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Trade Uncertainty and Investment in the Euro Area

by Christian Ebeke and Jesse Siminitz

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Trade Uncertainty and Investment in the Euro Area[1]

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Abstract

We analyze the impact of trade policy uncertainty on investment in the euro area. Our identification strategy assumes that countries that are relatively more dependent on global trade networks exhibit a higher sensitivity of investment with respect to trade uncertainty. We find that the investment-to-GDP ratio is on average 0.8 percentage points lower for five quarters following a one standard deviation increase in the level of trade uncertainty. We demonstrate that these results are unlikely to be driven by omitted variables and that they are robust to different measures of trade uncertainty and trade openness. Our analysis suggests that the detrimental effect of trade tensions goes beyond lower trade growth, as uncertainty can reduce investment and the economy's long-term growth potential.

JEL Classification Numbers: F13; D25; D81

Keywords: trade tensions, uncertainty, trade openness, investment, euro area

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[1] We are grateful to Sandile Hlatshwayo (IMF), Isabelle Mateos y Lago and Kemin Yang (both from BlackRock) for sharing datasets on trade uncertainty and global trade tensions. We also thank Shekhar Aiyar, Bergljot Barkbu, Enrica Detragiache, Laura Papi, Carlos Granados, Faezeh Raei, Huidom Raju, Emil Stavrev, Philippe Wingender, and staff at the European Commission and the European Central Bank for their valuable comments and suggestions. Christine Rubio provided outstanding editorial assistance.

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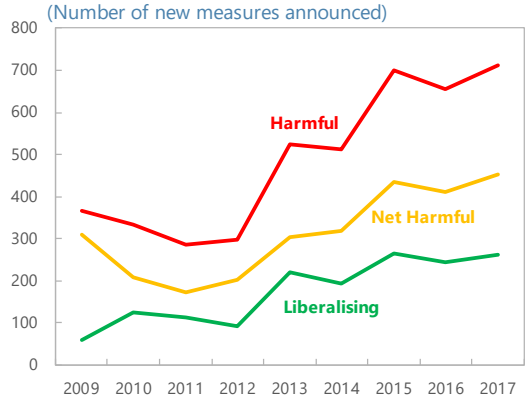
I. INTRODUCTION

Since early 2018, a sequence of tariff actions by the U.S. and retaliation by affected countries have put the spotlight on increasing trade protectionism globally. Although global growth has remained solid despite the increasing trade tensions, trade growth is slowing, and sentiment indicators have softened, suggesting that higher trade barriers will likely take a toll on growth.

The recent trade tensions follow a gradual rise in protectionism. The number of new sovereign measures restricting global trade has increased over the past decade, while there have been relatively fewer measures favoring trade liberalization. For euro area countries, the number of harmful measures implemented or announced by its trading partners has also been on the rise, potentially increasing trade costs for exporters and businesses.

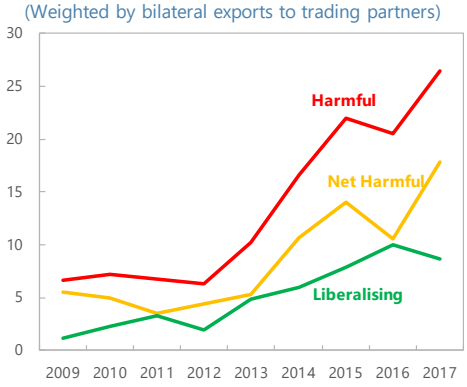
Protectionism is on the Rise

Number of harmful measures is rising rapidly…



Source: Global Trade Alert.
Notes: Data have been adjusted for reporting lags. The cut-off date in each year is 31 December.

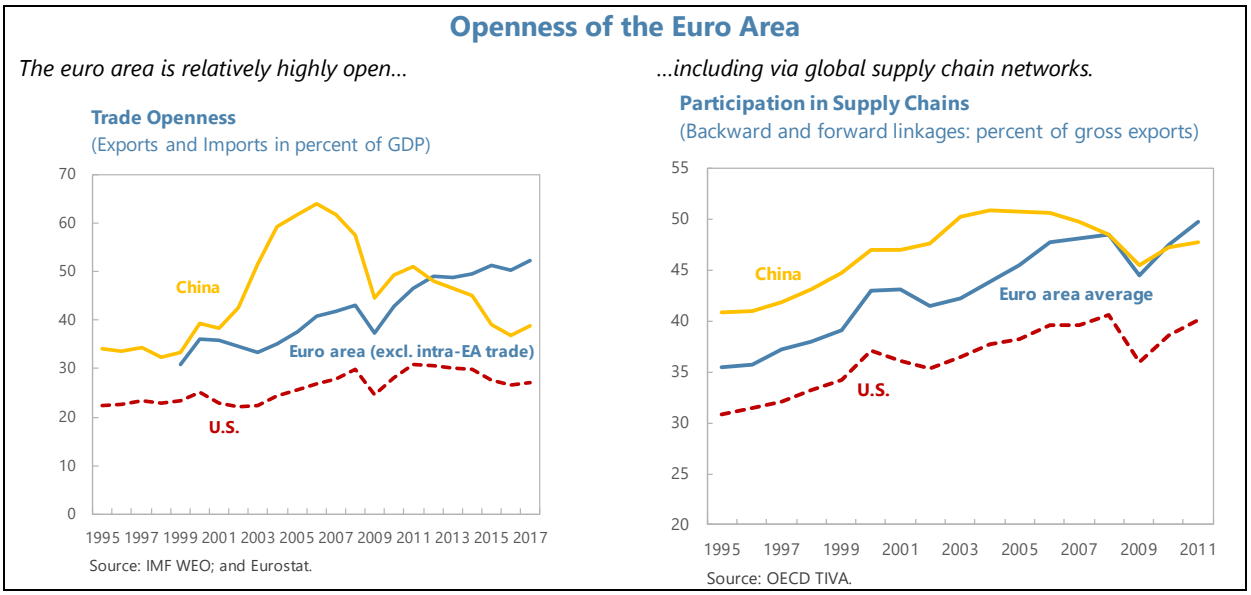
…affecting euro area countries.



Sources: Global Trade Alert, OECD stat, and IMF staff estimates.
Note: Data have been adjusted for reporting lags. The cut-off date in each year is 31 December. Assumes no trade barriers implemented between countries with free trade agreements.

Higher trade costs have a direct impact on growth by lowering trade through distortions. The size and direction of the effects depend on a number of factors, such as substitutability of goods and adjustment costs. The euro area could become particularly exposed to trade distortions due to its high degree of trade openness, its dependency upon manufacturing exports (it accounts for one-third of world's manufacturing exports), and its considerable participation in global supply chains.

Moreover, trade measures and threats have led to uncertainty about future trade policy, which could also dent growth through reduced business confidence and lower investment. Statistics that track the public's and market's attention to trade, show an increase in the relative frequency of newspaper articles, analyst reports, and tweets focused on trade risks and trade uncertainty.



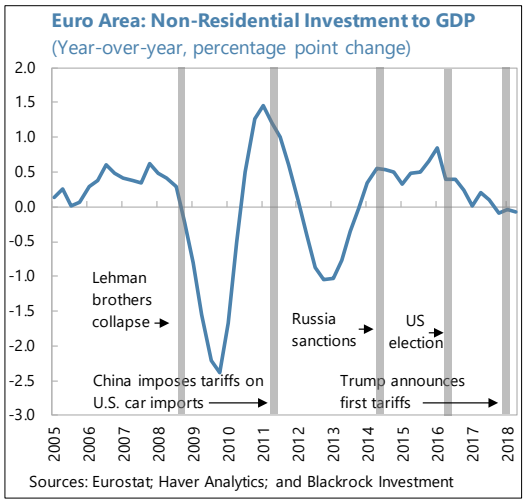
Theoretically, there are various channels through which trade uncertainty can affect business investment decisions. First, heightened global trade uncertainty can "delay" the investment decisions and investment choices of the firm until the uncertainty has dissipated. It is possible to posit that the information asymmetry faced by a firm about global or external market conditions is perhaps higher than when uncertainty is of a domestic nature only. This implies that global trade uncertainty would have larger impacts on firms that face higher investment irreversibility. Similarly, domestic firms that participate heavily in global supply chains might be more sensitive to global uncertainty shocks than to conditions domestically or the in the primary destination of their exports.

There is an extensive empirical macro literature documenting the negative effect of macroeconomic and trade uncertainty, more broadly, on private investment in advanced economies (see Bloom, 2014, for a useful survey). For example, Handley and Limão (2015) find that when Portugal joined the European Community in 1986, the reduction in uncertainty accounted for a substantial rise in firm investment spending. The micro evidence is also substantial. For example, Leahy and Whited (1996) examined a panel of several hundred U.S. publicly listed manufacturing firms and found a strong relationship between uncertainty, proxied by firm stock-price volatility, and investment, which they argue is consistent with theories focusing on the irreversibility of investment decisions. Bloom et al. (2007) confirmed this result with data for 672 U.K. manufacturing firms from 1972–91. Similarly, Guiso and Parigi (1999) used a 1993 survey of Italian firms and found a large negative relationship between uncertainty and investment.

Studies focusing on the euro area also find a strong and statistically significant negative relationship between macroeconomic uncertainty and investment. Meinen and Roehe (2017) used various uncertainty proxies to document pronounced negative investment responses to uncertainty shocks in the euro area. Similar findings are also described by Gieseck and Largent (2016) for the period 1999–2015.

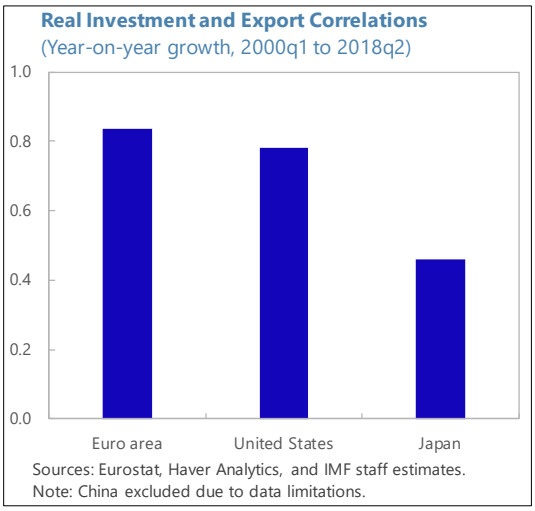
In a similar vein, the IMF's *World Economic Outlook* (2018) looked at the impact of rising trade tensions on investment in the U.S. using the Baker et al. (2016)'s overall "Economic Policy Uncertainty" index. The study finds that a one standard deviation increase in the economic uncertainty measure (which is roughly 1/6 of the change that occurred during the Global Financial Crisis) leads to an estimated 1 percent drop in the level of investment in the U.S. within one year (which corresponds to decline in the investment-to-GDP ratio of about 0.2 percentage points of GDP). Using the estimated impact of uncertainty on investment in the U.S., the authors measured the effect of uncertainty in other countries by scaling the decline in investment by countries' trade openness compared to the U.S.—hence, countries more dependent on trade were assumed to see a larger fall in investment than the U.S.

Our paper complements this previous literature on the investment-uncertainty nexus in several ways. First, it quantifies the impact of global trade uncertainty on investment in the euro area in a dynamic way, tracing the impact over several quarters after the occurrence of an uncertainty shock. This is an important contribution as it will help disentangle for how long a trade uncertainty shock remains significant in explaining investment dynamics.



Second, our study focuses on a narrower definition of uncertainty which is specific to international trade given the focus of this paper. Doing so has the advantage of allowing us to precisely dissect the effect of a specific source of uncertainty on investment instead of relying on a synthetic measure of economic uncertainty that encompasses various dimensions and hence very difficult to interpret. Having said that, restricting the analysis to a specific dimension of uncertainty is not without the same measurement challenges that also apply to other forms of economic uncertainty.

Third, we propose an identification strategy that takes into account countries' exposures to global trade. We do not simply examine to what extent global trade uncertainty deters investment in the euro area, but also by how much this effect varies according to the degree of trade openness or participation in supply chains, after attempting to control for other types of global shocks or uncertainty measures.



Our main assumption is that an increase in global trade uncertainty is likely to weigh more on investment in those countries that are more dependent on global trade. Our identification strategy therefore assumes that the responsiveness of investment to trade uncertainty depends on the degree of trade openness of countries (or participation in global supply

chains). This framework is applied to a large sample of euro area countries observed over the end 1990s until 2018Q2. To trace the impact of trade uncertainty on investment over time, the paper uses the Local Projections methodology (Jorda, 2005), which can identify the associated impulse response functions of the investment ratio following a trade uncertainty shock.

One limitation from the proposed empirical set up is that average effects of trade uncertainty on investment cannot be easily traced directly. This arises because the key parameter of interest in the model is associated with an interaction term of the trade uncertainty index weighted by a country's degree of trade openness—after controlling for other global shocks. The immediate implication is that we can only measure "treatment effects" at various levels of trade openness. In other words, we would start with the assumption that a spike in global trade uncertainty has no statistical effect on domestic investment in situation of autarky. Then, we assume that the marginal negative effect of trade uncertainty rises with the degree of trade openness of a country. Hence, for a given fixed level of trade openness of a given country, a sudden increase in global trade uncertainty will reduce the investment-to-GDP ratio several quarters after the shocks, proportionally to the degree of trade openness of this country.

We find that trade uncertainty has a negative impact on investment, an impact which stays significant for about a year. In terms of magnitude, the investment-to-GDP ratio is 0.8 percentage points lower for four to five quarters following a standard deviation increase in the level of trade uncertainty in a median trade openness regime (e.g., in countries such as Germany). When trade openness is very high (e.g., Ireland, Netherlands), the decline in the investment-to-GDP ratio can reach 1.6 percentage points in the fifth year following the uncertainty shock, before becoming statistically indistinguishable from zero. These results are robust to the presence of various control variables, other global shocks, various uncertainty measures, and alternative measures of trade openness that focus on supply chain links.

II. Identifying the Effects of Trade Uncertainty on Investment

Our objective is to quantify by how much the investment ratio would change following a sudden increase in trade-related uncertainty. We first discuss the empirical approach to identifying the effects of trade uncertainty on investment, including a discussion of the econometric challenges that we need to address. Then, we consider how to measure trade uncertainty. Finally, we discuss the magnitude of the estimated impact and its plausibility.

A. The Econometric Approach

The econometric approach is designed to address several challenges:

- Uncertainty shocks affect macroeconomic variables in a dynamic way. The size and persistence of the effects can depend on the severity of the shocks and the mechanics of the transmission channel.

- The relationship between trade uncertainty and investment may be non-linear and depend on trade openness.

- Trade uncertainty needs to be measured adequately and should not be confounded with implemented trade policy actions or any other policy or geopolitical shocks.

To quantify the dynamic effects of trade uncertainty on the investment-to-GDP ratio, we utilize the Local Projection (LP) method (Jorda, 2005). This method is now very standard in the literature when examining the impact of shocks on macroeconomic variables. A key advantage of the LP technique is its flexibility. LP accommodates nonlinear or state-dependent impacts easily, allowing us to investigate whether the effects of trade uncertainty can vary depending on the degree of trade openness.

The baseline estimation aims to measure the time-varying correlation between our measure of trade uncertainty and changes in the non-residential investment-to-GDP ratio, while controlling for basic determinants, cyclical conditions, country fixed effects and quarterly fixed effects. More formally, the LP baseline specification is as follows:

$$y_{i,t+h} = u_i + \lambda_t + \theta_h\left(U_t \times O_{it-q}\right) + \psi_h(L)y_{i,t+h-1} + X'_{i,t}\Gamma_h + \epsilon_{i,t+h} \quad [1]$$

where $y_{i,t+h} = I_{i,t+h} - I_{i,t-1}$, and I_{it} is the non-residential gross fixed capital formation divided by GDP in country *i* observed at quarter *t*. The model is estimated at each horizon $h = 0, 1, \ldots, H$.

U is the logarithmic measure of global trade uncertainty (more details below) common to all countries.[2] *O* is the standard measure of trade openness (exports plus imports of goods and services normalized by GDP), specific to each country and averaged over several quarters to avoid contamination by contemporaneous levels of trade uncertainty or investment. *X* is a matrix of control variables, considered in the literature to be the standard determinants of the private investment ratio, including the trade openness variable O_{it-q}.

The coefficients of interest are $\theta_h O_{it-q}$, which measure the *conditional* impacts of trade uncertainty, for a given degree of trade openness, on the changes in the investment ratio at each horizon starting in year $h = 0$. At each horizon, and for a given level of trade openness, the coefficient represents the trade uncertainty-induced deviation of the investment-to-GDP ratio with respect to its level prior to the uncertainty shock. The models are estimated using a sample of euro area countries (see Appendix) observed over the period 1998Q1 to 2018Q2. The reliance of quarterly data in this macro setting allows us to trace the impact of uncertainty on the investment rate over time. This would have been difficult to do as firm-level data are usually available only at an annual frequency. The choice of this econometric specification deserves further explanation:

- *Country and time-fixed effects*: To control for time-invariant unobservable characteristics at the country level (such as proximity to global trade centers, importance of large firms versus smaller companies, etc.), the model includes country-fixed effects, u_i. The presence of country-fixed effects implies that the regression coefficients of

[2] All uncertainty measures in the paper are rescaled to be comprised between 0 and 100, before applying the natural log transformation (ln(1+*u*)).

interest can be interpreted as the within-country reaction of the investment rate to global trade uncertainty at each given level of trade openness. Country-fixed effects also help control for the fact that more open euro area countries (e.g., Ireland, the Netherlands) generally have higher investment ratios. In addition, the model also includes the full set of quarter (time) fixed effects, λ_t. The latter are crucial for the identification strategy. Indeed, the time-fixed effects absorb and control for any time-varying but common factors to all countries in the model (e.g., rising protectionist measures worldwide, geopolitical global shocks, oil prices, global financial crisis, global market risk aversion, etc.). This ensures that the interactive variable of interest $U_t \times O_{it-q}$ truly captures the effect of trade uncertainty and not the effects of any other global shock that might be correlated with trade uncertainty.

- *The interaction term,* $U_t \times O_{it-q}$: This is the crux of our identification strategy. We exploit the uncertainty variation at the time level (the uncertainty shock is common to all countries but specific to each quarter) and at the country-time level, via the lagged trade openness variable, O_{it-q}. By construction, we therefore assume that the marginal effect of trade uncertainty on investment (at each horizon), $\theta_h O_{it-q}$, is conditional on the initial level of trade openness of the country O_{it-q}. To further ensure that this multiplicative variable identifies the combined effect of trade uncertainty and trade openness on investment, the model controls for the lagged trade openness additively in the matrix *X*. Trade openness is measured as the average of exports and imports in percent of GDP averaged over the past 16 quarters (four years), to reduce any contamination of from contemporaneous levels of trade uncertainty or investment rate to our lagged trade openness variable.

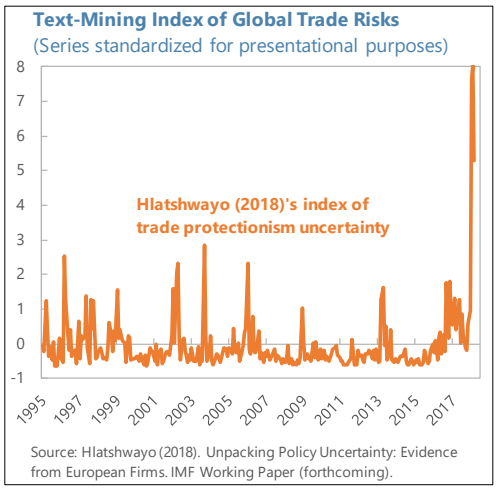
- *Other control variables*: We include additional explanatory variables to reinforce our identification of the impact of uncertainty on investment. These variables include: the lagged level of trade openness (which can also proxy for aggregate volatility), quarterly real GDP growth (including five lags), corporate bond spreads, domestic lending rates, 10-year sovereign bond yields, and five lags of the change in the investment ratio to sufficiently take into account the internal dynamic of the investment rate. The rich set of control variables helps account for the effects of structural, cyclical, and financial variables on investment.

- *Limitations*: One limitation from the proposed empirical set up is that average effects of trade uncertainty on investment cannot be easily traced directly. This arises because the key parameter of interest in the model is associated with an interaction term of the trade uncertainty index weighted by a country's degree of trade openness—after controlling for other global shocks. The immediate implication is that we can only measure "treatment effects" at various levels of trade openness. In other words, we would start with the assumption that a spike in global trade uncertainty has no statistical effect on domestic investment in situation of autarky. Then, we assume that the marginal negative effect of trade uncertainty rises with the degree of trade openness of a country. Hence, for a given fixed level of trade openness of a given country, a sudden increase in global trade uncertainty will reduce the investment-to-GDP ratio several quarters after the shocks, proportionally to the degree of trade openness of this country.

B. Measuring Trade Uncertainty Using Text-Mining Techniques

Uncertainty is admittedly difficult to measure, and this is no different when considering trade policy uncertainty. We remain convinced in the merits of text-mining techniques over other forms of model-driven uncertainty measures, which can be derived from hard data.

The trade uncertainty variable is created by Hlatshwayo (2018) and aggregates references to trade protectionism in newspapers.[3] The measure counts articles that meet a four-part metric: (1) the name or demonym of a country must come within eight words of a trade-policy related term; (2) within eight words of an uncertainty-related term; (3) cannot mention declines in uncertainty, references to alternative policies, or equity-market volatility; and (4) should be over 99 words to avoid ticker articles. For instance, the algorithm includes trade-policy terms such as trade war, trade barrier, and protectionism. The index is normalized by broader country news coverage over time and ranges between 0 and 100.



To ensure that the trade uncertainty measure is not merely a proxy for other types of policy uncertainty, the search algorithm rejects articles that mention other types of uncertainty (e.g., the trade protectionism policy uncertainty's algorithm picks up articles that meet the protectionism search terms, but excludes articles related to fiscal or monetary policy search terms).

We construct a broader measure of trade uncertainty by aggregating trade uncertainty of the EU, the U.S., China, and the U.K. as a proxy for generalized trade uncertainty. The aggregation is performed using the principal component analysis (PCA) and the first principal component (which explains 65 percent of the overall variance) is retained as the global measure of generalized trade protectionism uncertainty and indexed between 0 and 100. We finally converted the index into natural log (ln (1 + u)) to smooth out the effects of very large spikes (see Baker et al., 2016). Indeed, trade uncertainty has increased since the first quarter of 2017 by around 1.4 log points and this corresponds to an increase of about 300 percent = $100 \times (e^{1.4} - 1)$. This is two times a typical standard deviation shock of the trade uncertainty measure in the sample.

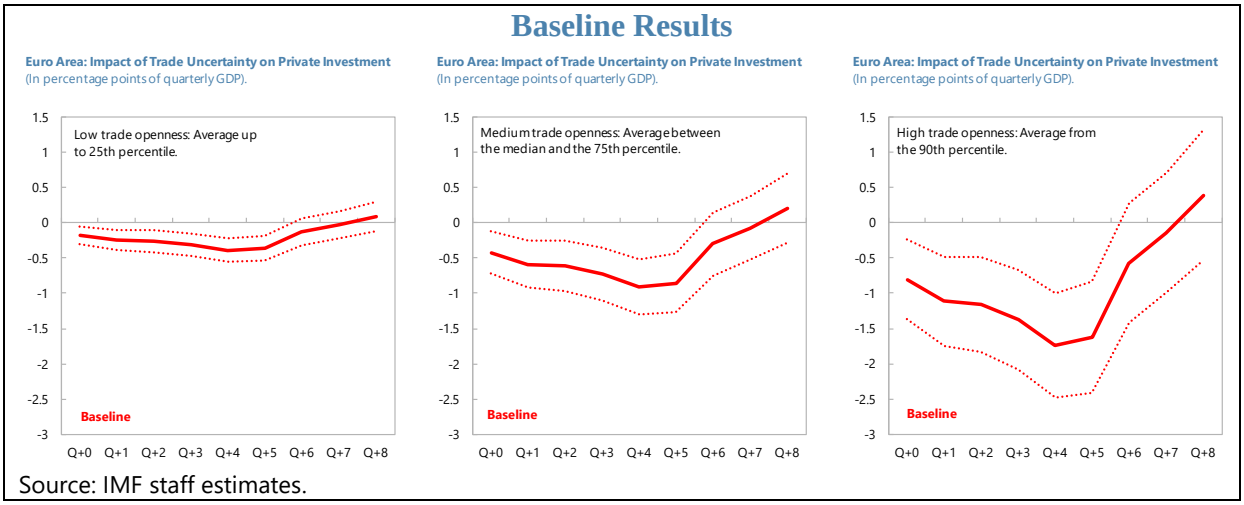
[3] Hlatshwayo (2018) designed and ran search algorithms on Dow Jones's Factiva news aggregator. Factiva covers over 36,000 sources in 28 languages. These sources include almost 700 newswires (e.g., the Associated Press and Reuters) and all major newspapers. In addition to digitized newspaper inclusion 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.

C. Baseline Results

The results of the baseline estimations are summarized in the figure below (the solid line shows the point estimates at each horizon, and the shaded area denotes the confidence band at 90 percent level).

- For the median country in terms of trade openness, we estimate a reduction in the investment-to-GDP ratio by up to 0.8 percentage points of GDP in the fifth quarter following a typical trade uncertainty spike (middle chart). This corresponds to about one-fifth of the typical standard deviation of the investment-to-GDP ratio in the sample, while a typical trade uncertainty spike (of one standard deviation), translates into an increase in trade uncertainty of 0.9 log points, i.e., roughly 146 percent.[4] After five quarters, the point estimates are no longer statistically different from zero.

- As expected, the effect is larger for the countries with highest trade openness regimes (where exports and imports sum to 200 percent of GDP on average). For these countries, the investment decline can reach 1.6 percentage points of GDP after four quarters.[5]



Source: IMF staff estimates.

III. Robustness Checks

A. Alternative Measure of Trade Uncertainty: The BlackRock Index of Trade Tensions[6]

To test the robustness of our baseline results, we assess the stability of the estimates to alternative measures of trade uncertainty. For this purpose, we take advantage of the newly

[4] The *World Economic Outlook* (2018) also models the uncertainty shock as a one standard deviation shock.

[5] The shape of the impulse response functions is similar across the trade openness spectrum because the marginal effect of trade uncertainty on investment is linearly conditional on the degree of trade openness (see Equation 1).

[6] We are grateful to Isabelle Mateos y Lago and Kemin Yang (both from BlackRock) for sharing their dataset on global trade tensions with us. The data are described here: https://www.blackrockblog.com/blackrock-geopolitical-risk-dashboard/?risk=8.

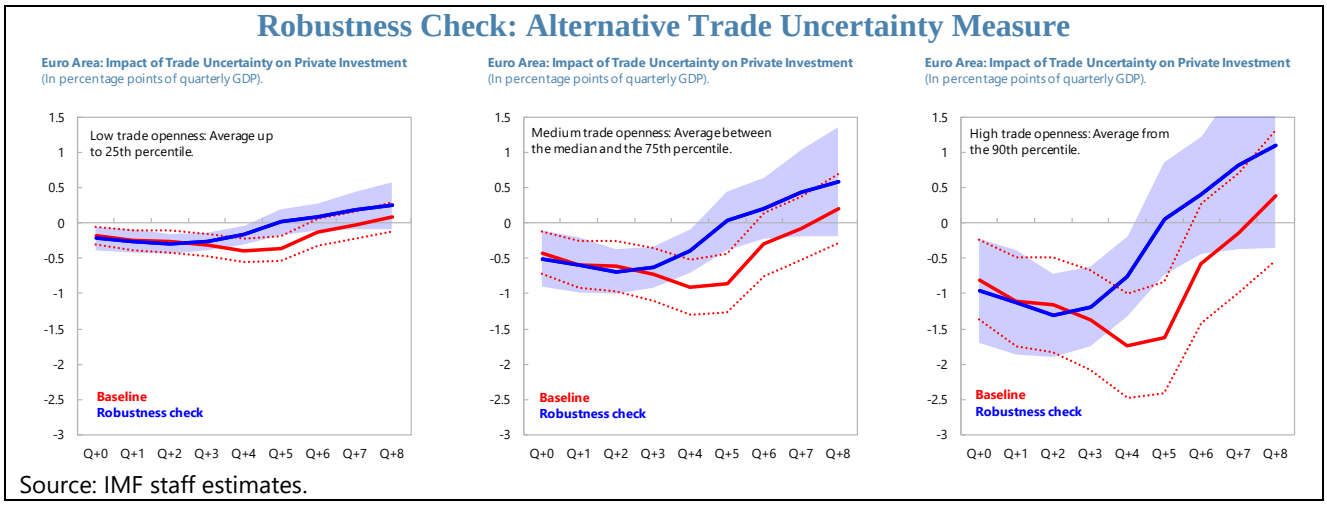
computed global index of trade tensions produced by the BlackRock Investment Institute. In contrast to the previous measure of trade uncertainty, borrowed from Hlatshwayo (2018), which focuses on the public's attention to trade uncertainty and risks, the BlackRock index of trade tensions aims to capture the market's attention to trade risk. It assigns a much heavier weight to brokerage reports than to other data sources. Hence, the BlackRock measure is primarily a market attention and sentiment indicator, gauging to what extent market-related content is focused on trade risks. The higher the index, the more financial analysts and media are referring to this risk.

More formally, the BlackRock global trade tension indicator continuously tracks the relative frequency of analyst reports, financial news stories, and tweets associated with trade risks. It uses the Thomson Reuters Broker Report and the Dow Jones Global Newswire databases as sources, and recently added the one million most popular tweets each week from Twitter-verified accounts. It calculates the frequency of words that relate to trade risk, adjusts for positive and negative sentiment in the text of articles or tweets, and then assigns a final score. A zero score represents the average trade tension level over its history from 2003, up to that point in time. A score of one means the trade tension level is one standard deviation above the average. BlackRock weighs recent readings more heavily in calculating the average. A much heavier weight is assigned to brokerage reports than to the other data sources.

We then substitute the BlackRock trade uncertainty index (denoted here *BU* and transformed into a natural logarithmic form) into our baseline model as follows:

$$y_{i,t+h} = u_i + \lambda_t + \theta_{1h}\left(BU_t \times O_{it-q}\right) + \psi_h(L)y_{i,t+h-1} + X'_{i,t}\Gamma_h + \epsilon_{i,t+h} \quad [2]$$

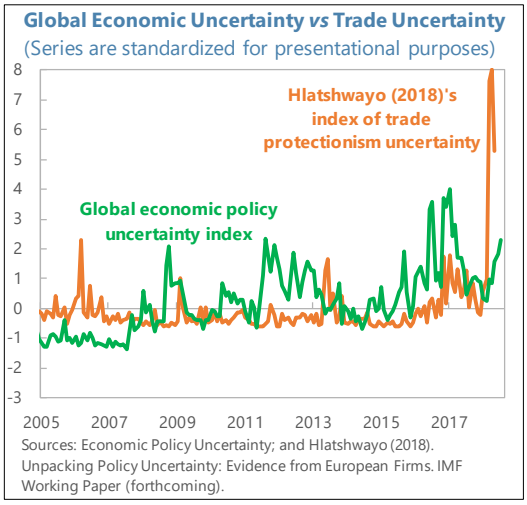
The results are summarized in the figure below. The impact of trade uncertainty as measured by BlackRock remains statistically significant, negative, and robust up to the fourth quarter following the shock (a one standard deviation increase in the index, which corresponds to an increase in trade uncertainty of 0.7 log points, i.e., roughly 100 percent). This is broadly similar to the baseline results using Hlatshwayo (2018)'s index, though the magnitude is somewhat smaller. This is not surprising given the relatively narrow focus of the BlackRock index of trade tensions (BlackRock index mainly focuses on market attention to trade risks) as opposed to the previous measure used in the paper. We estimate that decline in the investment-to-GDP ratio reaches 0.7 (1.3) percentage points of GDP in the second quarter following the increase in trade uncertainty in the median (high) trade openness regime.



Source: IMF staff estimates.

B. Controlling for Other Non-Linear Forms of Global Uncertainty

One key issue with the baseline model remains the risk that the estimate of the impact of trade uncertainty can be biased. The model includes time-fixed effects to capture the effects of other time-varying global shocks on investment. These time dummies address the omitted variable bias that are additively correlated with investment and trade uncertainty in the model. However, they may not be sufficient to address the bias arising from the possibility that other global uncertainty may also affect investment via their interaction with trade openness, similar to how trade uncertainty affects investment. This has the potential to bias the estimation of the interaction term.



To mitigate this bias, Equation 1 is amended to include a more comprehensive measure of uncertainty interacted with trade openness. To do this, we rely on the measure of global uncertainty computed by Davis (2016) building on country-specific uncertainty measures computed by Baker et al. (2016). This global uncertainty measure is a GDP-weighted average of national economic policy uncertainty indices for 16 countries, which account for two-thirds of global output. Each national economic policy uncertainty index reflects the relative frequency of domestic country newspaper articles that contain a trio of terms pertaining to the economy, uncertainty and policy-related matters.[7] The modified equation takes the following form:

[7] Data can be accessed at: http://www.policyuncertainty.com/.

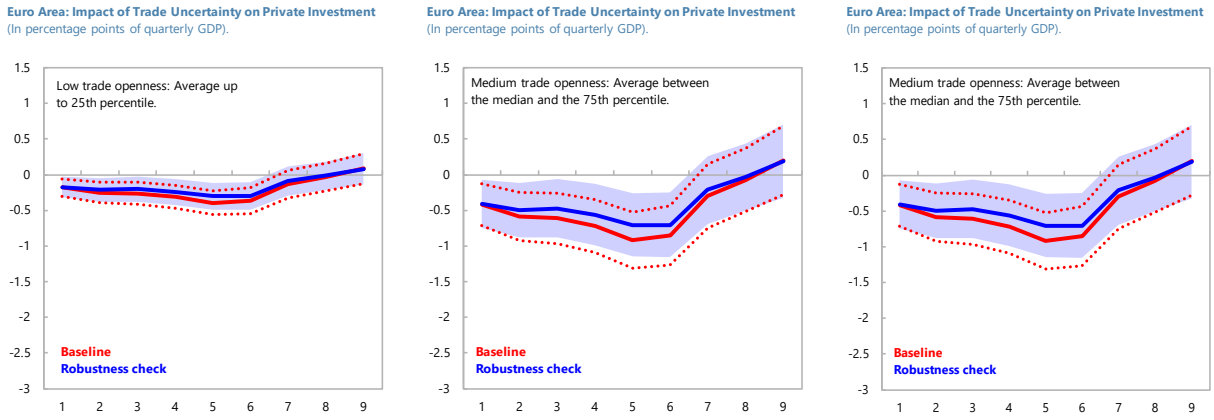
$$y_{i,t+h} = u_i + \lambda_t + \theta_{2h}\left(U_t \times O_{it-q}\right) + \theta_{3h}\left(GU_t \times O_{it-q}\right)$$

$$+\psi_h(L)y_{i,t+h-1} + X'_{i,t}\Gamma_h + \epsilon_{i,t+h} \quad [3]$$

where *GU* denotes the measure of global economic policy uncertainty (in log form), covering several elements beyond trade. Testing the robustness of the baseline estimates consists in checking whether θ_{2h} remains statistically significant and negative over a given horizon *h*, following a sudden increase in trade uncertainty *U*, and even after controlling for the effects of other forms of uncertainty on investment via the trade channel $\left(GU_t \times O_{it-q}\right)$.

The results are shown below. Controlling for the conditional effect of other global sources of economic uncertainty does not materially affect the baseline estimates. The estimates are broadly similar to the previous estimates, signaling that the identification strategy used in this paper (estimates conditional on trade openness controlling for country and time effects introduced additively) was sufficiently strong to reduce econometric biases. For the median country in terms of trade openness, we estimate a reduction in the investment-to-GDP ratio by up to 0.7 percentage points of GDP (representing about one-fifth of the typical standard deviation of the investment-to-GDP ratio in the sample) in the fifth quarter following a typical trade uncertainty spike. For the highest trade openness regime, the investment decline can reach 1.3 percentage points of GDP (representing about 30 percent of the standard deviation of the investment rate in the sample).

Robustness Check: Controlling for Global Uncertainty



Source: IMF staff estimates.

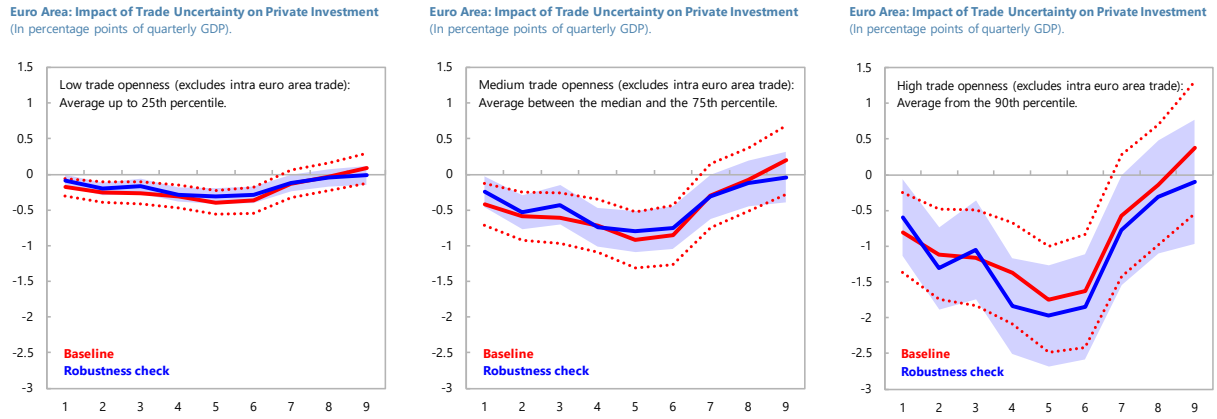
C. Excluding Intra-Euro Area Trade Flows

The measure of trade openness so far includes intra-EU trade flows—that is, trade flows between countries which have a common trade policy and a single market, and which would not directly be affected by trade policy actions. This suggests that we should test the robustness of estimates to only using the non-EU exposures of euro area countries as the measure of openness. At the same time, with the U.K. set to leave the EU, there is also uncertainty about its future trade relationship with the EU. Since the U.K. is the largest non-

euro area EU country, and reflecting data limitations, we perform this exercise using trade exposure outside the *euro area*, rather than the *EU*.

On this basis, we use the augmented specification from sub-section B, but with the difference that the trade openness indicator now excludes intra-euro area trade flows. The estimation results are broadly similar to the baseline estimates, which suggest that excluding intra-euro area trade flows did not lead to a material change in the sensitivity of the investment-to-GDP ratio to global trade uncertainty.

Robustness Check: Excluding Intra-Euro Area Trade



Source: IMF staff estimates.

D. Using an Alternative Measure of Trade Openness: Participation in Supply Chains

Our analysis has so far relied on the traditional measure of trade openness, measured as the ratio of exports and imports of goods and services over GDP. While this measure captures well the degree of integration of a country into the world economy via trade, it may not be sufficient to capture the newly complex relationships countries have with each other via supply chain links. This is important because supply chains could make investment more sensitive to global trade uncertainty shocks and trade protectionism costlier to businesses, which are integrated in complex trade flow webs around the world. At the same time, we expect investment to be relatively more resilient to uncertainty shocks within a supply chain network as opposed to when total trade openness is considered, as intra-group investment decisions can be motivated by other factors out of the control of a single firm. Econometrically, this implies that the point estimates obtained when trade openness is replaced by an index of participation in supply chain networks would be lower in absolute terms.

Nevertheless, we expect trade uncertainty to exert a negative effect on investment that rises with the degree of a country's participation into supply chains. To test for this hypothesis, we amend Equation 3 by substituting the old trade openness variable with a quantitative measure of supply chain participation. The indicator, as proposed by Koopman et al. (2010), is expressed as the share of foreign inputs (backward participation) and domestically produced inputs used in third countries' exports (forward participation) and here is normalized by GDP.

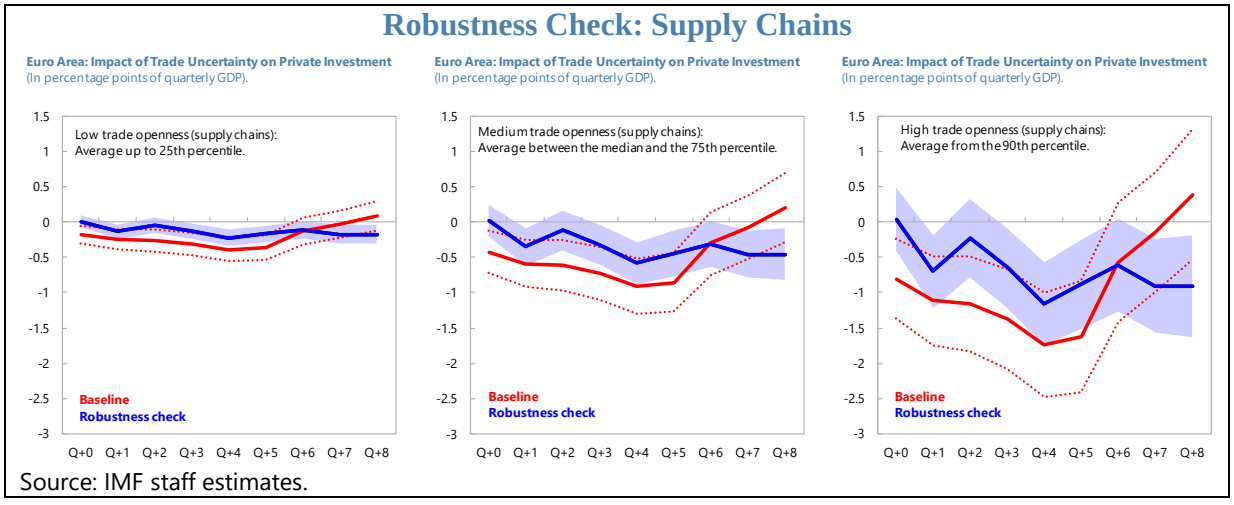
Data are sourced from the OECD's Trade in Value Added (TiVA) dataset. The econometric model is specified as follows:

$$y_{i,t+h} = u_i + \lambda_t + \theta_{4h}\left(U_t \times SC_{it-q}\right) + \theta_{5h}\left(GU_t \times SC_{it-q}\right)$$

$$+\psi_h(L)y_{i,t+h-1} + X'_{i,t}\Gamma_h + \epsilon_{i,t+h} \quad [4]$$

where *SC* refers to the indicator of participation into supply chains averaged over the past 16 quarters. We also control for the possible effects from other forms of uncertainty, $GU_t \times SC_{it-q}$ (as introduced in Equation 3), that may transit through the supply chain indicator and affect investment.

The results are shown in the figure below. They echo the baseline estimates that a sudden increase in trade uncertainty reduces the investment ratio and the negative effect is visible for about five quarters. In terms of magnitude, for the median and high levels of supply chain participation, the reduction in the investment-to-GDP ratio is near 0.5 and 1 percentage points of GDP in the fourth and fifth quarter following the trade uncertainty shock, respectively. This is in line with the estimates obtained with the traditional measure of trade openness and when accounting for other forms of uncertainty.



Source: IMF staff estimates.

IV. What can the Estimates Tell us About Recent Bouts of Uncertainty?

Trade tensions and threats of retaliatory measures among global trade leaders have pushed uncertainty measures to very high levels in 2018. Our benchmark measure of trade uncertainty has increased by 1.4 log points between the first quarter of 2017 and the second quarter of 2018. This corresponds to an increase of about 300 percent (which is double the typical standard deviation shock of the trade uncertainty measure).

If we use our preferred estimates from Section B, where the model also controls for other forms of global uncertainty interacted with trade openness, the results suggest that the investment-to-GDP could be lowered by 1 and 2 percentage points one year from now, due to this increase in trade uncertainty for countries at the medium and high level of trade

openness, respectively. This corresponds to a quarter (half) of the typical standard deviation of the investment-to-GDP ratio in the sample for countries exhibiting a median (high) level of trade openness. Of course, these results should be taken with some caution as trade uncertainty can dissipate quickly if major players resume constructive trade talks leading to a satisfactory outcome globally. The rebound in investment could therefore be very large.

V. CONCLUSION

We examined the impact of trade uncertainty on investment in the euro area using panel data techniques. Our identification strategy assumed that global trade uncertainty would reduce investment more significantly in those countries more dependent on global trade.

Using various measures of trade uncertainty relying on text-mining techniques, and using alternative measures of openness, including participation in supply chains, we find that the reduction in the investment ratio following a surge in trade uncertainty is visible up to four and five quarters following the shock.

In terms of magnitude, the decline in the investment peaks at 0.8 (1.6) percentage points of GDP, roughly a year after a trade uncertainty shock in countries located at the median (high) level of the trade openness spectrum. These results are robust to a battery of empirical tests.

Our findings highlight that trade barriers not only can reduce trade growth through higher trade cost, but that uncertainty about future trade policy can deter investment, reducing both growth in the near term and the economy's long-term production capacity. Avoiding protectionism and finding cooperative solutions that promote continued trade growth is essential to preserve and broaden the gains from decades of rules-based global trade integration.

VI. APPENDIX

Table 1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Investment-to-GDP	1729	11.6	3.9	-5.2	41.3
Trade uncertainty (log)	1692	2.0	0.9	0	4.6
Trade uncertainty (BlackRock) (log)	990	3.1	0.7	0	4.6
Economic Policy Uncertainty (log)	1566	111.2	41.3	55.6	244.0
Trade openness	1476	104.0	52.8	39.0	314.9
Participation in supply chains	1728	21.3	11.3	4.7	56.0
GDP growth	1674	5.3	6.0	-26.8	39.3
Corporate bond spreads	966	0.1	2.3	-20.3	3.2
Bank lending rate	1086	3.9	1.6	1.3	12.4
10-year sovereign spread	1921	6.0	4.0	-0.1	25.4

Table 2. List of Countries

Austria	Latvia
Belgium	Lithuania
Cyprus	Malta
Finland	Netherlands
France	Portugal
Germany	Slovak Republic
Greece	Slovenia
Ireland	Spain
Italy	

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