	(7) Time-Varying Share	(8) Exposure Instrument
Firm GPU_{t-1}	-0.053**	-0.054**	-0.065**	-0.083***	-0.178**	-0.178**	-0.175**	-0.062**
	(0.02)	(0.02)	(0.03)	(0.03)	(0.07)	(0.07)	(0.07)	(0.03)
Observations	4728337	4728337	4728337	4727689	4728592	4728608	4019990	4728337
F	4.853	4.882	6.344	2.790	27.671	27.734	28.028	5.176
R-squared	0.743	0.743	0.743	0.743	0.984	0.984	0.733	0.743
R-squared within	0.000	0.000	0.000	0.000	0.022	0.022	0.025	0.000
First Stage F Stat?	–	–	–	–	–	–	–	248.9
Firm FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Time FE?	Yes	Yes	Yes	–	–	–	–	Yes

Standard errors are clustered at the country-time level between brackets
*$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$*

Employment

	(1) FMC: Forecasts	(2) FMC: GDP	(3) FMC: Revisions	(4) Status x CST	(5) Share x CT, Share x ST	(6) Share x T	(7) Time-Varying Share	(8) Exposure Instrument
Firm GPU_{t-1}	-0.053***	-0.052***	-0.043***	-0.019**	-0.010	-0.010	-0.010	-0.056***
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Observations	2309533	2309533	2309533	2308877	2309806	2309842	1910251	2309533
F	768.479	770.567	605.996	610.492	157.354	155.849	144.170	763.576
R-squared	0.959	0.959	0.959	0.959	0.984	0.984	0.955	0.959
R-squared within	0.039	0.039	0.039	0.039	0.036	0.037	0.030	0.039
First Stage F Stat?	–	–	–	–	–	–	–	999.8
Firm FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Time FE?	Yes	Yes	Yes	–	–	–	–	Yes

Standard errors are clustered at the country-time level between brackets
*$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$*

Average Wages

	(1) FMC: Forecasts	(2) FMC: GDP	(3) FMC: Revisions	(4) Status x CST	(5) Share x CT, Share x ST	(6) Share x T	(7) Time-Varying Share	(8) Exposure Instrument
Firm GPU_{t-1}	-0.002	-0.002	-0.012	-0.016	-0.174***	-0.174***	-0.174***	-0.003
	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.03)	(0.02)
Observations	2162715	2162715	2162715	2162405	2162811	2162840	1766464	2162715
F	151.908	151.218	104.059	139.822	28.697	29.111	30.997	151.929
R-squared	0.821	0.821	0.821	0.821	0.999	0.999	0.814	0.821
R-squared within	0.004	0.004	0.004	0.004	0.077	0.077	0.077	0.004
First Stage F Stat?	–	–	–	–	–	–	–	394.4
Firm FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Time FE?	Yes	Yes	Yes	–	–	–	–	Yes

Standard errors are clustered at the country-time level between brackets
*$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$*

Appendix VIII.II: Adding lagged dependent variables to control for pre-existing trends.

Table 21: Levels with Fixed Effects Results

	(1) Sales	(2) Profits	(3) Investment	(4) Employment	(5) Avg Wage
Firm GPU_{t-1}	-0.058***	-0.062***	-0.057***	-0.033***	0.001
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
$Sales_{t-1}$	0.384***				
	(0.03)				
$Profits_{t-1}$		0.236***			
		(0.03)			
$Investment_{t-1}$			-0.021		
			(0.03)		
$Employment_{t-1}$				0.440***	
				(0.04)	
Avg $Wage_{t-1}$					0.145***
					(0.03)
Observations	6233953	4232138	3616432	1794206	1654249
F	788.085	738.169	8.863	645.394	105.054
R-squared	0.954	0.942	0.775	0.971	0.842
R-squared within	0.197	0.083	0.001	0.226	0.025
Firm FE?	Yes	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes	Yes
+ Firm GDP Forecasts Control?	Yes	Yes	Yes	Yes	Yes
Country-Sector-Time Controls?	Yes	Yes	Yes	Yes	Yes

Standard errors are clustered at the country-time level between brackets
*$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

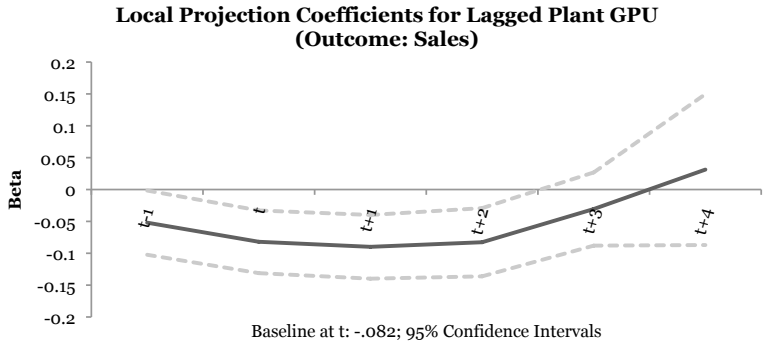
Table 22: Difference GMM Results

	(1) Sales	(2) Profits	(3) Investment	(4) Employment	(5) Avg Wage
Firm GPU_{t-1}	-0.041***	-0.057***	-0.119***	-0.011***	-0.113***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$Sales_{t-1}$	0.488***				
	(0.00)				
$Profits_{t-1}$		0.391***			
		(0.00)			
$Investment_{t-1}$			0.010***		
			(0.00)		
Employment $_{t-1}$				0.617***	
				(0.01)	
Avg $Wage_{t-1}$					0.199***
					(0.00)
Observations	5087553	3445642	2613402	1282994	1166809
F	62687.192	43160.403	3870.841	1879.420	11354.748
Firm-Time Controls?	Yes	Yes	Yes	Yes	Yes
+ Firm GDP Forecasts Control?	Yes	Yes	Yes	Yes	Yes

Standard errors are clustered at the country-time level between brackets
*$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix VIII.III: Timing

Figure 9: Jorda (2005) Local Projection Results



Appendix IX: Additional Trade Policy Uncertainty Results

Appendix IX.I: Export Participation Linear Probability Model Specification & Results

To examine the extensive margin effects of policy uncertainty, I extend Roberts & Tybout's (1997) export participation specification, which was also employed by Bernard and Jensen (2004), to

include policy uncertainty. This specification has the benefit of testing for the importance/presence of sunk costs via the inclusion of lagged export participation.

$$S_{icst} = \begin{cases} 1 \; if \; \gamma_i + \tau_{cst} + \beta \times Uncertainty \; Type_{icst-1} + \mathbf{Z}_{it-1} + \mathbf{A}_{ct-1} + \psi S_{ics,t-1} + \varepsilon_{icst} \geq 0 \\ 0, \; otherwise \end{cases}$$

where S_{icst} is a binary variable for firm participation in exporting in period t; $\mathbf{Z_{it}}$ is a vector of time-varying firm characteristics; $S_{ics,t-1}$ is lagged participation, which should only be significant in the face of sunk costs.

There are several identification issues associated with such a specification. Bernard, Jensen, and Lawrence (1995) and Bernard and Jensen (1999) uncover large contemporaneous changes in firm fundamentals when firms opt-in to exporting. To moderate simultaneity bias, all variables are lagged. Following Bernard & Jensen (2004), I estimate this as a linear probability model (LPM) with fixed effects since time-invariant firm characteristics are unlikely to be uncorrelated with time-varying firm characteristics (as required by random effects nonlinear models). I can also control for several other dimensions of fixed effects in this context. Since my interest is primarily in β (i.e., policy uncertainty's impact), I also preference the LPM approach since it allows for the estimation of constant marginal effects. Identification of ψ, the coefficient on the lagged dependent variable has received considerable attention from the literature; it is likely to be downwardly biased and inconsistent if estimated via an LPM (Heckman, 1981). Lagged participation is likely to be correlated with lagged policy uncertainty and other country-time variables. I instrument for lagged participation using a higher-order lagged firm attribute—fixed assets. Fixed assets are highly serially correlated, so I also include lagged fixed assets within $\mathbf{Z_{it}}$ to help address this concern. This specification also ignores the initial conditions problem. However, given the length of the sample period and the number of firms, the initial condition problem should not be too egregious (Skrondal & Rabe-Hesketh, 2014).[61]

Effective monetary policy uncertainty decreases extensive market participation for more exposed firms, but increases in effective trade policy uncertainty increase the probability that a more exposed firm will participate in exporting in a particular period.[62]

[61] For a detailed discussion on this approach and possible sources of bias see Skrondal & Rabe-Hesketh (2014).

[62] The coefficients on the lagged dependent variable reflect the presence of sunk costs and are are in line with those estimates found in Bernard and Jensen (2004).

Table 23: Extensive Margin Linear Probabilty Model Results

	(1) Exporting	(2) Exporting	(3) Exporting	(4) Exporting
Exporting_{t-1}	0.339***	0.338***	0.339***	0.338***
	(0.06)	(0.06)	(0.06)	(0.06)
Firm GPU_{t-1}	-0.032			
	(0.02)			
Firm FPU_{t-1}		-0.015		
		(0.02)		
Firm MPU_{t-1}			-0.041***	
			(0.01)	
Firm TPU_{t-1}				0.088**
				(0.04)
Observations	5198590	5198590	5198590	5198590
F	67.348	69.310	73.754	67.533
R-squared	0.722	0.722	0.722	0.722
Firm FE?	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes
Country-Sector-Time FE?	Yes	Yes	Yes	Yes

Standard errors are clustered at the country-time level between brackets
*$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$*

Appendix IX.II: Sector, Firm, and Crisis Period Results

Table 24: Impact of Trade Policy Uncertainty on Firm Exports, by Sector

	(1) Firm TPU_{t-1}
Goods	1.561*
	(0.83)
Services	3.661**
	(1.69)
Agriculture, Forestry, Fishing and Hunting	2.020**
	(0.99)
Mining, Utilities, Contruction	3.646**
	(1.44)
Manufacturing	1.417*
	(0.83)
Wholesale, Retail, and Transportation	3.992**
	(1.60)
Professional Services	3.297*
	(1.87)
Education and Healthcare	2.995
	(3.11)
Arts and Entertainment	3.417**
	(1.49)
Other Services	3.731
	(2.59)
Firm FE?	Yes
Firm-Time Controls?	Yes
Country-Sector-Time FE?	Yes
Horse-Race Specifications?	Yes
IHS Transformation?	Yes

Standard errors are clustered at the country-time level between brackets
*$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$*

Table 25: Impact of Trade Policy Uncertainty, Across Firm Characteristics and Timing

	(1) Exports	(2) Exports	(3) Exports	(4) Exports	(5) IHS Exports	(6) IHS Exports	(7) IHS Exports	(8) IHS Exports
Firm TPU_{t-1}	0.260	0.351**	0.304*	0.411	1.732	2.029*	2.023*	2.536*
	(0.28)	(0.17)	(0.18)	(0.25)	(1.70)	(1.08)	(1.08)	(1.47)
Crisis x Firm TPU_{t-1}	0.072				0.378			
	(0.21)				(1.25)			
Size x Firm TPU_{t-1}		-0.060*				-0.053***		
		(0.03)				(0.01)		
Tenure x Firm TPU_{t-1}			0.005				-0.037*	
			(0.01)				(0.02)	
Goods x Firm TPU_{t-1}				-0.250				-1.484
				(0.24)				(1.47)
Observations	840670	840670	840670	840670	6521693	6521693	6521693	6521693
F	347.094	316.397	359.851	360.855	44.450	54.553	73.725	53.220
R-squared	0.884	0.884	0.884	0.884	0.763	0.763	0.763	0.763
R-squared within	0.007	0.007	0.007	0.007	0.004	0.004	0.004	0.004
Firm FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Time FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors are clustered at the country-time level between brackets
*$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$*

Appendix IX.III: Separate Policy Uncertainty non-IHS Export Results

Table 26: Trade Policy Results Across Domestic and External Policy Uncertainty

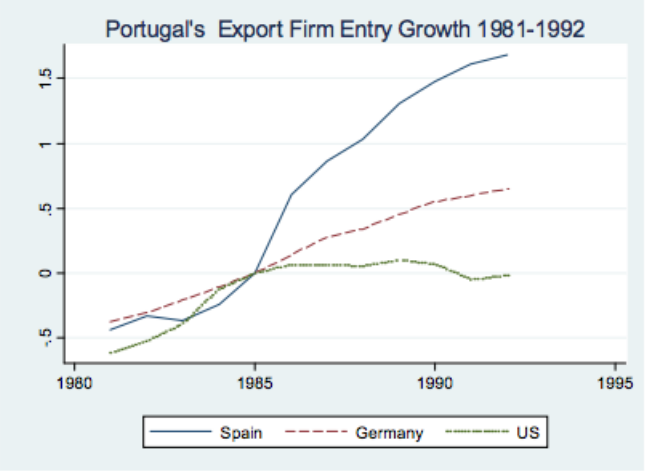
	(1) Sales	(2) Exports	(3) Domestic Sales	(4) Sales	(5) Exports	(6) Domestic Sales
Alpha x Domestic TPU_{t-1}	0.033	0.233	-0.141			
	(0.03)	(0.18)	(0.09)			
Alpha x External TPU_{t-1}				0.060**	0.340**	-0.185**
				(0.03)	(0.15)	(0.07)
Observations	6280569	840670	6242080	6280569	840670	6242080
F	1265.462	389.706	1041.519	1277.875	379.309	1093.988
R-squared	0.942	0.884	0.932	0.942	0.884	0.932
R-squared within	0.042	0.008	0.036	0.042	0.008	0.036
Firm FE?	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Time Controls?	Yes	Yes	Yes	Yes	Yes	Yes
+Firm-Time GDP Forecast Control?	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Time FE?	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors are clustered at the country-time level between brackets
*$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix X: Handley & Limao Pre-Event Trends

The work of Handley & Limao (2013, 2015) and others suggest that a reduction in policy uncertainty (via trade agreements) induces more export participation and the introduction of new product lines. The results in this paper seem to contradict that. However, a figure from an early version of Handley & Limao's (2015) work shows evidence of a pre-event positive uptick in growth in firm entry prior to the 1985 accession event (see below).[63] Thus, a positive response to anticipation of trade agreement resolution is not in contradiction to the empirical finding elsewhere that the relative slopes before and after agreements are reached do indeed significantly increase.

Figure 10: Evidence of a pre-trend in Handley and Limao's sample?



[63] Figure 3 from the NBER 2013 version of Handley & Limao (2015).

Appendix XI: Connections to Sluggish Recoveries

Both France and the United Kingdom have seen sluggish growth since 2011 and 2009, respectively.[64]

Table 27: Real GDP Growth Averages

	Sluggish Recovery	1998-2007
France	.6	2.4
U.K.	2.0	3.0

Table 28: Change in French Policy Uncertainty, 2011-2015

Effective Macro PU	.69
External Macro PU	.31
Domestic Macro PU	-.38
Effective TPU	.49
External TPU	1.1
Domestic TPU	.6

Table 29: Change in U.K. Policy Uncertainty, 2010-2015

Effective Macro PU	.35
External Macro PU	.82
Domestic Macro PU	.47
Effective TPU	-.06
External TPU	.51
Domestic TPU	.57

Table 30: Magnitude of Sluggish Growth Period Impacts on Sales Across Initial Shares

	Macro PU		TPU	
	France	U.K.	France	U.K.
75th Percentile	-2.00	-1.03	1.35	-.18
50th Percentile	-.41	-.21	.28	-.04

Table 31: Initial Share & Mean Firm Correlations

	Mean Exports	Mean Sales
France	.34	.10
U.K.	.37	.12

[64]Based on IMF's October 2016 WEO database.