A Note on the Time-Varying Impact of Global, Region- and Country-Specific Uncertainties on the Volatility of International Trade

Selçuk Gül* and Rangan Gupta**

Abstract

We use a dynamic factor model with time-varying parameters and stochastic volatility to decompose the variance of exports and imports over time for 22 Organization for Economic Co-operation and Development (OECD) countries spanning the quarterly period of 1960:01 to 2016:04 into contributions from country- and region-specific uncertainties and uncertainty common to all countries. We find that, while idiyosyncratic uncertainty has a dominant role in explaining the volatility of international trade, global, country-, and region-specific uncertainties drives around 40% of the volatility of real exports and imports, with the impact of the latter three uncertainties rising in explanatory power during episodes of crises. Our results have important policy implications.

JEL Codes: C32, F10
Keywords: Dynamic factor model, time-varying parameters, stochastic volatility, uncertainty shocks, trade volatility

1. Introduction

In the wake of the "Great Recession", large number of studies conclude that unexpected large changes in uncertainty represent an important source of macroeconomic fluctuations (see Gupta et al., (2018, 2019, 2020) for recent overviews of this literature). Given that, after investment, exports and imports are the most volatile components of aggregate demand within countries (Bennett et al., 2019), a relevant question to ask would be the role of uncertainty in explaining volatility of international trade, especially when we realize that the decline in international trade volumes was almost twice as big as output during the global financial crisis (GFC). Barkoulas et al., (2002), and more recently Baum and Caglayan (2010), while analyzing the impact of exchange rate uncertainty on first and second moments of trade, points out that trade flow variability can significantly impact the state of the overall level of economic activity resulting in financial sector illiquidity, reductions in real output, and/or heightened inflationary pressures. Naturally, determining the possible role of uncertainty in driving the volatility of exports and imports is of tremendous importance to the policymakers in the aftermath of the GFC.

Theoretically, Novy and Taylor (forthcoming), incorporate uncertainty shocks into an open economy model in which firms import nondurable ('material') and durable ('capital') inputs from foreign and domestic suppliers. In the model, due to fixed costs of ordering associated with transportation, firms hold an inventory of inputs, but the ordering costs are larger for foreign inputs. Given this, firms will optimally execute their inventory policy by cutting orders of foreign inputs much more than for domestic inputs in response to a large uncertainty shock in business conditions. Thus, in the aggregate, this differential response leads to a bigger contraction and subsequently a stronger recovery in international trade than in domestic trade, i.e., trade exhibits more volatility.[1]

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[1] The theoretical prediction of the model was also confirmed empirically for the US- based data on imports and industrial production going back to 1962, and also with disaggregated data at the industry level staring in 1989.

Against this backdrop, we assess, for the very first time, the time-varying impact of common global, common regional and country-specific macroeconomic uncertainty on the volatility of international trade. In order to carry out this investigation econometrically, we use a dynamic factor model with time-varying factor loadings and stochastic volatility to allow for the estimation of uncertainties that is common across a large set of advanced economies, specific regions (Euro Area, other European countries, North-America, Asia and Oceania) and particular country. We then calculate the evolution of the contribution of each of these components over time (based on the time-varying factor loadings) to the volatility of exports and imports for 22 Organization for Economic Co-operation and Development (OECD) countries spanning the quarterly period of 1960:1 to 2016:4.

Our approach follows the work of Mumtaz and Musso (2019), and is considered to be more robust relative to the often-used approach in the literature, whereby an estimate of macroeconomic uncertainty is derived first, and then used as an observable time series within an econometric model (such as, vector autoregression (VAR)) to derive the effects of uncertainty shocks on the economy. As noted by Carriero et al. (2018), such a two-step approach is flawed due to possible omitted variable bias and non-fundamentalness of the errors, linked to the fact that the second step is typically based on small-scale VAR models. Our econometric method is able to overcome such limitations, as the derivation of the uncertainty measures and the inference on the associated uncertainty shocks are derived within a coherent econometric framework including several (460) variables (involving 20 variables for each country and 20 additional international variables), thereby increasing the reliability of the estimates. The remainder of the paper is organized as follows: Section 2 outlines the methodology and the data used, while Section 3 presents the results, with Section 4 concluding the paper.

2. Methodology and Data

To estimate the contributions of several types of uncertainties on the volatility of trade, namely real exports and real imports, we use the dynamic factor model, with stochastic volatility and time-varying factor loadings, that is developed by Mumtaz and Musso (2019). The model includes three different kinds of uncertainty factors (global, region-specific, and country-specific) and an idiosyncratic factor as the following:

$$Z_{it} = A_{it}^{G} F_t^{G} + A_{it}^{R} F_t^{R} + A_{it}^{C} F_t^{C} + u_{it} \quad (1)$$

where Z_{it} is the set of macroeconomic and financial variables for i=1,…, N series over the t=1,…,T periods. There are four components in the model, namely the global component, F_t^G, the region-specific component, F_t^R, the country-specific component, F_t^C, and the idiosyncratic component that is, in fact, the error term. According to the model, global uncertainty stands for the uncertainty common among developed countries. Likewise, region-specific uncertainty represents the uncertainty specific to regions such as Euro Area, other Europe, North America, Asia, and Oceania. The factor loadings for country-specific, region-specific, and global uncertainty are represented by A_{it}^C, A_{it}^R, and A_{it}^G, respectively.

Following Mumtaz and Musso (2019), we define the country-specific, region-specific, and global factors as VAR processes. For instance, country-specific factor can be represented by the following equation:

$$F_t^C = \alpha^C + \sum_{j=1}^{M} \gamma_j^C \, F_{t-j}^C + (\Omega_t^C)^{1/2} \, v_t^C \quad (2)$$

Similarly, Mumtaz and Musso (2019) describe the idiosyncratic factor with an autoregressive (AR) transition equation as presented below:

$$u_{it} = \sum_{k=1}^{K} \sigma_k \, u_{it-k} + (h_{it})^{1/2} \, e_{it} \tag{3}$$

To generate time-varying factor loadings, Mumtaz and Musso (2019) employ the framework developed by Del Negro and Otrok (2008). In this context, they represent all the three factor loadings in a vector $A_{it} = \begin{bmatrix} vec(A_{it}^G) \\ vec(A_{it}^R) \\ vec(A_{it}^C) \end{bmatrix}$, and describe this vertor's equation of motion as the following:

$$A_{it} = A_{it-} + (\mathrm{Q}_i^A)^{1/2} U_{it} \tag{4}$$

Following Mumtaz and Musso (2019), error covariance matrices are generated by:

$$\Omega_t^d = (T^d)^{-1} \mathrm{H}_t^d [(T^d)^{-1}]' \tag{5}$$

where d=*G,R,C*, and H_t^d and T^d stands for the diagonal and lower triangular matrices, respectively. Diagonal matrix can be represented with a scalar process to indicate the time-varying volatility, θ_t^d, and a scaling factor, S_i^d, for *i*=1,…, *N* series as:

$$\mathrm{H}_t^d = diag(\mathrm{S}_i^d \theta_t^d) \tag{6}$$

Estimations for each of the volatility associated with global, region-specific and country-specific uncertainty are based on the equation (5).[2]

Finally, Mumtaz and Musso (2019) describe the unconditional variance of the volatility of trade variables as a function of factor loadings:

$$var(Z_{it}) = (A_{it}^G)\Theta_t^G(A_{it}^G) + (A_{it}^R)\Theta_t^R(A_{it}^R) + (A_{it}^C)\Theta_t^C(A_{it}^{GC}) + var(u_{it}) \tag{7}$$

where $\Theta_t^d = diag(var(A_t^d))$. The equation (7) is used to generate the forecast error variance decompositions.

Our study employs the dataset used by Mumtaz and Musso (2019). This dataset involves 22 countries including 11 Euro Area members such as Germany, France, Italy, Spain, the Netherlands, Belgium, Austria, Finland, Greece, Ireland, and Portugal, 5 other European countries such as the UK, Norway, Sweden, Switzerland, and Denmark, and 6 other countries such as the US, Japan, Canada, Australia, Korea, and New Zealand. For each country, there are 20 macroeconomic and financial series in the dataset such as real GDP, consumer price index, short-term price index, stock prices, credit to the private sector, bank loans to the private sector, house prices, broad money, narrow money, industrial production, retail sales volumes, employment, unemployment rate, real gross fixed capital formation, real private consumption, real exports, real imports, nominal effective exchange rate, US dollar exchange rate, and long-term interest rate. Besides, there are 8 series for international commodity prices and 12 series for several indicators of emerging market economies such as South Africa, Mexico, China, India, and Turkey. In sum, the dataset includes 460 quarterly series over the 1960:1-2016:4 period.

[2] Please refer to Mumtaz and Musso (2019) for further technical details of the methodology.

3. Empirical Findings

To investigate the contributions of uncertainty shocks to the volatility of the trade variables, we compute the forecast error decompositions. The contribution of the idiosyncratic component is defined as the difference between the unconditional variance of the trade variables and the variance of the trade variables explained by global, region-specific, and country-specific uncertainties. Our approach allows us to provide all the contributions in a time-varying framework. Results indicate that the relative significance of the contribution of each uncertainty type on the volatility of real export and imports differs over time and among geography. Table 1 presents the forecast error decompositions of real export volatility for the individual countries, regional aggregates, and the whole sample. Results suggest that the volatility of real exports for the entire sample is mainly driven by idiosyncratic uncertainty. While the idiosyncratic component helps explain much of the volatility of real exports in other European countries, its contribution to that of North American countries remains limited. Among other European countries, Norway is with the highest contribution of idiosyncratic uncertainty to the volatility of its exports. Almost 60 percent of the unconditional variance of the Euro Area's real exports is explained by the idiosyncratic uncertainty component. However, there is heterogeneity among the Euro Area members. In Austria, idiosyncratic uncertainty makes a significant contribution to the volatility of real exports, while it makes a relatively less contribution to the volatility of real exports in Belgium.

Although the idiosyncratic uncertainty has a significant role in explaining the volatility of real exports, the contributions of other uncertainty components are also not negligible. Results indicate that median contributions of the country-specific, region-specific, and global uncertainties to the unconditional variance of the real exports in the whole sample are 20 percent, 9 percent, and 11 percent, respectively. Country-specific uncertainty plays the most significant role in explaining the volatility of exports in the Euro area. In contrast, its impact on the unconditional variance of the exports in other European countries is minimal. Among the Euro area members, results indicate that the volatility of exports is mainly driven by country-specific uncertainty in Greece that was severely hit by the sovereign debt crisis following the global financial crisis. The median contribution of country-specific uncertainty on the volatility is also high in Belgium and Ireland. In addition to these countries, the US and Japan, two G7 members, have higher than the median contribution of country uncertainty on the volatility of exports such that 26 and 34 percent of the volatility of exports in these countries, respectively, are explained by country-specific uncertainty. From a policy perspective, these results suggest that domestic policy measures to stabilize the real exports are necessary for the countries where country-specific uncertainty has an important role in explaining the volatility of real exports.

Results indicate that the contributions of the shocks associated with region-specific uncertainty remains limited. Although the impact of region-specific uncertainty shocks on real exports is minimum for most of the countries, they are substantial for North American countries, especially for Canada. Around 67 percent of the volatility of real exports in Canada is explained by the region-specific uncertainty that is possibly driven by the trade policies of Canada's major trade partner, the US. Mitigating the impact of region-specific uncertainty shocks on the volatility of real exports is beyond the scope of domestic policy measures. In fact, most of the region-specific uncertainty originates from the unpredictable trade policies introduced by individual countries. For instance, recently, trade wars between the major economies in the world have triggered more uncertainty and conservatism not only in these economies but also at the regional scales. Thus, coordinated policies at the regional level need to be considered.

Global uncertainty still has a nonnegligible contribution to the volatility of real exports as a whole, while there are geographic heterogeneities, similar to the contributions of the uncertainties mentioned above. Around 11 percent of the unconditional variance of real exports in the entire sample is explained by the global uncertainty shocks. In several Euro area, North American and Asian countries, this figure is higher than the median-contribution. For instance, 21 percent of the volatility of Italian exports and 18 percent of the volatilities of the US and Korean exports are driven by global uncertainties. On the other hand, for countries such as Finland, Greece, Australia, and New Zealand, the impact of a global uncertainty shock is negligible. From a policy perspective, the response to global uncertainty shocks needs to be on the global level that is coordinated by most of the countries. Domestic policies applied by individual countries and regional policies are less likely to be adequate to contain the effects of a global uncertainty shock on the volatility of trade.

The role of uncertainty components in explaining the real imports does not significantly change with respect to countries and regional-aggregates. Table 2 summarizes the results at the country-level, region-level, and for the all sample. Similar to the results mentioned before, the volatility of real imports for all countries in the sample is mainly driven by idiosyncratic uncertainty that, on average, 61 percent of the unconditional variance of the real imports is explained by idiosyncratic component. The average contributions of the country-specific, region-specific, and global uncertainties are 17, 12, and 10 percent, respectively.

[INSERT TABLES 1 AND 2]

On the issue of time-varying contributions of the uncertainty components, this study provides evidence that the relative contributions of different uncertainties on the volatility of exports and imports differ over time. Figure 1 and Figure 2 present the time-varying contributions of each uncertainty component on the volatility of real exports and real imports, respectively. Results show that, especially during the financial crisis period and the periods in which oil prices are severely affected, the contribution of idiosyncratic uncertainty declines while the contributions of global, regional, and country uncertainties increase. For the whole sample and regional aggregates, the 2008-2009 period is common where the role of global and country-specific uncertainties in explaining the volatility of trade increases, and hence provides an explanation to the almost twice as big decline in international trade volumes relative to output during the GFC, as noted in the introduction. The impact of country-specific and region-specific uncertainty shocks remains elevated in the Euro Area after the Global recession because of the succeeding sovereign debt crisis in Europe. Similarly, following 1997 the role of region-specific and country-specific uncertainty on trade volatility increases in Asian countries because of the emergence of the Asian financial crisis.

Historically, the role of regional uncertainty in explaining the volatility of trade is relatively high in North American countries. In Asian countries, regional uncertainty explains an important part of the volatility of trade, especially during the period before 2000. For the remaining region groups, the impact of regional uncertainty on the unconditional variance of trade indicators is less pronounced. Regarding the periods associated with oil price shocks, the impact of uncertainties other than the idiosyncratic component is more pronounced in the 1973 Oil Crisis, 1980 Iran-Iraq War, 1990-1991 Gulf War, and 2003 Iraq War, especially for the North American countries.

To sum up, while the idiosyncratic uncertainty has a dominant role in explaining the volatility of trade of the countries in our sample, other uncertainty components still explain a nonnegligible part of the volatility of trade. Besides, the relative contributions of each uncertainty component on the unconditional variance of trade indicators significantly differ for

individual countries and at the regional level. Finally, the role of uncertainty components varies over time with the contributions of country-specific, region-specific, and global uncertainties gaining prominence during crisis periods.

[INSERT FIGURES 1 AND 2]

4. Conclusions

In this paper, we use a dynamic factor model with time-varying factor loadings and stochastic volatility, which allows for the estimation of uncertainty that is common across 22 advanced economies, as well as uncertainties that are region- and country-specific, derived from 460 quarterly time series for financial and macroeconomic variables spanning 1960:01 to 2016:04. Then the estimates of these three different components of macroeconomic uncertainty, are used to to explain the volatility of international trade, i.e., exports and imports in real terms over time. We find that, while, on average, idiosyncratic uncertainty plays the most dominant role in explaining the volatility of both exports and imports, the role of global, regional- and country-specific uncertainties cannot be ignored, with them explaining around 40% of the variability in exports and imports, and led by country-specific uncertainty. More importantly, global, country- and region-specific uncertainties gain prominence relative to the idiosyncratic component during periods of crises.

Our results have important policy implications. While idiosyncratic uncertainty is beyond the control of the government, policymakers can indeed reduce the impact of country-specific uncertainty (which tends to dominate regional and global uncertainties) on volatility of international trade by designing appropriate domestic policies. Given that during episodes of economic turmoil, the explanatory power of global, country- and region-specific uncertainties increase for exports and import volatilities, policy authorities would need to undertake not only local policy actions, but policies need to be coordinated across regions and at the global level. Hence, accounting for different sources of uncertainty can provide an accurate assessment of the macroeconomic (trade) landscape required to design the optimal policy response. Moreover, by showing the changing role of the different components of uncertainty in explaining the volatility of real exports and imports, our results tend to suggest that it is important to monitor all three sources uncertainty (global, region-, and country-specific) in order to better understand developments in fluctuations associated with international trade. As part of future research, it would be interesting to extend the analysis to emerging markets.

References

Barkoulas, J., Baum, C.F. and Caglayan, M. (2002). Exchange rate effects on the volume and variability of trade flows. Journal of International Money and Finance, 21(4), 481–496.

Baum, C.F. and Caglayan, M. (2010). On the sensitivity of the volume and volatility of bilateral trade flows to exchange rate uncertainty. Journal of International Money and Finance, 29(1), 79-93.

Bennett, F., Lederman, D., Pienknagura, S., and Rojas, D. (2019). The volatility of world trade in the 21st century: Whose fault is it anyway? The World Economy, 42(9), 2508-2545.

Carriero, A., Clark, T.E., and Marcellino, M. (2018). Measuring Uncertainty and Its Impact on the Economy. Review of Economics and Statistics, 100(5), 799-815.

Del Negro M., Otrok, C. (2008). Dynamic factor models with time-varying parameters: measuring changes in international business cycles, Staff Reports 326, Federal Reserve Bank of New York.

Gupta, R., Lau, C-K-M., and Wohar, M.E. (2019). The impact of US uncertainty on the Euro area in good and bad times: Evidence from a quantile structural vector autoregressive model. Empirica, 46, 353-368.

Gupta, R., Ma, J., Risse, M., and Wohar, M.E. (2018). Common business cycles and volatilities in US states and MSAs: The role of economic uncertainty. Journal of Macroeconomics, 57, 317–337.

Gupta, R., Olasehinde-Williams, G., and Wohar, M.E. (2020). The Impact of US Uncertainty Shocks on a Panel of Advanced and Emerging Market Economies: The Role of Exchange Rate, Trade and Financial Channels. The Journal of International Trade & Economic Development. DOI: https://doi.org/10.1080/09638199.2020.1720785.

Mumtaz. H.. Musso. A. (2019). The evolving impact of global. region-specific and country-specific uncertainty. Journal of Business & Economic Statistics. DOI: https://doi.org/10.1080/07350015.2019.1668798.

Novy, D., and Taylor, A.M. (Forthcoming). Trade and Uncertainty. Review of Economics and Statistics.

Table 1: Contributions of Uncertainty Components and Idiosyncratic Component to Real Export Volatility: Variance Decomposition

	Country			Region			Global			Idiosyncratic
	Lower	Median	Upper	Lower	Median	Upper	Lower	Median	Upper	
Germany	0.15	0.30	0.51	0.03	0.08	0.16	0.03	0.08	0.20	0.55
France	0.13	0.25	0.42	0.03	0.07	0.15	0.02	0.07	0.18	0.61
Italy	0.04	0.10	0.26	0.02	0.05	0.16	0.08	0.21	0.45	0.63
Spain	0.13	0.27	0.45	0.01	0.04	0.11	0.03	0.09	0.22	0.61
Netherlands	0.13	0.30	0.52	0.03	0.08	0.20	0.08	0.19	0.39	0.43
Belgium	0.20	0.42	0.67	0.01	0.04	0.13	0.07	0.18	0.38	0.36
Austria	0.02	0.08	0.20	0.00	0.00	0.01	0.06	0.13	0.27	0.79
Finland	0.06	0.12	0.21	0.00	0.01	0.04	0.01	0.03	0.10	0.83
Greece	0.34	0.55	0.76	0.00	0.01	0.04	0.00	0.02	0.08	0.42
Ireland	0.11	0.31	0.60	0.02	0.06	0.15	0.03	0.09	0.23	0.55
Portugal	0.02	0.09	0.29	0.01	0.04	0.12	0.07	0.19	0.43	0.68
Euro Area	0.12	0.25	0.44	0.01	0.04	0.11	0.04	0.12	0.27	0.59
UK	0.01	0.03	0.10	0.03	0.11	0.30	0.06	0.16	0.36	0.70
Norway	0.01	0.03	0.09	0.01	0.02	0.06	0.01	0.05	0.12	0.90
Sweden	0.03	0.10	0.25	0.01	0.02	0.06	0.05	0.12	0.23	0.76
Switzerland	0.07	0.13	0.23	0.01	0.02	0.07	0.03	0.08	0.17	0.77
Denmark	0.06	0.17	0.38	0.02	0.07	0.19	0.03	0.10	0.25	0.67
Other Europe	0.04	0.09	0.21	0.01	0.05	0.14	0.04	0.10	0.23	0.76
US	0.12	0.26	0.51	0.04	0.15	0.36	0.08	0.18	0.39	0.41
Canada	0.01	0.05	0.16	0.42	0.67	0.84	0.00	0.01	0.05	0.27
North America	0.07	0.16	0.33	0.23	0.41	0.60	0.04	0.10	0.22	0.34
Korea	0.01	0.03	0.09	0.03	0.10	0.29	0.06	0.18	0.43	0.68
Japan	0.16	0.34	0.58	0.05	0.15	0.34	0.04	0.13	0.35	0.38
Asia	0.08	0.19	0.34	0.04	0.13	0.31	0.05	0.16	0.39	0.53
Australia	0.06	0.19	0.43	0.02	0.06	0.16	0.01	0.02	0.08	0.73
New Zealand	0.10	0.22	0.40	0.01	0.04	0.12	0.01	0.03	0.10	0.71
Oceania	0.08	0.20	0.41	0.02	0.05	0.14	0.01	0.02	0.09	0.72
All	0.09	0.20	0.37	0.04	0.09	0.18	0.04	0.11	0.25	0.61

Table 2: Contributions of Uncertainty Components and Idiosyncratic Component to Real Import Volatility: Variance Decomposition

	Country			Region			Global			Idiosyncratic
	Lower	Median	Upper	Lower	Median	Upper	Lower	Median	Upper	
Germany	0.04	0.12	0.28	0.04	0.11	0.25	0.02	0.05	0.14	0.72
France	0.05	0.12	0.24	0.04	0.10	0.21	0.08	0.18	0.36	0.60
Italy	0.03	0.07	0.16	0.02	0.07	0.18	0.10	0.21	0.41	0.65
Spain	0.10	0.21	0.38	0.03	0.09	0.21	0.07	0.15	0.30	0.55
Netherlands	0.23	0.43	0.64	0.05	0.11	0.22	0.04	0.10	0.24	0.36
Belgium	0.11	0.26	0.46	0.01	0.02	0.07	0.06	0.13	0.27	0.59
Austria	0.03	0.09	0.20	0.00	0.00	0.01	0.04	0.09	0.18	0.82
Finland	0.08	0.14	0.24	0.00	0.01	0.03	0.02	0.06	0.14	0.79
Greece	0.31	0.51	0.72	0.00	0.01	0.04	0.00	0.01	0.04	0.46
Ireland	0.11	0.28	0.52	0.00	0.01	0.05	0.03	0.10	0.25	0.61
Portugal	0.06	0.19	0.39	0.02	0.07	0.20	0.04	0.13	0.35	0.61
Euro Area	0.10	0.22	0.38	0.02	0.06	0.13	0.05	0.11	0.24	0.61
UK	0.02	0.06	0.15	0.01	0.04	0.11	0.02	0.07	0.17	0.84
Norway	0.02	0.06	0.18	0.01	0.02	0.05	0.01	0.02	0.06	0.90
Sweden	0.09	0.22	0.44	0.01	0.03	0.09	0.06	0.13	0.28	0.62
Switzerland	0.08	0.15	0.26	0.01	0.02	0.07	0.02	0.05	0.13	0.78
Denmark	0.07	0.17	0.32	0.01	0.04	0.12	0.04	0.10	0.30	0.69
Other Europe	0.06	0.13	0.27	0.01	0.03	0.09	0.03	0.07	0.19	0.76
US	0.04	0.11	0.28	0.31	0.61	0.83	0.01	0.04	0.15	0.23
Canada	0.02	0.06	0.15	0.25	0.51	0.75	0.04	0.09	0.21	0.34
North America	0.03	0.08	0.22	0.28	0.56	0.79	0.03	0.07	0.18	0.29
Korea	0.06	0.17	0.39	0.07	0.19	0.41	0.03	0.11	0.31	0.53
Japan	0.05	0.13	0.27	0.12	0.26	0.46	0.01	0.04	0.16	0.57
Asia	0.05	0.15	0.33	0.10	0.23	0.44	0.02	0.08	0.23	0.55
Australia	0.04	0.14	0.36	0.03	0.10	0.23	0.08	0.18	0.38	0.58
New Zealand	0.02	0.05	0.13	0.08	0.18	0.34	0.03	0.09	0.21	0.68
Oceania	0.03	0.10	0.25	0.06	0.14	0.28	0.06	0.14	0.29	0.63
All	0.07	0.17	0.33	0.05	0.12	0.22	0.04	0.10	0.23	0.61

Figure 1: Time-Varying Contributions of Uncertainty Components and Idiosyncratic Component to Real Export Volatility: Variance Decomposition

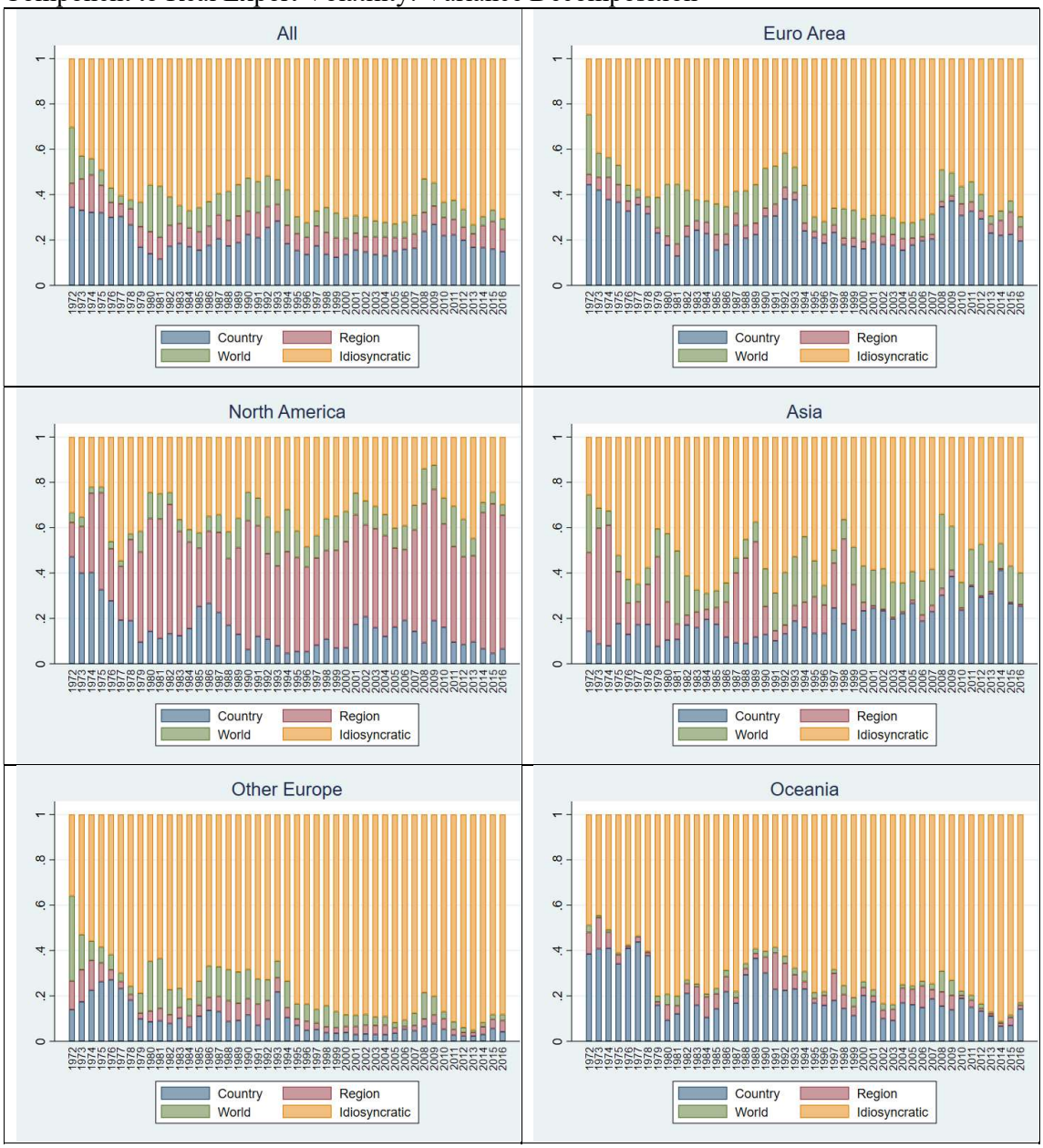

Figure 2: Time-Varying Contributions of Uncertainty Components and Idiosyncratic Component to Real Import Volatility: Variance Decomposition