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The impact of real exchange rate on international trade: Evidence from Panel Structural VAR model

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Abstract

This paper investigates the importance of real exchange rates on export volumes by estimating a panel SVAR model using quarterly unbalanced panel data from 21 emerging markets over the 2005:Q1-2018:Q4 period. Although the results suggest no conclusive evidence that real exchange rate shocks do affect the export volumes in our sample of emerging markets, the responses of export volume to real exchange rate shocks are heterogeneous across countries in which commodity exporter countries, on average, have a lower response of exports to the real exchange rate movements. Furthermore, we find that while the magnitude of response of the export volumes to exchange rate shocks is positively related to exchange rate volatility, the higher export market penetration ratio helps insulate the economy from real exchange rate shocks. Overall, our results carry broad policy implications indicating that policymakers need to pay attention to the exchange rate volatility of their countries and expand their export competition in the world trade.

Keywords: Exchange rate volatility, International trade, Real exchange rate, Panel SVAR

JEL: C22, C23, F14, F31

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1. Introduction

Over the recent decade, the link between real exchange rate developments and exports has been a controversial subject in international trade. Several studies have approached the phenomena from the increased role of global value chains (GVCs).[1] According to this strand of the literature, the rise in integration to global value chains may be linked to the disconnect between the real exchange rate movements and the exports over the recent decade. Tan et al. (2019) summarize the literature that integration to GVCs affects the exchange rate elasticity in two opposite channels. The first channel works mainly through the need for imported inputs to produce export products. Since the firms are more connected and require more intermediate imports in production, the positive impact of depreciation, for instance, may not materialize considering the increase in the firms' production costs. On the other hand, the second channel suggests that integration to GVCs leads the export performance to increase by lowering the uncertainty from the exchange rate volatility. Thus, the relation between integration to GVCs and exchange rate elasticity of trade depends on these channels' relative values.

In recent years, an increasing amount of literature has provided evidence that higher integration to GVCs has led the response of export volumes to exchange rate movements to decline over the recent period, such as Adler et al. (2019) for 37 advanced and developing countries, Tan et al. (2019) for eight Asian countries, de Soyres et al. (2018) for 40 countries, mainly members of the European Union, Kang and Dagli (2018) for 72 countries, Fauceglia et al. (2018) for Switzerland, and Ahmed et al. (2017) for 46 countries. Still, there is evidence, albeit limited, that the integration to GVCs may not be linked to lower exchange rate elasticity of trade. For instance, Leigh et al. (2017) investigate whether the exchange rate and trade are disconnected for a large sample of 60 countries, including 23 advanced and 37 developing. Their results suggest that the relation between exchange rates and trade is stable over time and there is no conclusive evidence that integration to GVCs affects this relation. To examine the impact of GVCs on the linkage between the exchange rate and exports, Bang and Park (2018) examine the three countries: China, Japan, and Korea. While their results suggest a significant impact of GVCs on the mentioned relation for Korea, they provide evidence that for China and Japan, integration to GVCs does not have a significant impact on the link between exchange rates and trade. In sum, there is varying evidence regarding the significance of the impact of integration to GVCs on the relation of exchange rates and trade.

[1] See Gangnes and Assche (2018) for a review of the literature regarding the impact of integration to GVCs on the link between exchange rates and trade.

A limited number of studies have addressed the phenomena with the impact of exchange rate uncertainty on the link between exchange rate movements and exports.[2] The main transmission is supposed to work through the impact of exchange rate uncertainty on the exchange rate pass-through to trade prices. In their prominent paper, Campa and Goldberg (2005) examine the exchange rate pass-through for 23 OECD countries and document that the exchange rate pass-through is more substantial for countries with higher exchange rate volatility. Higher exchange rate pass-through to trade prices increases the price adjustment to exchange rate shocks, strengthening the price elasticity of volumes. In a relatively recent study, to investigate the heterogeneity among exchange rate pass-through to export and import prices in 40 countries, Bussière et al. (2014) estimate bivariate regressions of exchange rate elasticity on several variables including exchange rate volatility. Their results suggest that exchange rate volatility plays a significant role in determining export prices' response to exchange rate shocks.

Although substantial research has been conducted in terms of the two common arguments, the integration to global value chains and the exchange rate uncertainty, the role of commodity-exporting in determining the link between exchange rate and exports has not been adequately examined. Given that emerging markets (EMs) are generally resource-rich countries, the share of commodities in their exports is relatively higher than that of the advanced countries.[3] Recently, Fally and Sayre (2018) examine the gains from trade by considering the key features of the commodities. Their brief review regarding the price elasticity of demand for commodities suggests that price elasticity of demand is lower due to the commodities' lack of substitutability. Considering that this fact is the same for domestic and export products, a change in the price of a commodity affects the demand for this product less than that of manufacturing products. Thus, low price elasticity of demand for commodities may be a factor in explaining the weak link between exchange rate movements and export volumes of emerging markets.

In this study, we aim to provide evidence on the dynamics of the real exchange rate and export volumes using quarterly unbalanced panel data from 21 emerging markets over the 2005:Q1-2018:Q4 period. For this purpose, we follow a two-step approach. In the first step, we estimate a panel SVAR that accounts for the cross-sectional dependence following the framework of Pedroni (2013). The second step includes regressions of the impulse-response functions (IRFs) on several variables, brought forward in the previous empirical literature to help explain the link between real exchange rate and exports. Besides, we contribute

[2]For a review of studies regarding the exchange rate volatility and trade flows, see Bahmani-Oskooee and Hegerty (2007).

[3]According to the World Bank (2016), approximately two-thirds of emerging and developing countries are commodity-exporters.

to the academic literature by examining for the first time how the dynamics between export volumes and the real exchange rates is contingent upon whether the country can be considered as an commodity-exporter or commodity-importer which may be important in determining the size and direction of the impact of the real exchange rate shocks on export volume. This in turn might suggest that, different policy measures would need to be designed keeping this heterogeneity across the countries in mind.

Accordingly, results from the panel SVAR indicate that there is no conclusive evidence that real exchange rate shocks do affect the export volumes in our sample of emerging markets. Second step regressions suggest that higher exchange rate volatility is associated with a stronger response of export volumes to exchange rate shocks. Besides, commodity exporter countries, on average, have a lower response of exports to the real exchange rate movements.

The remainder of this paper is organized as follows. The second section introduces the and data. Empirical results are provided in Section 3, and a conclusion follows in Section 4.

2. Methodology and Data

We utilize the heterogeneous panel SVAR methodology introduced by Pedroni (2013) which builds upon structural shocks that can be decomposed into both common and idiosyncratic parts[4]. The main advantage of the panel SVAR approach is that it accounts for the cross-sectional dependence that is likely to emerge from the fact that individual members of the panel react not just to their own member-specific idiosyncratic shocks, but also to shocks that are common across members of the panel. In this way, it enables the member-specific inference for any individual member of the panel for which the time series data is insufficient for reliable time series analysis. Moreover, the method is suitable for unbalanced panels for which the data period differs between panel members.

We consider a structural panel VAR model that can be defined as:

$$A_{i,0} z_{i,t} = A_i(L) z_{i,t} + \varepsilon_{it} \tag{1}$$

where $A_i(L)$'s are matrix polynomials in the lag operator of order q where lag length is chosen using the BIC criteria, $z_{i,t}$ is a vector of demeaned endogenous variables to account for country- fixed effects includes the log of export-weighted output index, log of real exchange rates, log of real exports with country-specific dimension $t = [1, \ldots, T_i]$ for each member $i = [1, \ldots, M]$, and ε_{it}'s are the composite structural white noise

[4] It is assumed that the structural shocks are orthogonal with respect to each other for each type. Put differently, the idiosyncratic shocks are mutually orthogonal to one another, as are the various common shocks to one another.

shocks.[5] These composite shocks are distributed independently over time, but may be cross-sectionally dependent.

To disentangle composite structural shocks into orthogonal common and country-specific idiosyncratic shocks, we can decompose each composite structural shock in the vector ε_{it} into $M \times 1$ vectors of a common shock $\bar{\epsilon}_t$ and a country-specific idiosyncratic shock $\tilde{\epsilon}_{it}$ using the equation:

$$\begin{gathered} \varepsilon_{it} = \Lambda_i \bar{\epsilon}_t + \tilde{\epsilon}_{it} \quad \text{where } E\left[\xi_{it}\xi_{it}'\right] = \begin{bmatrix} \Omega_{i,\bar{\epsilon}} & 0 \\ 0 & \Omega_{i,\tilde{\epsilon}} \end{bmatrix} \forall i,t, \quad E\left[\xi_{it}\right] = 0 \quad \forall i,t \\ E\left[\xi_{it}\xi_{it}'\right] = 0 \quad \forall i, s \neq t, \quad E\left[\tilde{\epsilon}_{it}\tilde{\epsilon}_{it}'\right] = 0 \quad \forall t, i \neq j \end{gathered} \tag{2}$$

where $\xi_{it} = \left(\bar{\epsilon}_t', \tilde{\epsilon}_{it}'\right)'$ and Λ_i is $M \times M$ diagonal matrix such that the diagonal elements are the loading coefficients $\lambda_{i,m}$, $m = 1, \ldots, M$. These restrictions imply that the co-variance matrix for the composite white noise errors ε_{it} has the form $E\left[\varepsilon_{it}\varepsilon_{it}'\right] = \Omega_{i,\varepsilon}$ which is also a diagonal co-variance matrix with arbitrarily normalizable variances subject to the adding up constraint implied by Eq. (2).[6]

To obtain estimates for the composite shocks ε_{it} defined in Eq. (2) and the associated impulse responses, we estimate a set of $M + 1$ reduced-form VARs: one for each country in the panel and an additional one using the cross-sectional averages[7]:

$$\begin{aligned} z_{1,t} &= B_i(L) z_{1,t} + e_{1,t} \\ &\vdots \\ z_{M,t} &= B_M(L) z_{M,t} + e_{M,t} \\ \bar{z}_{,t} &= \bar{B}(L) \bar{z}_t + \bar{e}_t \end{aligned} \tag{3}$$

where $B_i(L) = A_{i,0}^{-1} A_i(L)$, $\quad e_{i,t} = A_{i,0}^{-1} \varepsilon_{i,t}$, $\quad \bar{B}(L) = \bar{A}_0^{-1} \bar{A}(L)$, and $\bar{e}_t = \bar{A}_0^{-1} \bar{\varepsilon}_t$ gives the structural composite and common shocks from the reduced-form residuals. Hence, the next step is to estimate the idiosyncratic shocks $\tilde{\epsilon}_{it}$, and the loading matrices, Λ_i. This can be done using the conditions of the Eq. (2) where all of the structural shocks are *i.i.d* white noise and the co-variances between $\bar{\epsilon}_t$ and $\tilde{\epsilon}_{it}$ are all zero. As a result, we construct the loading matrix for the common factors by estimating the Eq. (2) for each i with OLS regressions. This leads to estimates of $\hat{\Lambda}_i$ as an $M \times M$ diagonal matrix with sample estimates of $E\left[\varepsilon_{it,m}\bar{\epsilon}_{t,m}\right] / E\left[\bar{\epsilon}_{t,m}^2\right]$ for $m = 1, \ldots, M$ along the diagonals.[8]

[5] The i and t subscripts on the time and cross-section dimensions take into account the unbalanced panel data.

[6] As suggested by Pedroni (2013), the imposed restrictions on the panel are consistent with the similar restrictions made upon the individual data if they were viewed as individual time series rather than as members of a panel.

[7] The reason is that when we obtain estimates for the composite shocks ε_{it}, and common shocks $\bar{\epsilon}_t$, $\tilde{\epsilon}_{it}$ and Λ_i can be recovered using the orthogonality properties of the shocks.

[8] As suggested by Pedroni (2013), we normalize the variances of both ε_{it} and $\bar{\epsilon}_t$ to be unity, $E\left[\varepsilon_{it,m}\bar{\epsilon}_{t,m}\right] / E\left[\bar{\epsilon}_{t,m}^2\right]$ is equal to simple correlation between ε_{it} and $\bar{\epsilon}_t$.

We then decompose the composite impulse responses for each country into the common and idiosyncratic impulse responses by combining the composite impulse responses to structural shocks using the following equation for each country i:

$$A_i(L) = A_i(L)\Lambda_i + A_i(L)\left(I - \Lambda_i\Lambda_i'\right)^{\frac{1}{2}} \tag{4}$$

where $A_i(L)\Lambda_i \equiv \bar{A}_i(L)$ and $A_i(L)\left(I - \Lambda_i\Lambda_i'\right)^{\frac{1}{2}} \equiv \tilde{A}_i(L)$ represent common and idiosyncratic impulse responses, respectively.[9] We report descriptive statistics for the cross-sectional distribution of the common and idiosyncratic responses including the median, mean and interquartile ranges which can be used as confidence intervals for the mean response relative to the cross-country sample distribution.

The data set of our study is a quarterly unbalanced panel data set from 21 EMs over the 2005:Q1-2018:Q4 period. We categorize the countries as net commodity-exporters and net commodity-importers based on the criteria in Aslam et al. (2016). They classify a country as commodity exporter if commodity exports in total exports are at least 35 percent or the net commodity exports in total exports and imports are at least 5 percent. In this context, 8 countries are net commodity exporters, while the remaining 13 are net commodity importers. Table A1 in the Appendix provides the list of the countries and their status with respect to net commodity-exporting.

Our panel VAR analysis employs three main country-level variables: the real exports, real exchange rate, and an indicator to represent the external demand. Merchandise export volume indices from the World Trade Organization (WTO) are used as the real exports variable. The real exchange rate indicator is the CPI-based real effective exchange rates, published by the Bank of International Settlements (BIS). To represent the external demand at the country level, we construct an export-weighted output index using the gross domestic product (GDP) of the five countries that a country exports most. GDP statistics of each countries' trade partners are taken from Bloomberg. All the variables are seasonally-adjusted and log-transformed.

Finally, one may think about the rationale behind the choice of aggregate series in the estimation process. There are two main reasons why we use aggregate country-level statistics instead of destination-based ones. First, since we follow a time series approach with quarterly data, seasonal adjustment is a critical dimension to consider in the estimation process. Unfortunately, we do not have seasonally adjusted destination-based export volume indices at the country level. Given that destination-level export series can have substantial and heterogeneous seasonal and calendar effects, controlling seasonality properly is of great importance.

[9]Following Pedroni (2013), we re-scale the size of the idiosyncratic shocks in order to interpret all impulse responses as unit shocks.

Second, contrary to our export series, which are in volumes, destination-based trade statistics are provided in nominal terms. It requires converting them to volumes using export price indices, which are not published at the destination level. Thus, it also requires aggregation.

3. Results

The impulse responses and variance decompositions of the export variable are shown in Figure 1 and Figure 2, respectively. According to the economic theory, positive external demand outlook and real depreciation of the local currencies are expected to have favorable effects on export levels (Goldstein and Khan, 1978). However, our results indicate that while the external income has a positive and statistically significant impact on export volume, the impact of the real exchange rate is positive but quite weak and insignificant. In addition to the impulse responses, variance decompositions also point out that there is a weak exchange rate impact on export volume. Overall, our findings suggest a disconnect between the export volumes and exchange rate movements for the 21 EMs in the sample. In this respect, our results are similar to the findings of Baek (2012) for Korea. They also document that exchange rate movements have a weak impact on Korean exports to the US.

One explanation for the weak link between trade and exchange rates may be the country-specific policies that distort the price-quantity adjustment. In practice, countries facing exchange rate disadvantages apply trade policies like a higher tariff rate or anti-dumping interventions to compensate for their trade drawbacks (Thorstensen et al., 2014; Nicita, 2013). Thus, gains of the exporter from an exchange rate appreciation in the destination country, for instance, may diminish because the destination country imposes higher import tariffs.

Panel SVAR methodology allows us to estimate the impulse-response functions and variance decompositions across countries. Our country-level results indicate a high degree of heterogeneity in terms of the impact of the real exchange rate on exports by countries. Given that several EMs in the sample are substantial commodity exporters and the previous evidence that the impact of exchange rate shocks on commodity trade may be weak (see Broda and Romaris, 2011), we further examine our findings. For this purpose, countries in our sample are divided into two groups depending on whether they are commodity exporters or not. Average idiosyncratic and common responses of export volumes to exchange rate shocks across countries with respect to their commodity-exporting status are reported in Figure 3 and Figure 4. In both cases, especially for the common shocks, we observe that the responses of export volumes to real exchange rate shocks differ according to the countries' commodity exporting status. On average, real exchange rate movements have a more substantial role in determining export volumes in commodity importer countries. Variance decompositions presented in Figure 5 and Figure 6 also support these findings. In a nutshell, being commodity-exporter for a country seems to weaken the impact of real exchange rate variations on export volumes.

To better understand the factors behind the weak response of exports to exchange rate shocks, we run several cross-section regressions in the second step. Our approach follows the ones of Mishra et al. (2014), Hao et al. (2017), and Bhattacharya et al. (2018) that estimate second step regressions using the individual responses from SVAR. Table 1 presents the results of estimations in which the dependent variable is the IRFs from the first step panel SVAR. In the first four columns, the response of export volumes to real exchange rate impulses in the 1-4 quarters are used, respectively. The fifth column presents the results of the model that have the average IRFs in the first four-quarter as the dependent variable.

Taking the previous empirical literature examining the link between exchange rate movements and trade volumes into account, we use three explanatory variables. The first variable is a dummy variable, COMEX, that takes the value one if the country is a net commodity exporter and zero otherwise. We follow Aslam et al. (2016) in classifying countries with respect to their net-commodity exporting status. Real exchange rate volatility is the second independent variable. We define real exchange rate volatility as the moving standard deviation of the quarterly changes in the real effective exchange rate following Arize et al. (2000), Bahmani et al. (2015) and López and Nguyen (2015). As a control variable, we use an export performance indicator, the export penetration, that represents a country's degree of export competition. According to World Bank (2020), it indicates the extend a country expands to global export markets. A high export penetration implies that there are fewer barriers to trade firms; thus, they can grow in foreign markets easier.

– Insert Table 1 about here. –

Results indicate that the coefficient estimate of the commodity exporter dummy variable is statistically significant and negative. That is to say, the exports of a commodity-exporter country respond weaker than that of a commodity-importer country, on average, to the same exchange rate shock. This result is in line with the already reported fact that commodities have a lower price elasticity of demand (see, Fally and Sayre, 2018). Since most of them do not have substitutes, contrary to most of the manufacturing products, commodities' responsiveness to price shocks originated from exchange rate movements are not as substantial as that of other export products. The results may also be interpreted as that exports of the commodity-exporter countries may not be hurt by exchange rate appreciations. At the same time, they also can not enjoy the positive effect of the exchange rate depreciation as much as the commodity-importer countries.

Exchange rate volatility has a statistically significant and positive coefficient estimate in line with previous literature.[10] Bussière et al. (2014) and earlier Campa and Goldberg (2005) provide evidence that higher exchange rate volatility leads to higher exchange rate pass-through to trade prices.[11] This pronounced pass-through helps prices to respond to the exchange rate more elastically, which in turn increases the responsiveness of the export volumes to exchange rate movements.

Furthermore, the results suggest that export penetration has a negative and statistically significant effect on the responsiveness of export volumes to exchange rate movements. For instance, an exchange rate appreciation causes the export volumes to decrease less for countries with higher export penetration, on average. This result can be interpreted as an increase in a country's diversification in global markets leads to a weakening in the relation between export volumes and the real exchange rate. Thus, a higher export market penetration ratio helps insulate the economy from the impact of substantial exchange rate fluctuations that emerging markets experience more frequently than the advanced economies.

4. Conclusion

This paper provides an examination of the effects of real exchange rate movements on export volumes and investigates whether the impact of exchange rate shocks on export volumes differs between commodity-exporter and commodity importer countries. Although our results provide no significant evidence for the whole dataset that real exchange rates and export volumes are related, the empirical evidence suggests that the responses of export volumes to real exchange rate shocks are heterogeneous across countries which is contingent upon whether the country can be considered as a commodity-exporter or commodity-importer. In particular, we observe that export volumes of commodity importers countries are more strongly linked to real exchange rate shocks compared to the those of commodity-exporter countries.

Our second step regression results also indicate that real exchange volatility and export penetration index of the countries have significant explanatory power for the response of export volumes to real exchange rate shocks. The results may be interpreted as that while the higher exchange rate volatility may lead to higher

[10] For robustness, we generate an alternative real exchange rate volatility variable using ARCH/GARCH methodology following Zhang et al. (2006), Baum and Caglayan (2006), and Hooy and Baharumshah (2015). Table A2 in the Appendix presents the results from the robustness tests that support the baseline results.

[11] In a county-level study for Brazil, Paiva (2003) reports that the significance of the exchange-rate movements on export volumes increases once the exchange rate volatility is controlled.

exchange rate pass-through to trade prices, an increase in a country's penetration index may provide some diversification benefits in global markets which result in a negative impact on the responsiveness of export volumes to exchange rate movements.

Overall, our results provide important policy implications for the policymakers in emerging markets that experience relatively larger and more frequent exchange rate fluctuations than the advanced economies. Given that the exchange rate volatility amplifies the impact of real exchange rate shocks on export volumes, policies that aim to ensure stability in exchange rate markets need to be followed to mitigate the distorting impact of the exchange rate fluctuations on trade, especially during the currency appreciations. Similarly, since a higher export penetration ratio may help insulate the economy from real exchange rate shocks, particularly when the currency appreciates, policymakers may implement economic liberalization and deregulation policies aimed at supporting export penetration by removing barriers to international trade to sustain more stable exports.

As part of future research, it would be interesting to extend our analysis also for import volume dynamics of the emerging markets. Moreover, further research could be useful in examining other countries with different characteristics, for example, -small open economies- which are price takers in the world market for goods and capitals.

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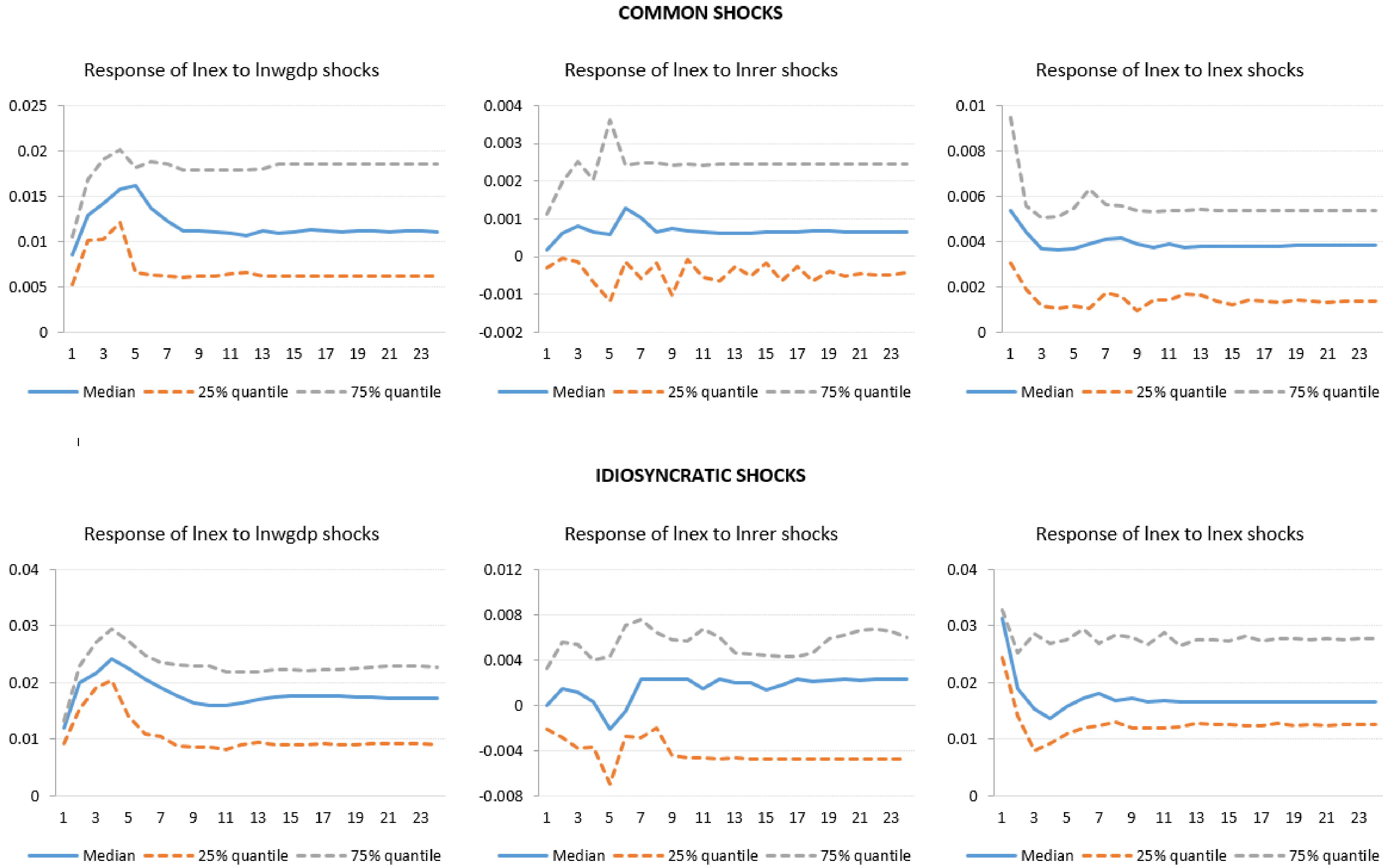
Figure 1: Impulse responses from Panel SVAR model



Notes: The blue solid line represents median effect, the dashed lines represent the 25th and 75th percentiles.

Figure 2: Variance decompositions from Panel SVAR model

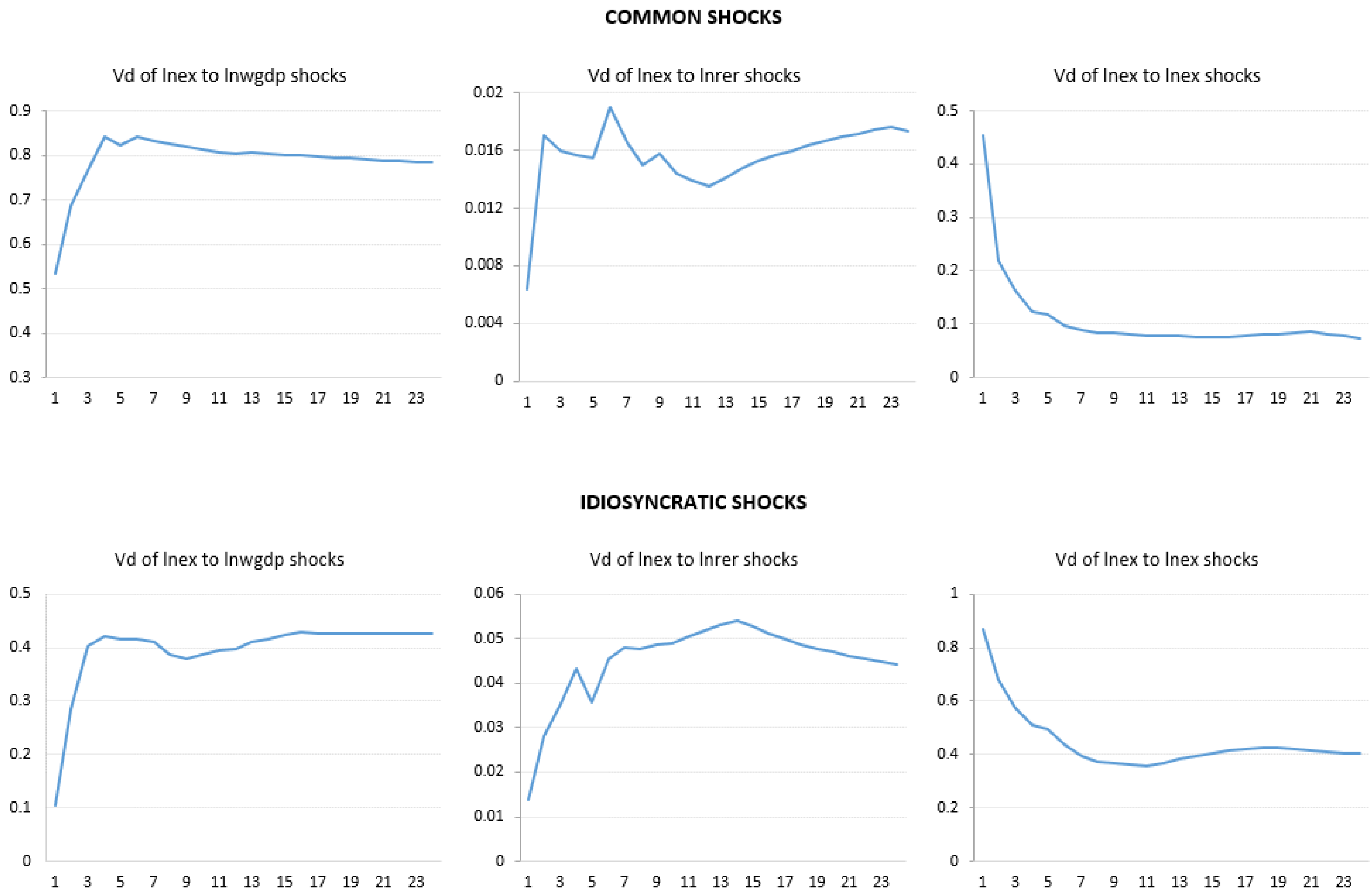


Figure 3: Individual member responses to common and idiosyncratic shocks

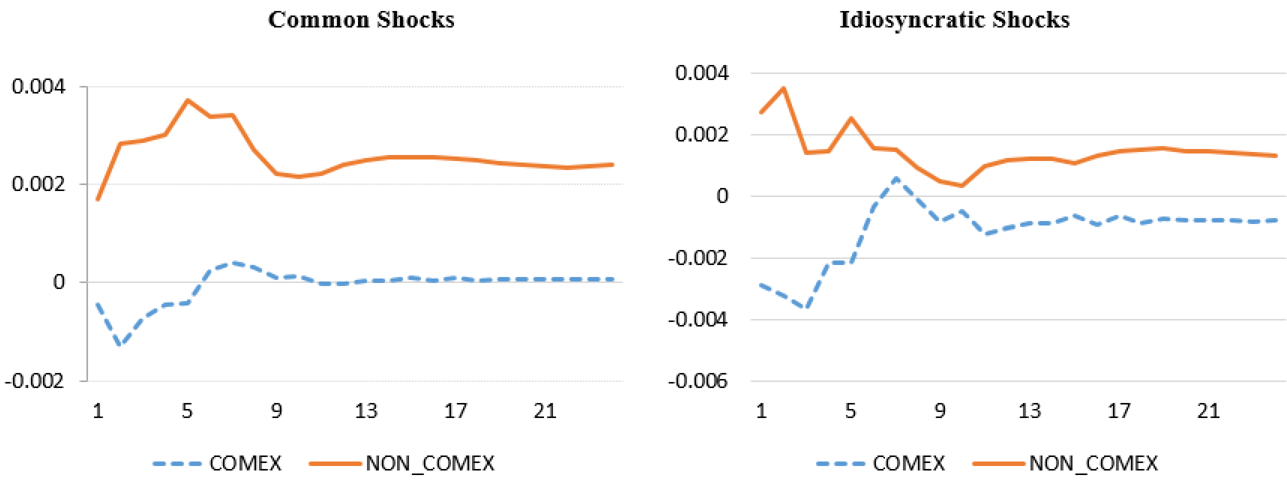


Figure 4: Average responses to common and idiosyncratic shocks

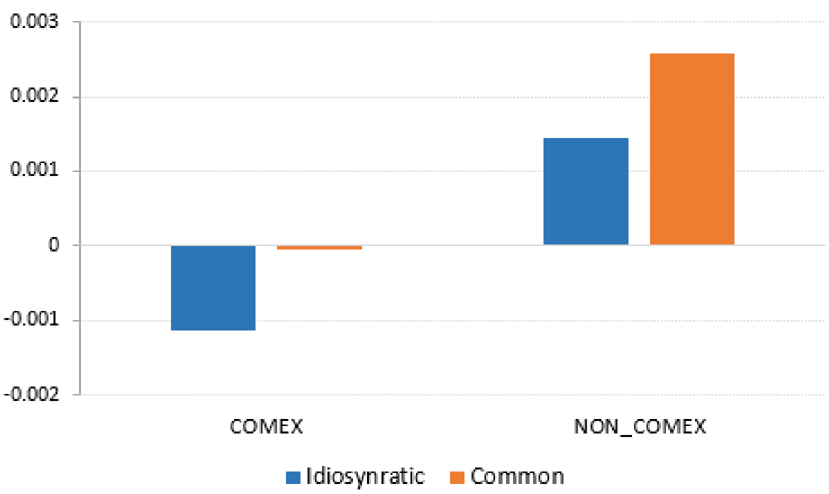


Figure 5: Individual member variance decomposition to common and idiosyncratic shocks

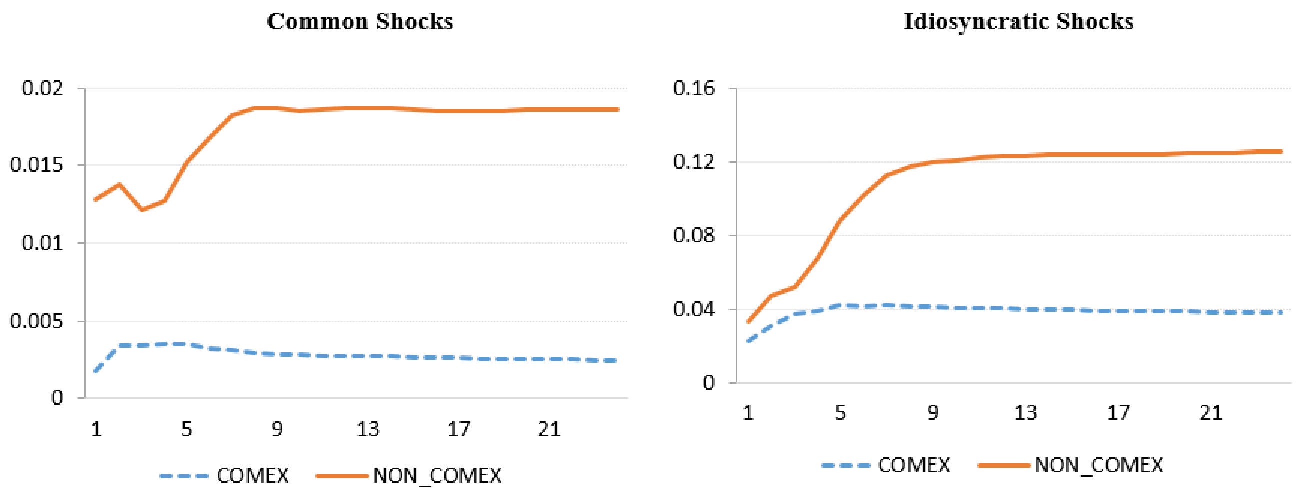


Figure 6: Average variance decomposition to common and idiosyncratic shocks

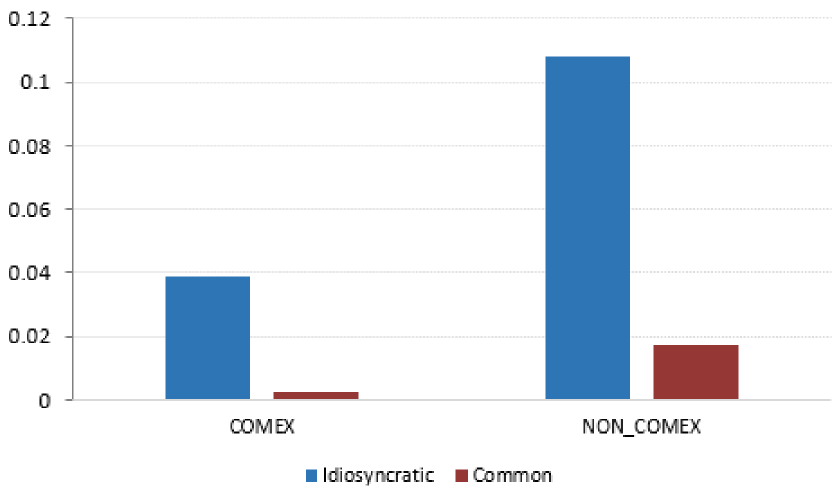


Table 1: Second-step regression results

	(1)	(2)	(3)	(4)	(5)
VARIABLES	IRF1	IRF2	IRF3	IRF4	IRF4av
COMEX	-0.009***	-0.012***	-0.013***	-0.011**	-0.011***
	(0.002)	(0.004)	(0.003)	(0.004)	(0.003)
REER Volatility	0.422**	0.236	0.803**	0.655	0.529*
	(0.171)	(0.295)	(0.326)	(0.488)	(0.256)
Export Penetration	-0.022***	-0.053***	-0.056***	-0.059**	-0.048***
	(0.007)	(0.010)	(0.019)	(0.024)	(0.011)
Constant	0.002	0.010*	0.002	0.004	0.005
	(0.003)	(0.005)	(0.007)	(0.011)	(0.005)
Observations	21	21	21	21	21
R-squared	0.515	0.526	0.537	0.319	0.579
F-stat	9.773	12.51	10.28	4.804	11.34

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix

Table A1: List of Countries and Their Net Commodity-Exporting Status

3-Digit Code	Country Name	Net Commodity Trade Status
ARG	Argentina	Exporter
BRA	Brazil	Exporter
CHL	Chile	Exporter
CHN	China	Importer
COL	Colombia	Exporter
CZE	Czechia	Importer
HUN	Hungary	Importer
IDN	Indonesia	Exporter
IND	India	Importer
KOR	South Korea	Importer
MAR	Morocco	Importer
MEX	Mexico	Importer
MYS	Malaysia	Exporter
PER	Peru	Exporter
PHL	Philippines	Importer
POL	Poland	Importer
ROU	Romania	Importer
RUS	Russia	Exporter
THA	Thailand	Importer
TUR	Turkey	Importer
ZAR	South Africa	Importer

Table A2: Second-step regression results: robustness with alternative REER volatility

	(1)	(2)	(3)	(4)	(5)
VARIABLES	IRF1	IRF2	IRF3	IRF4	IRF4av
COMEX	-0.009***	-0.012***	-0.012***	-0.010**	-0.011***
	(0.002)	(0.003)	(0.003)	(0.004)	(0.003)
REER Volatility	0.379**	0.218	0.624*	0.468	0.422*
	(0.158)	(0.254)	(0.301)	(0.461)	(0.235)
Export Penetration	-0.023***	-0.053***	-0.056***	-0.058**	-0.047***
	(0.007)	(0.010)	(0.019)	(0.024)	(0.012)
Constant	0.002	0.010*	0.003	0.006	0.005
	(0.003)	(0.005)	(0.008)	(0.011)	(0.005)
Observations	21	21	21	21	21
R-squared	0.523	0.529	0.501	0.293	0.560
F-stat	10.26	13.81	9.986	4.153	11.36

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1