Uncertainty about Future Policy Changes Could Be Harming the US Economy

Robert Krol

MERCATUS CENTER
George Mason University
3434 Washington Blvd., 4th Floor, Arlington, Virginia 22201
www.mercatus.org

Robert Krol. "Uncertainty about Future Policy Changes Could Be Harming the US Economy." Mercatus Research, Mercatus Center at George Mason University, Arlington, VA, May 2020.

ABSTRACT

This paper examines the impact of economic and trade policy uncertainty on US imports, US exports, and foreign direct investment inflows to the United States. Using alternative indices of uncertainty and controlling for the level of tariffs, I find that higher levels of US policy uncertainty generally depress international trade and investment and increase the variability of investment inflows. Higher levels of policy uncertainty abroad also impact trade and investment flows. Consumers and businesses would benefit from clear signals concerning the future course of economic policy in the United States and abroad.

JEL codes: F1, F2, F3

Keywords: economic policy uncertainty, exports, imports, foreign direct investment

This paper can be accessed at https://www.mercatus.org/publications/trade-and-immigration/uncertainty-about-future-policy-changes-could-harming-us-economy

After World War II, the United States worked to expand international commerce using trade agreements as the foremost instrument of its trade policy.[1] This policy regime was upended in January 2017, however, when the new presidential administration withdrew from the Trans-Pacific Partnership trade agreement that the previous administration had negotiated.[2] By the summer of 2017, talks had started to renegotiate the long-standing North American Free Trade Agreement.[3] A trade war with China began a year later,[4] raising tariffs on solar panels, washing machines, steel, aluminum, and other items.[5]

Not only have US tariffs increased, US trade policy has also become more unpredictable.[6] When international economic policy becomes less predictable at home and abroad, businesses both in the United States and abroad hold off on new investments. They may postpone decisions to expand into foreign markets as the expected profits from these types of business activities decline because businesses think higher tariffs are more likely.[7] As the value of waiting increases, economic growth slows.

---

1. James McBride, "The State of U.S. Trade Policy," Council on Foreign Relations Backgrounder, last updated January 31, 2017.
2. Brian Naylor, "Trump Signs 3 Memorandums, Including Withdrawal from the Pacific Trade Deal," *NPR*, January 23, 2017.
3. David Lawder, "NAFTA Renegotiations Are About to Begin—and Trump Is on a Collision Course with the Auto Industry," *Business Insider*, August 14, 2017. A new agreement was ratified by the United States in December 2019.
4. Weizhen Tan, "Trade War Begins: US and China Exchange $34 Billion in Tariffs," *CNBC*, July 5, 2018. For a detailed guide to all President Trump's trade actions, see Chad P. Bown and Melinda Kolb, "Trump's Trade War Timeline: An Up-to-Date Guide," Peterson Institute for International Economics, last updated March 13, 2020.
5. Bown and Kolb, "Trump's Trade War Timeline."
6. Robert Krol, "Uncertainty on Trade Is Killing American Businesses," *National Interest*, June 30, 2019.
7. Ben S. Bernanke, "Irreversibility, Uncertainty, and Cyclical Investment," *Quarterly Journal of Economics* 97, no. 1 (1983): 85–106; Kyle Handley and Nuno Limão, "Policy Uncertainty, Trade, and Welfare: Theory and Evidence for China and the United States," *American Economic Review* 107, no. 9 (2017): 2731–83.

Indices constructed by economists can be used to measure changes in trade and economic policy uncertainty. For their indices, Scott Baker, Nicholas Bloom, and Steven Davis count articles in major newspapers that suggest there is trade policy uncertainty or uncertainty about economic policy in general.[8] For the period beginning in January 1985 and ending with the November 2016 elections, the Baker, Bloom, and Davis trade policy uncertainty index averaged 91.9. Since President Trump took office in January 2017, the index has averaged 452.9, a nearly fivefold increase. This suggests that trade policy has become far less predictable.

Trade policies are important because trade promotes economic growth and, therefore, prosperity.[9] Increased competition from trade lowers prices. Less efficient (i.e., less profitable) firms contract and more efficient firms expand, leading to further declines (or slower growth) in prices. In addition, foreign competition strengthens the incentive to invest in innovation that increases productivity growth and improves long-run standards of living.

This paper uses a vector autoregression model to empirically examine the impact that US and foreign economic policy uncertainty (EPU) and trade policy uncertainty (TPU) have on US imports, US exports, and foreign direct investment inflows to the United States. The paper builds on my previous paper from 2018.[10] Since then, the number of policy uncertainty indices has expanded. In addition to the US index, there now are EPU indices for other countries, enabling me to examine the impact of higher EPU abroad on US international investment and trade.

General EPU has traditionally been measured using the Chicago Board Options Exchange Volatility Index (VIX).[11] I will also estimate vector

8. Scott R. Baker, Nicholas Bloom, and Steven J. Davis, "Measuring Economic Policy Uncertainty," *Quarterly Journal of Economics* 131, no. 4 (2016): 1593–636.
9. Giammario Impullitti and Omar Licandro, "Trade, Firm Selection, and Innovation: The Competition Channel," *Economic Journal* 128, no. 608 (2018): 189–229; Davide Furceri et al., "Macroeconomic Consequences of Tariffs" (NBER Working Paper No. 25402, National Bureau of Economic Research, Cambridge, MA, 2018); Dario Caldara et al., "The Economic Effects of Trade Policy Uncertainty," *Journal of Monetary Economics* (forthcoming).
10. Robert Krol, "Does Uncertainty over Economic Policy Harm Trade, Foreign Investment, and Prosperity?" (Mercatus Research, Mercatus Center at George Mason University, Arlington, VA, 2018).
11. The VIX uses the Black-Scholes option pricing model to measure expected variability in stock prices. When variability in stock prices is high, option prices are also high. High variability in stock prices is associated with uncertainty about the future course of the economy. This suggests that when the VIX is high, general economic uncertainty is also high. Critics of using the VIX to measure uncertainty argue that it can change for reasons other than macroeconomic uncertainty—for example, because of changes in investor risk aversion. Of course, if investors become more risk averse, this is likely the result of greater uncertainty in the economy. See Chicago Board of Options Exchange,

autoregressions using an alternative measure of macroeconomic uncertainty developed by economists Kyle Jurado, Sydney Ludvigson, and Serena Ng.[12] Using two measures allows me to determine whether the way economic uncertainty is measured impacts the results. This paper also draws a distinction between the level of tariffs and policy uncertainty. A measure of the level of tariffs on a quarterly basis is now included in the estimated model. Finally, the sample period is extended beyond that considered in my 2018 paper. The sample is extended by an additional one and a half years to the fourth quarter of 2018 for direct foreign investment inflows and to the first quarter of 2019 for trade flows.

The results show that higher levels of US EPU, US TPU, and foreign EPU tend to depress both US imports and exports. These effects are persistent and often statistically significant. The results are not sensitive to the various measures of economic uncertainty. Increases in EPU or TPU have both a strong and a statistically significant negative impact on US foreign direct investment inflows. The variability of US foreign direct investment inflows increases.

This evidence is consistent with the theory that, as uncertainty over US trade and general economic policy increases, domestic and foreign firms delay or postpone international trade and investment decisions. This may be because policy uncertainty raises the chances that governments may raise tariffs, which makes entering or investing in foreign markets less attractive. Seeing value in waiting, firms delay or even postpone international trade and investment decisions.

TPU and EPU represent an additional source of deadweight losses related to trade restrictions on the US economy. The creation of uncertainty about future trade and economic policies depresses trade, which limits consumer choice, reducing consumers' well-being. Because intermediate goods, raw materials, and capital equipment account for nearly 60 percent of imports, the unwillingness of foreign firms to enter and sell in the United States, or to invest, means that American businesses face higher costs and reduced profitability. Ultimately a significant portion of these costs will be borne by consumers. The policy conclusion is that the administration should send a clear signal to US trading partners that an open global economy benefits all participants and that the administration stands behind that policy.

Cboe VIX White Paper: Cboe Volatility Index (Chicago: Cboe Exchange, 2014); Geert Bekaert, Marie Hoerova, and Marco Lo Duca, "Risk, Uncertainty, and Monetary Policy," *Journal of Monetary Economics* 60, no. 3 (2013): 771–88.

12. Kyle Jurado, Sydney C. Ludvigson, and Serena Ng, "Measuring Uncertainty," *American Economic Review* 105, no. 3 (2015): 1177–216.

The remainder of this paper is organized in the following manner: The next section explains the theory behind the impact of uncertainty on business behavior. The third section describes how the different policy uncertainty indices are constructed and how they behave over time. The fourth section sets up the empirical model used in the paper. A fifth section presents the results, and the paper ends with policy conclusions.

HOW DOES POLICY UNCERTAINTY AFFECT BUSINESS DECISIONS?

The ongoing debate among policymakers over government taxes, spending, and regulation represents economic policy uncertainty. When debates over the best approach to economic policy engender disagreement, which is a normal part of the political process, policy uncertainty will be elevated. Businesses must deal both with general economic uncertainties, caused by changes in consumer tastes and in technology, and with policy uncertainty.

Baker, Bloom, and Davis have developed an index that captures many of the aspects of policy uncertainty. They find that higher levels of EPU depress investment, employment, and economic activity.[13] Why does greater EPU slow the economy?

Economist Robert Higgs argued that uncertainty over government policy—what he called regime uncertainty—often puts private property rights at risk, just as the anticipation of a potential weakening of private property rights can cause a decline in investment and, therefore, a reduction in economic activity.[14] Starting a new business, expanding a factory, or entering a new market imposes irreversible or "sunk" costs. These may include the costs of research, marketing activities, and employee training. When future economic policies such as tax rates and regulations become less certain, businesses are more inclined to delay investment or entry into new markets. In this environment, there is value in waiting.[15]

This argument carries over to an international business environment. There are similar sunk costs associated with entering a foreign market or

13. Baker, Bloom, and Davis, "Measuring Economic Policy Uncertainty." In the context of small businesses in the United States, I have found that higher levels of economic policy uncertainty depress investment and hiring by small businesses, slowing economic activity; see Robert Krol, "Economic Policy Uncertainty and Small Business Decisions," *Cato Journal* 37, no. 1 (2017): 59–68.
14. Robert Higgs, "Regime Uncertainty: Why the Great Depression Lasted So Long and Why Prosperity Resumed after the War," *Independent Review* 1, no. 4 (1997): 561–90.
15. Bernanke, "Irreversibility, Uncertainty, and Cyclical Investment"; Robert Pindyck, "Irreversibility, Uncertainty, and Investment," *Journal of Economic Literature* 29, no. 3 (1991): 1110–48.

building a factory abroad—perhaps even higher costs than those associated with similar expansions in a domestic setting. For example, more up-front research is needed before entering a foreign market than before expanding in one's home market. Foreign expansion requires the business to become familiar with the target country's institutional environment, such as its legal system and regulations. Existing firms already understand the institutions that impact their business at home.

Economists Kyle Handley and Nuno Limão have built a formal model of this process in an international setting.[16] The model focuses on decisions to enter foreign markets and on investing in domestic production to expand exports. It predicts that increases in TPU have two effects that influence a firm's decision to expand in an international setting: First, the probability of higher tariffs rises. Second, expected profit declines. Handley and Limão hypothesize that both effects discourage international expansion. They test their model in the context of China's accession into the World Trade Organization in 2001. When China joined the World Trade Organization, future US trade policy in regard to China became more certain. Handley and Limão find that the reduction in uncertainty over future US trade policy explains about a third of the expansion of Chinese exports into the US market between 2000 and 2005.

Two recent papers use the Handley and Limão model in the context of Brexit.[17] These papers examine the impact of higher levels of uncertainty over trade relations between the United Kingdom and the European Union as a result of the 2016 UK vote to leave the European Union. A study by economists Meredith Crowley, Oliver Exton, and Lu Han finds that Brexit reduced UK firm entry and increased exit with respect to the European Union following the vote. Alejandro Graziano, working with Handley and Limão, finds that Brexit reduced the number of UK products exported to the European Union and reduced the bilateral value of trade between the United Kingdom and the European Union. These papers and others suggest that changes in TPU have an impact on international commerce in the European Union.[18]

---

16. Handley and Limão, "Policy Uncertainty, Trade, and Welfare."
17. Meredith Crowley, Oliver Exton, and Lu Han, "Renegotiation of Trade Agreements and Firm Exporting Decisions: Evidence from the Impact of BREXIT on UK Exports" (Working Paper in Economics No. 1839, University of Cambridge, 2018); Alejandro Graziano, Kyle Handley, and Nuno Limão, "Brexit Uncertainty and Trade Disintegration" (NBER Working Paper No. 25334, National Bureau for Economic Research, Cambridge, MA, 2018).
18. For a review of older papers on this topic, see Krol, "Does Uncertainty over Economic Policy Harm Trade?"

MEASURING ECONOMIC POLICY UNCERTAINTY AND TRADE POLICY UNCERTAINTY

Researchers interested in estimating the impact of policy uncertainty on international commerce face the problem of how to measure uncertainty at a macroeconomic level.[19] For EPU, a common approach has been to compare a measure of the performance of the economy, or a specific economic variable such as investment, in election years, when uncertainty was thought to have increased, to the same variable or variables in nonelection years. Alternatively, researchers look at differences in an economic variable before and after an election.[20] A drawback to this approach is that variation in EPU is continuous and always present in the economy. Comparing discrete time periods may not fully capture all dimensions of EPU.

The index devised by economists Scott Baker, Nicholas Bloom, and Steven Davis is shown in figure 1. It measures the amount of EPU that is present in the US economy over time.[21] We can see that it tends to be high around the recessions of the early 1990s and shortly after 2000 and during the deep recession in 2008–2009. It has also been high during the Trump presidency despite a healthy economy up until the global COVID-19 pandemic.

The index is based on a count of articles that discuss EPU. The counted articles come from 10 large newspapers: *USA Today*, the *Miami Herald*, the *Chicago Tribune*, the *Washington Post*, the *Los Angeles Times*, the *Boston Globe*, the *San Francisco Chronicle*, the *Dallas Morning News*, the *Houston Chronicle*, and the *Wall Street Journal*. A monthly computerized search looks for articles that contain groups of keywords associated with EPU. An article is counted if it contains a triple combination of at least one term from each of the following three groups: (1) "uncertainty" or "uncertain"; (2) "economic" or "economy"; and (3) words such as "Congress," "White House," "regulation," "deficit," or "the Fed." Because the number of articles overall can change over time, the authors scale the count by dividing it by the total number of articles that appear in the paper each month. This figure is then averaged over the 10 newspapers.[22]

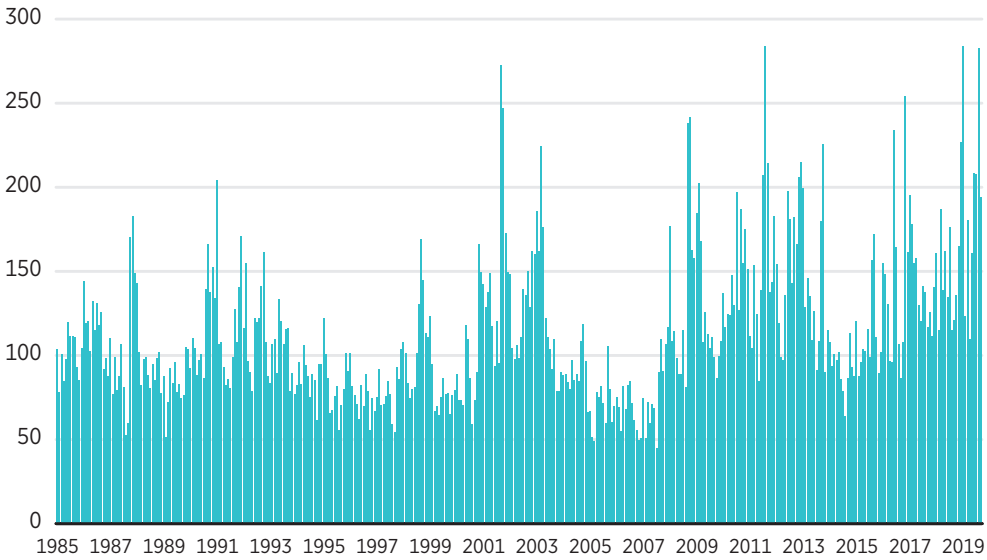
19. The VIX has been the primary workhorse for measuring general economic uncertainty in the most recent research on uncertainty and the economy.

20. See, for example, Brandon Julio and Youngsuk Yook, "Political Uncertainty and Corporate Investment Cycles," *Journal of Finance* 67, no. 1 (2012): 45–83.

21. Baker, Bloom, and Davis, "Measuring Economic Policy Uncertainty"; Economic Policy Uncertainty, "US EPU (Monthly, Daily, Categorical)" (dataset), accessed April 7, 2020, http://www.policyuncertainty.com/us_monthly.html.

22. The authors standardize the data (for each paper they divide the newspaper-level series by its standard deviation for the 1985–2009 period) so it has a standard deviation of one. They average

FIGURE 1. US ECONOMIC POLICY UNCERTAINTY INDEX, 1985–2019

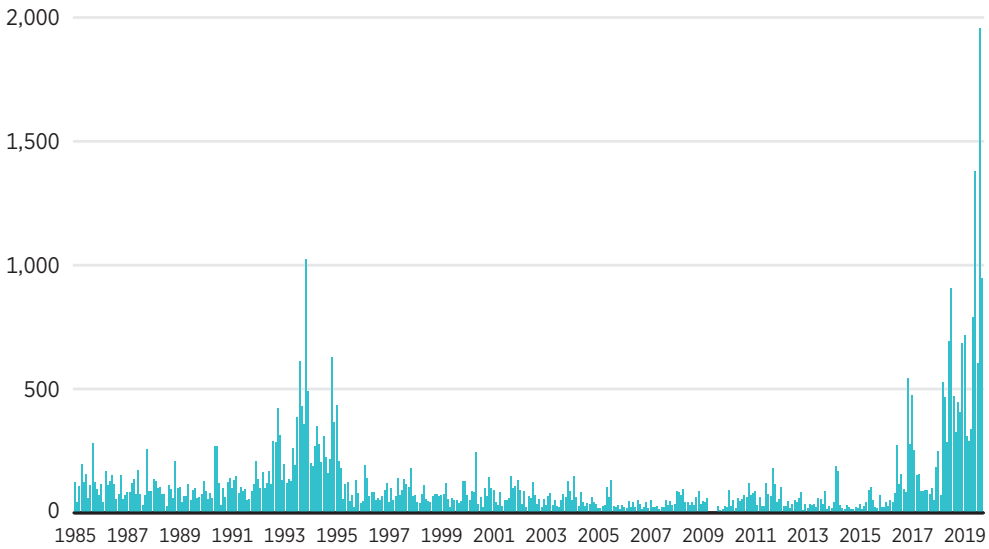


Source: Economic Policy Uncertainty, "US EPU (Monthly, Daily, Categorical)" (dataset), accessed April 7, 2020, http://www.policyuncertainty.com/us_monthly.html.

Baker, Bloom, and Davis also construct subindices that measure EPU for categories such as monetary policy, regulation, and trade policy. The methodology used to construct a category index is the same as that used to construct the overall EPU index. For the category indices, the article search uses the Access World News database, which contains 2,000 US newspapers. Counted articles must contain terms associated with the category of interest along with terms associated with the economy and uncertainty. In the case of the TPU index, an article must contain a term such as "tariffs" or "World Trade Organization" to be included in the count. Figure 2 shows how the index has evolved over time. Spikes in the index occurred during the negotiations on the North American Free Trade Agreement in the early 1990s, during the 2016 presidential campaign, and during President Trump's years in office.

the standardized data across the 10 papers, producing a multipaper index. Then they normalize this index so it has a mean of 100 for the 1985–2009 period. For details, see Baker, Bloom, and Davis, "Measuring Economic Policy Uncertainty," 1599. As a check on the reliability of this measure, they also have a group of people read a sample of the articles to see whether they deal with EPU. The human review was consistent with the inclusion and exclusion of articles based on the computer search.

FIGURE 2. US TRADE POLICY UNCERTAINTY INDEX, 1985–2019



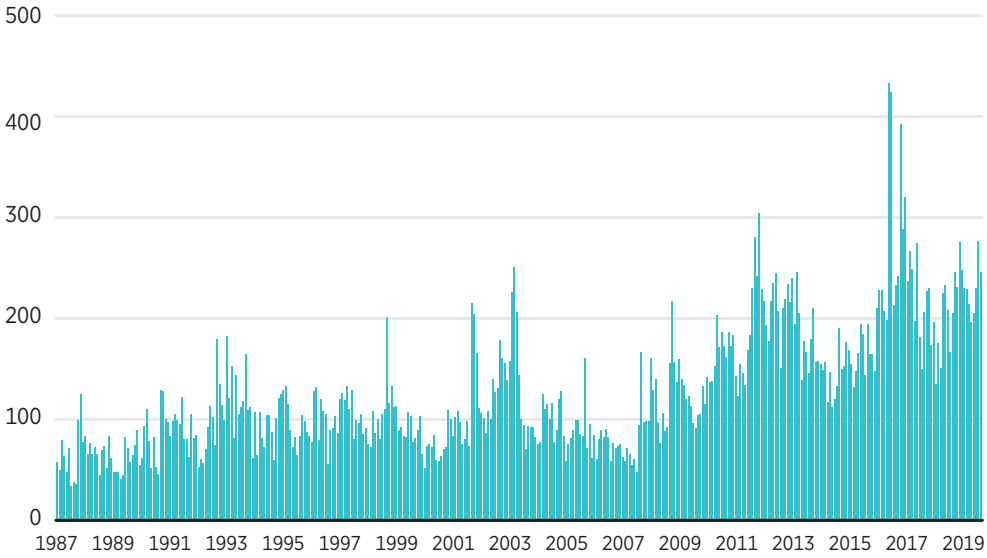
Source: Economic Policy Uncertainty, "US Monthly Trade Policy Uncertainty Index" (dataset), accessed May 5, 2020, http://www.policyuncertainty.com/trade_uncertainty.html.

The mean of the TPU index increased from 91.9 for the period from January 1985 to November 2016, to 452.9 during President Trump's first three years in office. The variability of the TPU index as measured by its standard deviation increased from 99.6 before President Trump was elected to 407.0 during the president's tenure. The average during the Trump years is almost 4.4 standard deviations higher than the average in the years before the Trump presidency. Uncertainty over trade policy has remained high and variable during the Trump presidency.

In order to measure the impact of EPU from abroad, figure 3 provides Baker, Bloom, and Davis's EPU index for Europe. The European Union is the largest export market for the United States, accounting for 19.1 percent of total US exports in 2018. It is also the second-largest supplier of imports into the United States, accounting for 19.2 percent of total US imports in 2018.[23] The EPU index for Europe, shown in figure 3 for the period from January 1987 to October 2019, is based on articles in newspapers from France, Germany, Italy, Spain, and the United Kingdom (two major papers per country). The index is constructed in the same manner as the US EPU index. It shows considerable variation over

23. "European Union," Office of the United States Trade Representative, accessed April 7, 2020, https://ustr.gov/countries-regions/europe-middle-east/europe/european-union.

FIGURE 3. EUROPEAN ECONOMIC POLICY UNCERTAINTY INDEX, 1987–2019



Source: Economic Policy Uncertainty, "Global Economic Policy Uncertainty Index" (dataset), accessed May 5, 2020, http://www.policyuncertainty.com/global_monthly.html.

the period, and EPU appears to be significantly higher since the deep recession that occurred in 2008–2009.

In order to provide an even broader perspective on EPU generated from abroad, figure 4 plots the global EPU index. The index begins in January 1997 and ends in September 2019. It is a GDP-weighted average of national EPU indices from 20 industrial and highly developed emerging economies.[24] Each country index is constructed like the US EPU index. There is considerable variation in this index over time. It tends to be high during recessions and periods of financial stress. It has also been high since Trump was elected president at the end of 2016.

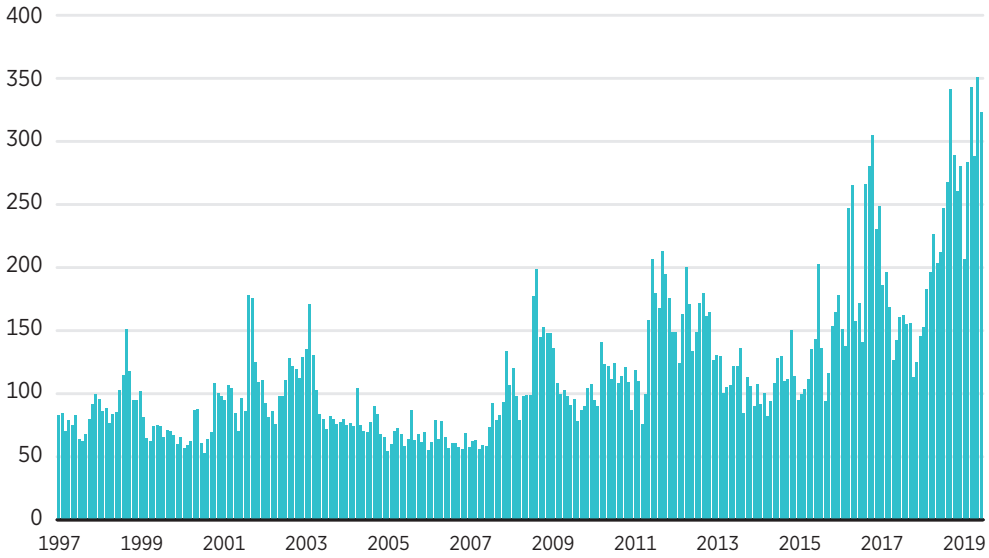
All four of these policy indices show there is considerable variation over time in the uncertainty of government policies in the United States and abroad.

THE IMPACT OF POLICY UNCERTAINTY

This section of the paper describes the basic economic framework used to analyze the different factors that influence exports, imports, and foreign direct

24. An advantage of this index is that it includes a larger set of countries than the European EPU index. A drawback is that it includes the United States.

FIGURE 4. GLOBAL ECONOMIC POLICY UNCERTAINTY INDEX, 1997–2019



Source: Economic Policy Uncertainty, "Global Economic Policy Uncertainty Index" (dataset), accessed May 5, 2020, http://www.policyuncertainty.com/global_monthly.html.

investment inflows. In order to quantify the impact policy uncertainty has on international commerce, it is important to control for the economic factors, other than policy uncertainty, that affect international trade and investment.

The Empirical Model

For each EPU measure, import demand and export supply functions are used to estimate the impact policy uncertainty has on international trade. US imports are hypothesized to depend on the US tariff level, policy uncertainty, general economic uncertainty, the trade-weighted real exchange rate, and US real GDP.[25] That is,

> US real imports = f (US tariffs, policy uncertainty, economic uncertainty, real exchange rate, US real GDP).

A measure of the level of tariffs is included to help draw a distinction between the level of tariffs and uncertainty over tariffs. Higher tariffs are

25. Morris Goldstein and Mohsin S. Khan, "Income and Price Effects in Foreign Trade," in *Handbook of International Economics*, vol. 2, ed. Ronald W. Jones and Peter B. Kenen (Amsterdam: North-Holland, 1985).

expected to reduce imports. As the trade-weighted dollar appreciates in real terms, imports are less expensive in the United States. This should cause imports to increase. Higher real GDP is expected to raise consumption in the United States, resulting in more imports.

Higher levels of uncertainty are expected to depress imports. For example, an increase in US TPU will worry foreign firms, because it raises the probability that tariffs might increase. This should lower expected profits and discourage foreign entry and sales in the US market. As a result, US imports can be expected to decline.

US exports can be explained in a similar manner. In the estimations, world real GDP replaces US real GDP:

> US real exports = f (US tariffs, policy uncertainty, economic uncertainty, real exchange rate, world real GDP).

Higher US tariffs can result in trading partners raising their tariffs. Trade wars reduce exports. A real appreciation of the trade-weighted dollar would make US exports relatively more expensive, and hence lower. Higher world real GDP can be expected to raise world consumption and the demand for US goods, so exports would increase.

High levels of general economic uncertainty in the United States and abroad depress economic activity, reducing international commerce. Higher levels of TPU in the United States reduce exports, because if the United States threatens to raise tariffs on imports, the potential for retaliation arises. US trading partners respond by threatening to raise tariffs. The expected decline in profits dampens US firms' plans for selling abroad. This can be expected to cause a decline in exports. Similarly, higher levels of EPU abroad raise the probability of higher tariffs or other regulations, reducing the expected profits of US firms. This can be expected to discourage US exports. Higher general economic uncertainty tends to depress economic activity and reduces international commerce.

US foreign direct investment inflows (FDI) are analyzed using the same framework as imports:

> US real FDI = f (US tariffs, policy uncertainty, economic uncertainty, real exchange rate, US real GDP).

Higher tariffs reflect a less open set of international economic policies, which discourages direct investment inflows into the United States. A real appreciation of the trade-weighted dollars makes investment in the United States relatively more expensive for a foreign firm, which should cause such investment to decline. Higher levels of US real GDP encourage investment inflows because

of higher expected sales and profits. Both types of uncertainty reduce foreign direct investment inflows because they raise the chance of policy changes that might work against foreign firms, lowering expected profits. If uncertainty also reduces economic activity, we would expect lower sales, which should depress investment inflows. However, higher levels of global EPU may encourage investment inflows into the United States. Less certainty over policies abroad can make investing in the United States more attractive.

The changes in international trade and investment that result from variations in real GDP, the real exchange rate, tariffs, and uncertainty occur over time. A vector autoregression model (VAR) is used to capture these dynamic adjustments. VARs have been workhorses in macroeconomic modeling of the dynamic behavior of aggregate time-series economic variables since 1980.[26] In a VAR, each variable is regressed on lagged values of itself and of each of the other variables included in the model. Like Baker, Bloom, and Davis, I take the logarithm of the level of each variable except the tariff rate in the model.[27]

Data

This subsection discusses the data used in the vector autoregression estimates. First, world real GDP is proxied by real aggregate GDP of the countries of the Organisation for Economic Co-operation and Development (OECD). It is available on a quarterly basis starting in the first quarter of 1985; my study ends with the first quarter of 2019.[28] Using real GDP from OECD countries to proxy world real GDP is reasonable since OECD countries produce about 50 percent of world real GDP.

Foreign direct investment inflows into the United States and US real GDP are measured on a quarterly basis. The inflows are deflated using the US producer price index. The data sample begins in the first quarter of 1985 and ends in the fourth quarter of 2018 for FDI and in the second quarter of 2019 for US real GDP.

The real, trade-weighted exchange rate of the US dollar against the currencies of 26 industrial and emerging economies is measured on a monthly basis

26. Christopher Sims, "Macroeconomics and Reality," *Econometrica* 48, no. 1 (1980): 1–49. See the appendix for model details.
27. In six quarters of the sample, foreign direct inflows are negative. Since logarithms are not defined for negative numbers, these observations are dropped. The tariff rate is already expressed in percentage terms.
28. I am not aware of a quarterly measure of world real GDP.

beginning in January 1985 and ending in June 2019. US imports and exports are measured on a monthly basis beginning in January 1992 and ending in June 2019. Imports and exports are deflated using the US producer price index in order to measure them in real terms.[29]

All the uncertainty indices are measured on a monthly basis. The VIX begins in January 1990 and ends in June 2019. The alternative general macroeconomic uncertainty index developed by Jurado, Ludvigson, and Ng begins in January 1985 and ends in June 2019. The US policy uncertainty indices begin in January 1985 and end in June 2019. The European EPU index begins in January 1987 and ends in June 2019. The global EPU index begins in January 1997 and ends in June 2019.[30] All monthly data are converted into quarterly data by averaging the monthly values for each quarter in the sample.

Since this analysis is on a quarterly basis and most tariff rate measures are calculated on an annual basis, a proxy measure of the tariff level is needed. Monthly customs duty revenue divided by the value of imported goods is used as the measure of the level of tariffs in any given quarter.[31]

EMPIRICAL RESULTS

Each VAR contains five variables. The tariff variable is ordered first. The policy uncertainty variable is ordered second, followed by the VIX (which controls for general economic uncertainty), the trade-weighted real exchange rate, real GDP, and one of the following: real imports, real exports, or real US foreign direct investment inflows. The sample period for imports and exports begins in the

29. I used nominal exports and imports in Krol, "Does Uncertainty over Economic Policy Harm Trade?," so a direct comparison is not meaningful. The real value is a better measure of trade flows.
30. OECD real GDP was downloaded from the OECD Quarterly National Accounts, Organisation for Economic Co-operation and Development, OECD.Stat (dataset), accessed March 26, 2020, http://stats.oecd.org. US real GDP, foreign direct investment inflows, exports, imports, the real exchange rate, and the producer price index were downloaded from the Federal Reserve Economic Database (FRED) of the Federal Reserve Bank of St. Louis, accessed March 26, 2020, http://fred.stlouisfed.org/categories. Custom revenues are taken from the Bureau of the Fiscal Service, *Treasury Bulletin*, table FFO-2, last modified March 12, 2020, https://www.fiscal.treasury.gov/reports-statements/treasury-bulletin/. The VIX was downloaded from Cboe, "VIX Index Historical Data" (dataset), accessed March 26, 2020, http://www.cboe.com/products/vix-index-volatility/vix-options-and-futures/vix-index/vix-historical-data. The Jurado, Ludvigson, and Ng data were downloaded from Sydney C. Ludvigson, "Data & Appendixes," accessed March 26, 2020, https://www.sydneyludvigson.com/data-and-appendixes. The Baker, Bloom, and Davis data were downloaded from Economic Policy Uncertainty, "Economic Policy Uncertainty Index" (dataset), accessed March 26, 2020, http://www.policyuncertainty.com/.
31. This is similar to the approach used in Caldara et al., "Economic Effects of Trade Policy Uncertainty"; and Robert Krol, "Testing Tariff Endogeneity in Japan: A Comparison of Pre- and Post-war Periods," *Economics Letters* 50, no. 3 (1996): 399–406.

first quarter of 1993 and ends in the first quarter of 2019. The sample period for foreign direct investment inflows begins in the first quarter of 1991 and ends in the fourth quarter of 2018. The number of lags in the model is five.[32] This is long enough to capture the dynamics in the relationship between variables and result in no residual serial correlation in the equations' error terms.[33]

The results of the estimated models are presented as impulse response functions. More specifically, an impulse response function, produced using a VAR, estimates the impact of a one standard deviation increase in a measure of policy uncertainty on US imports, exports, or foreign direct investment inflows.[34] In this paper, 12 quarters is the number of periods examined by each impulse response function. Each impulse response function includes a 90 percent confidence band. When the confidence band includes the value of zero, the relationship between policy uncertainty and the measures of economic activity cannot be said to differ from zero in a statistically meaningful way. The confidence band includes the true impulse response function 90 percent of the time. The results are summarized in table 1, and graphical representations of each impulse response function are shown in figures 5 through 16.

Panel A of table 1 summarizes the response of imports to changes in the four measures of policy uncertainty. Figures 5 through 8 show that the increase in policy uncertainty has a significant and negative impact on imports for up to six quarters after the shock. The minimum average decline in imports is −0.25 percent across the four different measures of policy uncertainty. The largest maximum decline was −1.35 percent. Using data from the first quarter of 2019, the largest decline would result in a $10.6 billion decline in imports in that quarter.

Policy uncertainty abroad, as measured by European economic policy uncertainty (EEPU) and global economic policy uncertainty (GEPU), also reduces US imports. This is consistent with economic theory, which suggests that exporting foreign firms fear tariff retaliation from the United States when they experience high levels of policy uncertainty in their own countries. As a result, they spend less time developing US markets, and US imports decline.

---

32. The sample periods are determined by data availability. We lose five observations at the start of each sample because of the five lags in the model.

33. I do not use a lag selection technique to choose the number of lags in the model. Research has shown that common lag selection techniques tend to set too few lags in a model. See Thomas Doan, *RATS User Guide*, version 8, p. 206. Dario Caldara et al. use three lags in "Economic Effects of Trade Policy Uncertainty." Baker, Bloom, and Davis focus on results produced with three lags in "Measuring Economic Policy Uncertainty." They also look at six lags. The results are comparable.

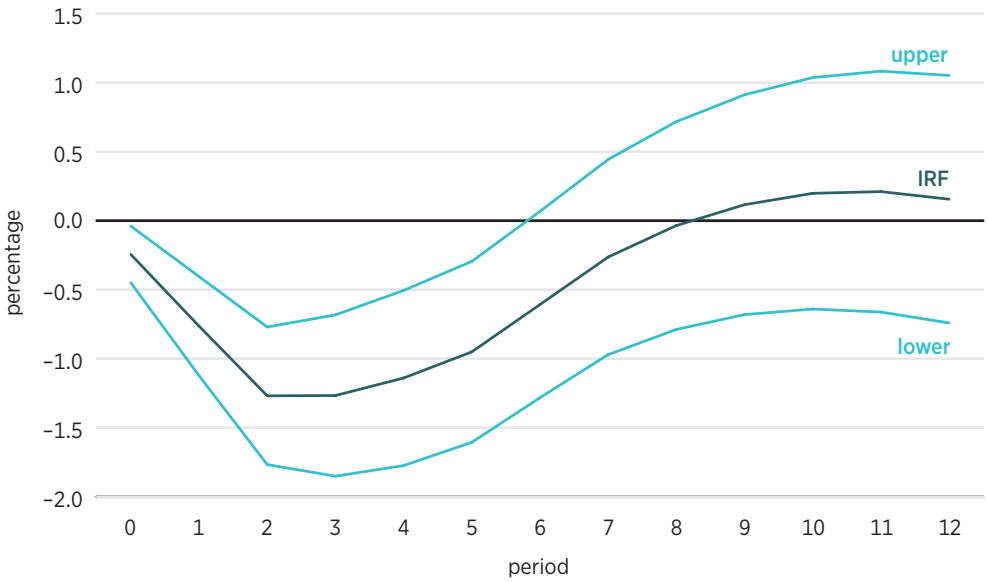
34. To estimate the impulse response function, the different shocks must be independent of each other in the period in which they occur. This is accomplished using the Cholesky (recursive) decomposition. See Sims, "Macroeconomics and Reality," and this paper's appendix.

TABLE 1. SUMMARY OF THE IMPULSE RESPONSE FUNCTIONS

	EPU	TPU	EEPU	GEPU
		A. Imports		
Periods	0–5	0–6	1–4	1–5
Impact	−0.25 / −1.27	−0.32 / −1.35	−0.54 / −0.85	−0.55 / −1.16
Figure #	5	6	7	8
		B. Exports		
Periods	0–7	1–2, 4–6	0–2	0–5
Impact	−0.61 / −1.20	−0.41 / −1.30	−0.23 / −0.61	−0.52 / −0.96
Figure #	9	10	11	12
		C. Foreign Direct Investment Inflows		
Periods	3, 5–6	3, 6	–	2, 5–6
Impact	−9.0 / −13.1	−9.2 / −11.1	–	−9.4 / −13.3
Figure #	13	14	15	16

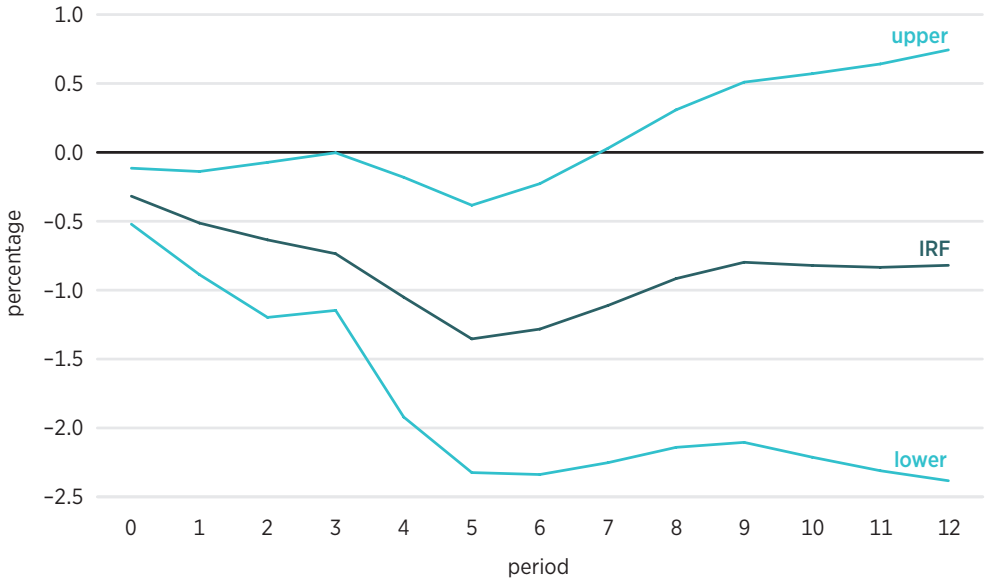
Note: EPU = economic policy uncertainty, TPU = trade policy uncertainty, EEPU = European economic policy uncertainty, GEPU = global economic policy uncertainty. "Periods" indicates the periods when the impulse response function value is statistically significant. "Impact" indicates the range of the negative values of statistically significant impulse response function estimates, measured as percentages. "Figure #" indicates the impulse response function graph's number. A dash indicates there are no statistically significant results.

FIGURE 5. IMPULSE RESPONSE OF IMPORTS TO ECONOMIC POLICY UNCERTAINTY



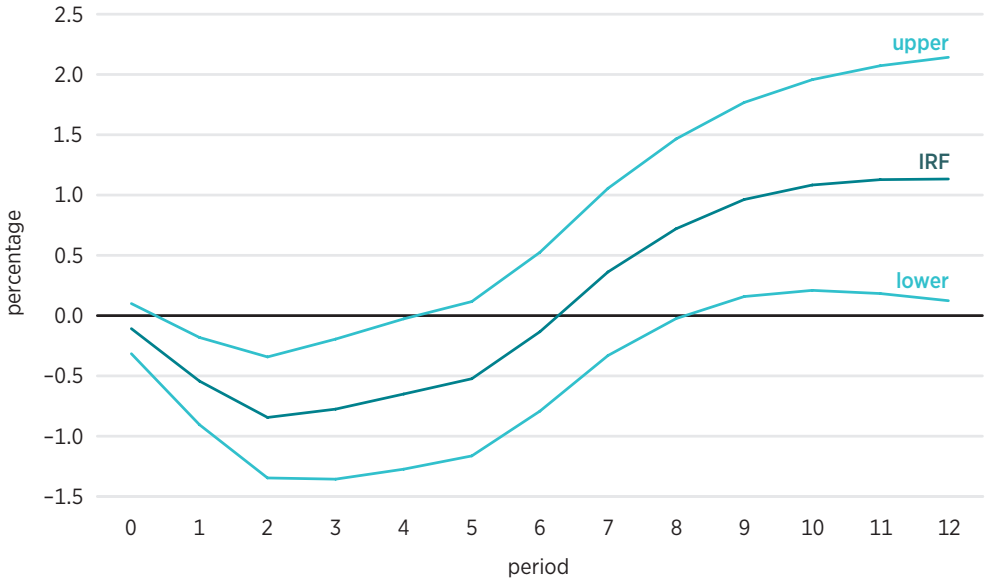
Note: IRF = impulse response function. Upper and lower bounds show a 90 percent confidence interval.
Source: Author calculations.

FIGURE 6. IMPULSE RESPONSE OF IMPORTS TO TRADE POLICY UNCERTAINTY



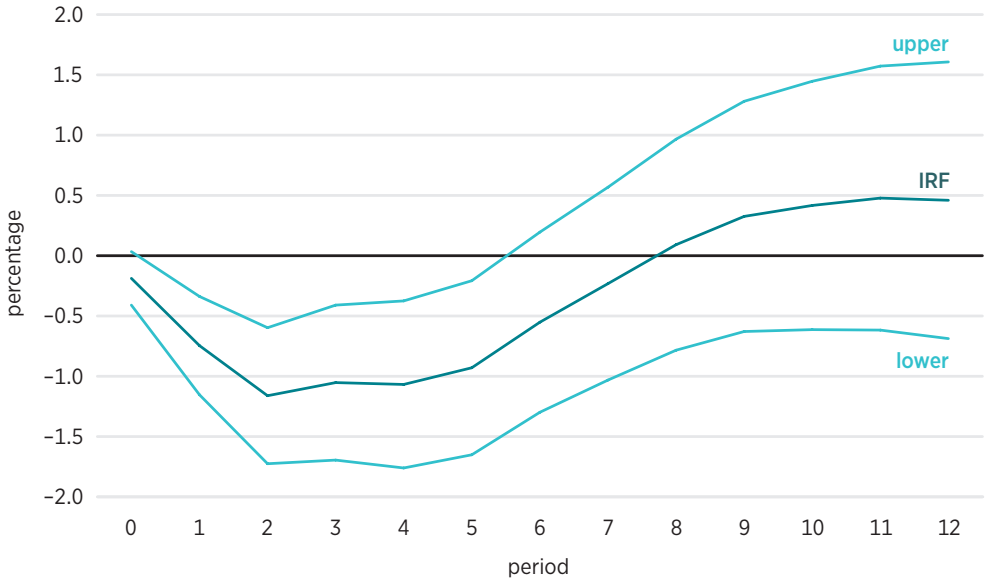
Note: IRF = impulse response function. Upper and lower bounds show a 90 percent confidence interval.
Source: Author calculations.

FIGURE 7. IMPULSE RESPONSE OF IMPORTS TO EUROPEAN ECONOMIC POLICY UNCERTAINTY



Note: IRF = impulse response function. Upper and lower bounds show a 90 percent confidence interval.
Source: Author calculations.

FIGURE 8. IMPULSE RESPONSE OF IMPORTS TO GLOBAL ECONOMIC POLICY UNCERTAINTY



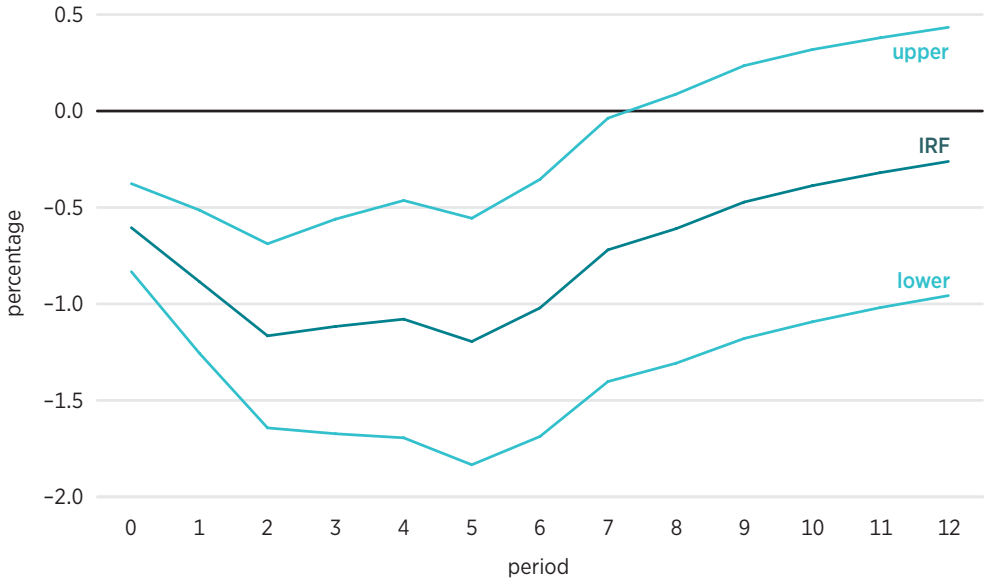
Note: IRF = impulse response function. Upper and lower bounds show a 90 percent confidence interval.
Source: Author calculations.

Panel B of table 1 summarizes the response of exports to an increase in one of the four different measures of policy uncertainty. Figures 9 through 12 show that higher levels of EPU in the United States significantly reduce exports for up to seven periods after the shock. This result is comparable in value to the import results. Using data from the first quarter of 2019, the largest decline of −1.20 percent would result in a $7.5 billion decline in exports. Increases in TPU also significantly decrease exports. Higher levels of policy uncertainty abroad (EEPU, GEPU) significantly lower exports for up to five periods. The magnitude ranges from −0.23 percent to −0.96 percent.

The maximum values are lower than the impact higher levels of US policy uncertainty had on exports. The decline in exports resulting from higher foreign economic policy is to be expected. Elevated levels of policy uncertainty in foreign markets lead to concerns that tariffs abroad may rise. Under these conditions, US exporters reduce or slow expansion into foreign markets, leading to a decline in exported goods.

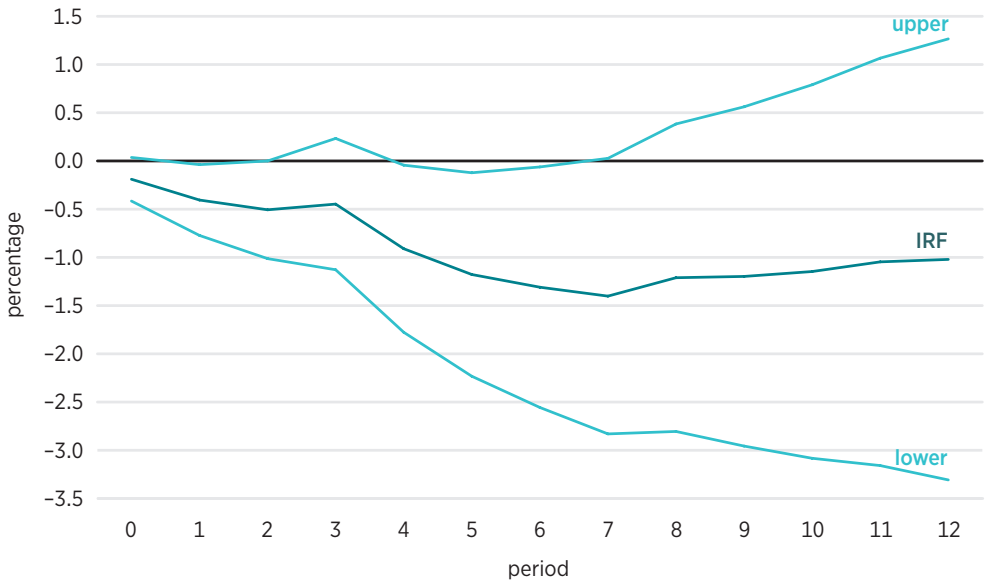
Panel C of table 1 summarizes the response of FDI to an increase in one of the various measures of policy uncertainty. Figures 13 through 16 show that both EPU and TPU increase the variability of foreign direct investment. The impact

FIGURE 9. IMPULSE RESPONSE OF EXPORTS TO ECONOMIC POLICY UNCERTAINTY



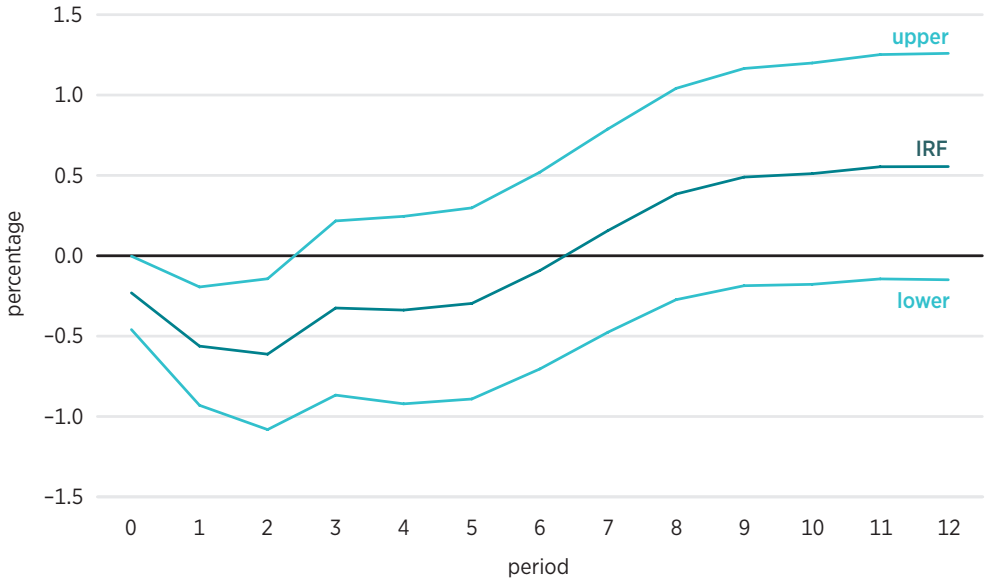
Note: IRF = impulse response function. Upper and lower bounds show a 90 percent confidence interval.
Source: Author calculations.

FIGURE 10. IMPULSE RESPONSE OF EXPORTS TO TRADE POLICY UNCERTAINTY



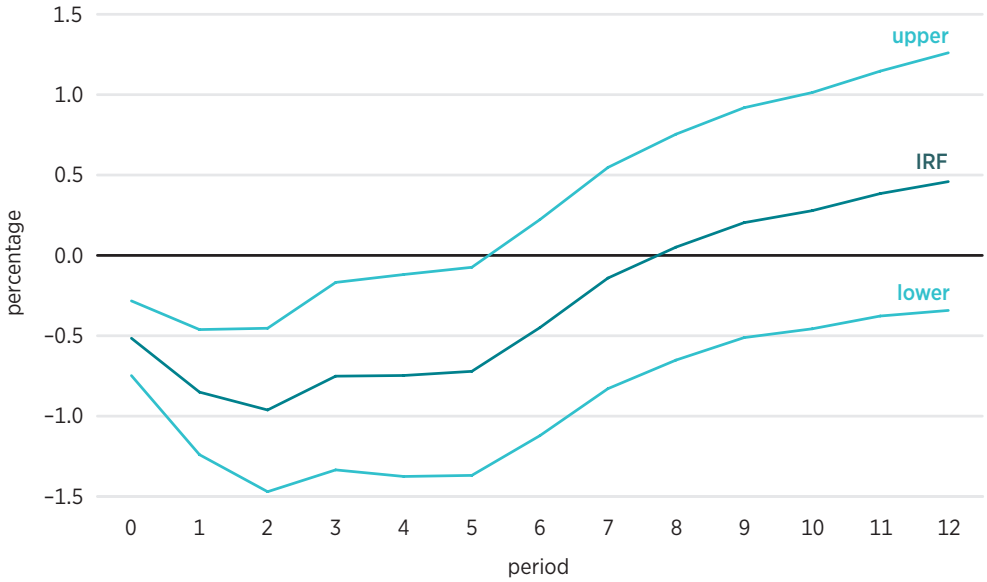
Note: IRF = impulse response function. Upper and lower bounds show a 90 percent confidence interval.
Source: Author calculations.

FIGURE 11. IMPULSE RESPONSE OF EXPORTS TO EUROPEAN ECONOMIC POLICY UNCERTAINTY



Note: IRF = impulse response function. Upper and lower bounds show a 90 percent confidence interval.
Source: Author calculations.

FIGURE 12. IMPULSE RESPONSE OF EXPORTS TO GLOBAL ECONOMIC POLICY UNCERTAINTY



Note: IRF = impulse response function. Upper and lower bounds show a 90 percent confidence interval.
Source: Author calculations.

can be large and significant up to seven periods after the shock. The largest drop reaches about 13 percent following an EPU shock, which is larger than the almost 9 percent drop I reported in my 2018 paper.[35] Using data from the fourth quarter of 2018, this would result in a $ 53.4 billion decline in foreign direct investment inflows following the policy uncertainty shock.

The impact on imports and exports is more persistent. Although the increase in policy uncertainty abroad as measured by EEPU does not have a significant impact on investment inflows, it also increases their variability. However, the broader GEPU measure does significantly reduce FDI inflows by about 9 to 13 percent. Variability also increases as a result of the shock. Over time, the impact turns positive, suggesting that higher levels of policy uncertainty abroad can increase investment inflows into the United States.[36]

These results show that increases in policy uncertainty both in the United States and overseas depress trade and investment flows.

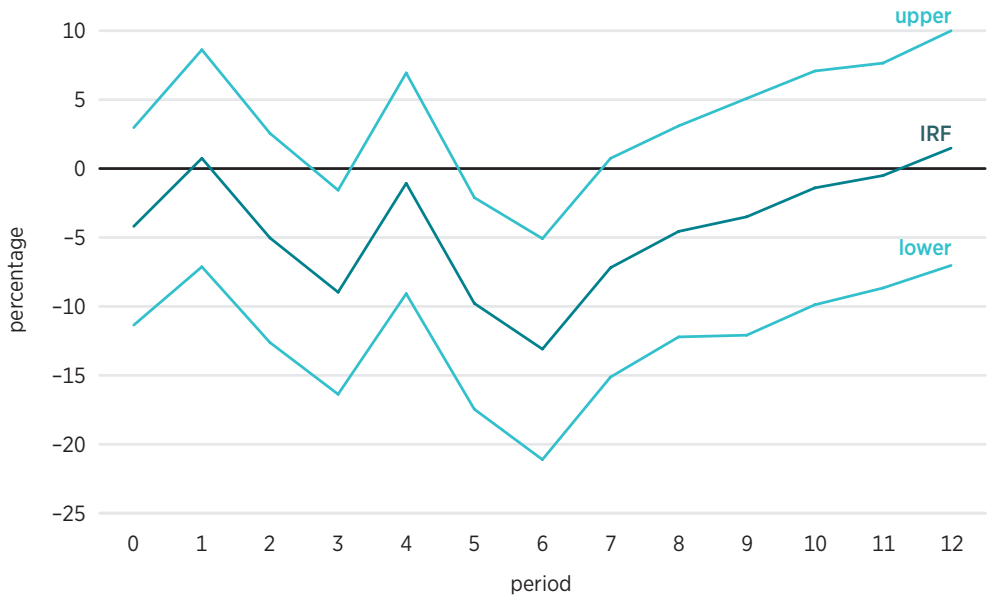
POLICY CONCLUSIONS

This paper examines the impact of policy uncertainty in the United States and abroad on US imports, exports, and foreign direct investment inflows. Using alternative measures of policy uncertainty, I find that higher levels of policy uncertainty at home tend to depress all three measures of international commerce.

It is well established that higher tariffs and controls on international investment flows are costly to an economy.[37] There is the direct deadweight loss that results from the inefficiencies created by these restrictions. The higher costs

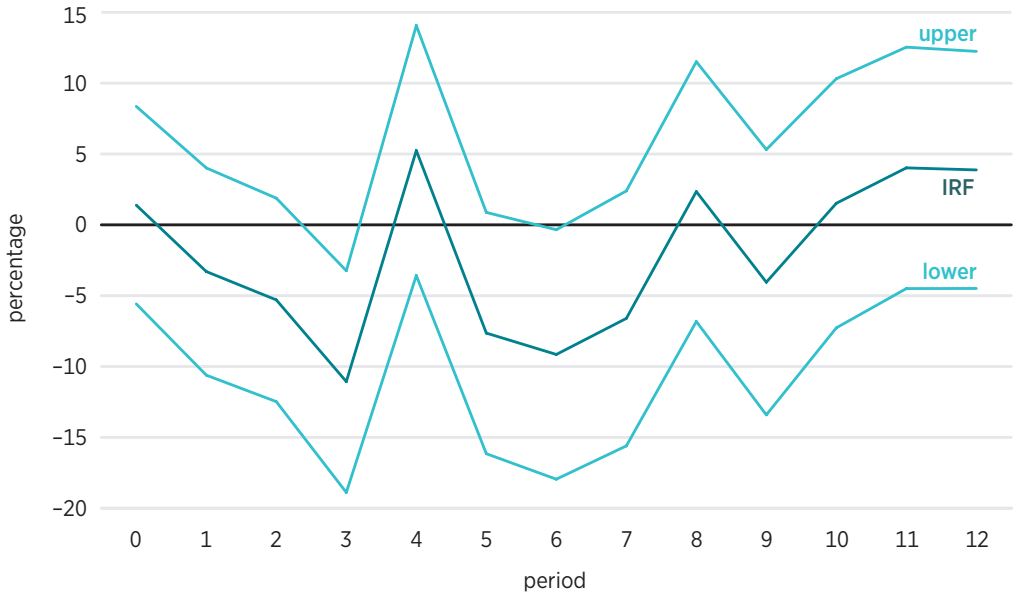
35. Krol, "Does Uncertainty over Economic Policy Harm Trade?"
36. All the results are similar when I use the alternative measure of general economic uncertainty developed by Jurado, Ludvigson, and Ng. Their approach measures general economic uncertainty as "the conditional volatility of the purely unforecastable component of the future value of a series" (Jurado, Ludvigson, and Ng, "Measuring Uncertainty," 1178). Each series represents a different macroeconomic variable used in the calculation. The time-varying volatility of forecast errors of macroeconomic variables serve as a measure of economic uncertainty. Also, how sensitive are the results to the policies of the Trump presidency? If I end the sample in the fourth quarter of 2016, before the Trump administration began, the results hold—except for the impact of TPU on imports and exports, which remains negative but not significant. Since most of the volatility in the index occurs during the years of the Trump administration, and to a lesser degree during the NAFTA negotiations, this loss of significance may suggest that the full-sample results are tied to the Trump years.
37. See, for example, Mary Amiti, Stephen J. Redding, and David Weinstein, "The Impact of the 2018 Trade War on U.S. Prices and Welfare" (NBER Working Paper No. 25672, National Bureau of Economic Research, Cambridge, MA, 2019); Robert Krol, "Cross-Country Evidence on Capital Account Liberalization and Economic Growth," *Global Economy Quarterly*, January–March 2001.

FIGURE 13. IMPULSE RESPONSE OF FOREIGN DIRECT INVESTMENT INFLOWS TO ECONOMIC POLICY UNCERTAINTY



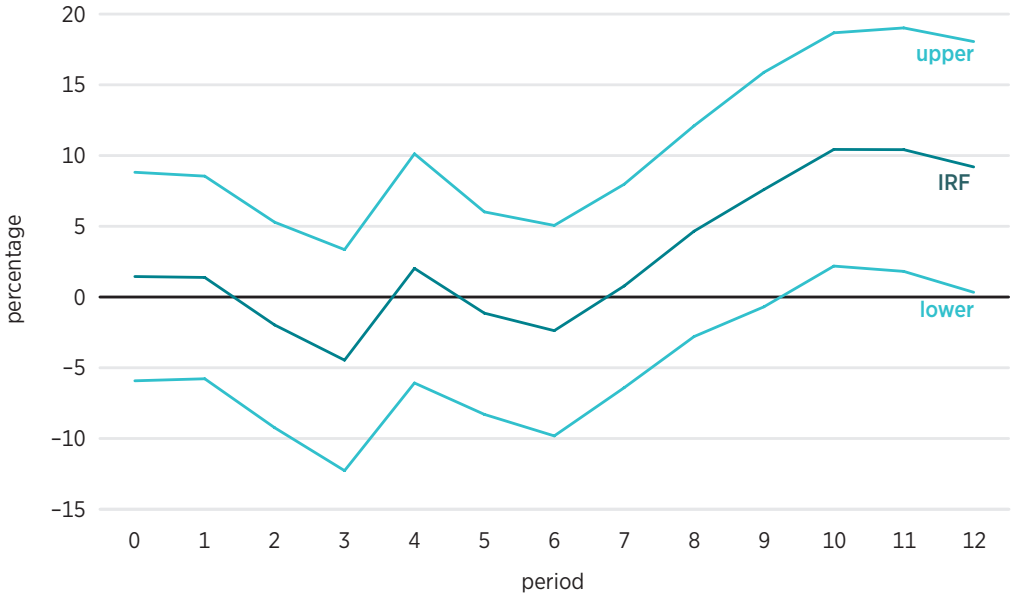
Note: IRF = impulse response function. Upper and lower bounds show a 90 percent confidence interval.
Source: Author calculations.

FIGURE 14. IMPULSE RESPONSE OF FOREIGN DIRECT INVESTMENT INFLOWS TO TRADE POLICY UNCERTAINTY



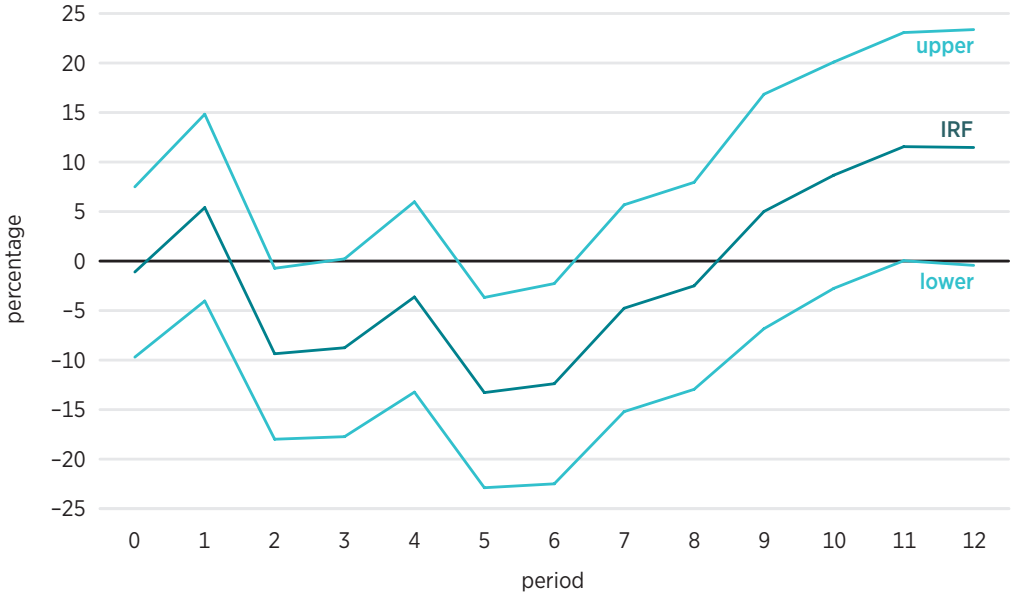
Note: IRF = impulse response function. Upper and lower bounds show a 90 percent confidence interval.
Source: Author calculations.

FIGURE 15. IMPULSE RESPONSE OF FOREIGN DIRECT INVESTMENT INFLOWS TO EUROPEAN ECONOMIC POLICY UNCERTAINTY



Note: IRF = impulse response function. Upper and lower bounds show a 90 percent confidence interval.
Source: Author calculations.

FIGURE 16. IMPULSE RESPONSE OF FOREIGN DIRECT INVESTMENT INFLOWS TO GLOBAL ECONOMIC POLICY UNCERTAINTY



Note: IRF = impulse response function. Upper and lower bounds show a 90 percent confidence interval.
Source: Author calculations.

and inefficiency ultimately slow economic growth. The market shares of less efficient firms remain stable and reduced competition from abroad weakens the incentive to invest in innovation.[38]

The results presented in this paper suggest there is another avenue by which economic and trade policies can harm an economy. Uncertainty over trade policies has a negative impact on the international flow of goods, services, and investment, even before these policies are implemented. The resulting decline in international commerce caused by EPU and TPU reduces the quantity and variety of goods and services available to consumers and businesses in the United States. Declines in direct foreign investment into the United States reduce job opportunities for American workers, slow the growth of the capital formation, and put a damper on innovation.[39] Economic prosperity is negatively impacted.

US politicians would better serve their constituents by returning to trade policies that are *clearly* directed at promoting open global commerce and financial markets. International trade is a positive-sum game that benefits both the United States and its trading partners. This approach has served the United States well during the post–World War II period. Economists Gary Hufbauer and Zhiyao Lu estimate that US real GDP per person is $7,014 higher (in 2016 dollars) as a result of the opening of trade since the end of World War II.[40] However, policymakers must also consider the distribution effects of trade. Because lower-income individuals consume disproportionately more imported goods, trade has been very beneficial to these consumers.[41]

---

38. Impullitti and Licandro, "Trade, Firm Selection, and Innovation"; Andrew B. Bernard et al., "The Empirics of Firm Heterogeneity and International Trade," *Annual Review of Economics* 4 (2012): 283–313; Nicholas Bloom, Mirko Draca, and John Van Reenen, "Trade Induced Technical Change: The Impact of Chinese Imports on Innovation, Diffusion, and Productivity," *Review of Economic Studies* 83, no. 1 (2016): 87–117.
39. Daniel J. Ikenson, "The Economic Bedrock of Foreign Direct Investment," *Forbes*, October 17, 2018.
40. Gary Hufbauer and Zhiyao Lu, "The Payoff to America from Globalization: A Fresh Look with a Focus on Costs to Workers" (Policy Brief, Peterson Institute for International Economics, Washington, DC, 2017).
41. Tyler Moran, "Tariffs Hit Poor Americans Hardest," Peterson Institute for International Economics, July 31, 2014.

APPENDIX: MODEL SETUP

This paper examines the dynamic relationship between five variables—policy uncertainty; the VIX; the real exchange rate; the real GDP; and one of the following: imports, exports, or foreign direct investment inflows—in a VAR. The VAR contains five equations, one for each variable in the model. Each equation contains lagged values of itself and of the other four variables in the model. Because each variable is predetermined, known at time *t*, each equation can be consistently estimated using ordinary least squares.[42] Each variable in the model is the level of its logarithmic value[43] and is lagged five periods to ensure that each equation's residual has no autocorrelation. The fifth lag removes any remaining seasonality in the data. Lag length selection methods are not used because the tendency to choose too few lags is well known.[44] With samples ranging from 52 to 62, additional lags can cause an overfitting problem (too few degrees of freedom), which lowers the quality of estimates. Lag lengths of around one year or even less are common in the macroeconomic VAR literature.

The results of the estimated model are presented as impulse response functions. The impulse response function shows how a variable in the model responds over time to a one standard deviation change in policy uncertainty. To get the impulse response function, the autoregressive form of the VAR is inverted to get its equivalent moving average representation. To identify the impulse response function, one must ensure that each variable change or shock that starts the impulse response is independent of the other disturbance terms in the model. That is accomplished using a standard Cholesky (or recursive) decomposition.[45] The variable order is policy uncertainty, VIX, real exchange rate, real GDP, and one of the following: imports, exports, or foreign direct investment inflows.

The 90 percent confidence bands are calculated using Stata. The 90 percent confidence intervals are calculated as the impulse response point estimate for a period plus or minus 1.64 multiplied by the asymptotic standard error.[46]

42. See Sims, "Macroeconomics and Reality."
43. See Christopher Sims, "Using a Likelihood Perspective to Sharpen Econometric Discourse: Three Examples," *Journal of Econometrics* 95, no. 2 (2000): 1–20.
44. See Thomas A. Doan, "RATS Handbook for Vector Autoregressions" (working paper, February 5, 2010), https://hhstokes.people.uic.edu/ftp/e538/VAR_Material/VAR%20Workbook.pdf.
45. See Sims, "Macroeconomics and Reality."
46. See Stata, *Base Reference Manual*, release 15 (College Station, TX: Stata Press, 2017), 304–7; and Helmut Lütkepohl, *New Introduction to Multiple Time Series Analysis* (New York: Springer, 2005), sec. 3.7.

ABOUT THE AUTHOR

Robert Krol is an emeritus professor of economics at California State University, Northridge; a senior affiliated scholar at the Mercatus Center at George Mason University; and a member of the Heartland Institute's board of policy advisers. He also worked as an economist at Security Pacific National Bank in Los Angeles and the Milken Institute in Santa Monica, California. He received his PhD in economics from Southern Illinois University, Carbondale in 1982. His current research focuses on regulation, transportation infrastructure issues, international trade and investment, and the impact of economic policy uncertainty on the economy. His research has been published in leading economics journals, including the *Review of Economics and Statistics*, *Journal of Econometrics*, *Journal of Urban Economics*, *Regional Science and Urban Economics*, *International Finance*, and *Journal of International Money and Finance*. He has published policy papers for the Cato Institute, the Center for Growth & Opportunity at Utah State University, and the Mercatus Center. He has also published opinion articles in the *Los Angeles Times*, the *Washington Times*, the *Cleveland Plain Dealer*, *Investor's Business Daily*, *U.S. News & World Report*, *The Hill*, *Real Clear Markets*, *Real Clear Policy*, *economics21*, and *National Review Online*.

ABOUT THE MERCATUS CENTER AT GEORGE MASON UNIVERSITY

The Mercatus Center at George Mason University is the world's premier university source for market-oriented ideas—bridging the gap between academic ideas and real-world problems.

A university-based research center, Mercatus advances knowledge about how markets work to improve people's lives by training graduate students, conducting research, and applying economics to offer solutions to society's most pressing problems.

Our mission is to generate knowledge and understanding of the institutions that affect the freedom to prosper and to find sustainable solutions that overcome the barriers preventing individuals from living free, prosperous, and peaceful lives.

Founded in 1980, the Mercatus Center is located on George Mason University's Arlington and Fairfax campuses.