

A large container ship is docked at a port, with numerous stacks of shipping containers. The containers are primarily green and blue, with 'EVERGREEN' and 'COSCO' logos visible. The ship's hull is dark green with 'EVERGREEN' written in large white letters. In the background, port cranes and the text 'Port of Baltimore USA' are visible. The scene is set during dusk or dawn, with a soft, dim light.

Global value chains and export elasticities: all linkages matter

François de Soyres *et al.* consider the consequences of international input-output linkages on exchange rate elasticities

When a country's currency depreciates, its export volumes are expected to increase. Yet some recent episodes suggest that exports now barely respond to significant exchange rate movements. This column argues that global value chains are an important part of the answer, as countries now need to import to export, and often re-import their exports. To assess the consequences of international input-output linkages on exchange rate elasticities, policymakers need indices of global value chain participation based on currencies rather than countries.

Economics textbooks outline a clear-cut relationship between movements in a country's exchange rate and its export volumes. When a currency depreciates, export volumes are expected to increase by some amount. By how much exports increase is referred to as the exchange rate elasticity of exports. Yet, some recent episodes of significant exchange rate movements, such as those in Japan (2012-2014) and the UK (2007-2009), were not associated with very large movements in trade volumes (Leigh *et al.* 2015). This perceived unresponsiveness of exports to exchange rate fluctuations has raised the question among some commentators as to whether the exchange rate elasticity of export volumes has changed, or even become zero.

The latest research suggests that global value chains (GVCs), and more generally the development of international production, could be one important part of the answer. Firms increasingly (i) use imports to produce exports and (ii) export inputs that are re-exported further by their trading partners.

An example of the former is a car manufacturer in Germany that exports finished products to Mexico. The car manufacturer imports parts and components – for example the gear box or the microchips that connect the car to the internet – to produce the exported car. As an example of the latter, the same German manufacturer can export inputs (gear boxes or microchips) to a subsidiary or another firm in Mexico that assembles a finished car for exports and final consumption in the US.

Alternatively, the domestic value-added embedded in the German exports to Mexico can also be returned to Germany for final consumption (as re-imported exports). With such complex linkages in the production process of exporters, the consequences of a currency devaluation for export volumes depend on the details of both upstream and downstream interconnections with other countries. In other words, it depends on where all (direct and indirect) imported inputs come from and on what is the destination of final consumption.

... policymakers would do well to produce indices of global value chain participation based on currencies rather than countries

The literature

A greater share of imported inputs in exports imply that any export price competitiveness gained by currency depreciation is partly offset by increasing costs of those imported inputs. Using a panel of 46 countries over the period 1996-2012, Ahmed *et al.* (2015) show that GVC participation lowers the elasticity of manufacturing exports to the real effective exchange rate (REER) by 22% on average and by close to 30% for countries with highest GVC participation.

Arbatli and Hong (2016) find that growing participation in global production chains and rising export complexity of products are important determinants of Singapore's export elasticities. Imbs and Mejean (2017) confirm that trade elasticities can differ because of the specialisation of consumption, of production, or because of international differences in sector level trade elasticities.

Other factors that could reduce the responsiveness of exports to exchange rate movements relate to the increasing use of pricing-to-market strategies among large exporters that tend to keep their export prices stable and absorb any variability in the exchange rate in their markups. Based on Belgian firm-product-level data, Amiti *et al.* (2014) find that import intensity and market share are key determinants of exchange rate pass-through.

New results

In our new paper (de Soyres *et al.* 2018), we use sectoral data for 40 countries and 33 sectors between 1995 and 2009 and apply recent advances in the value-added decomposition of trade flows to precisely pin down the importance of three key measures of international production fragmentation. First, we find that an increase in the export's share of foreign value-added from a country with a different currency (the 'FV index') reduces the change in export price in response to exchange rate movements, hence lessening the associated change in export volumes.

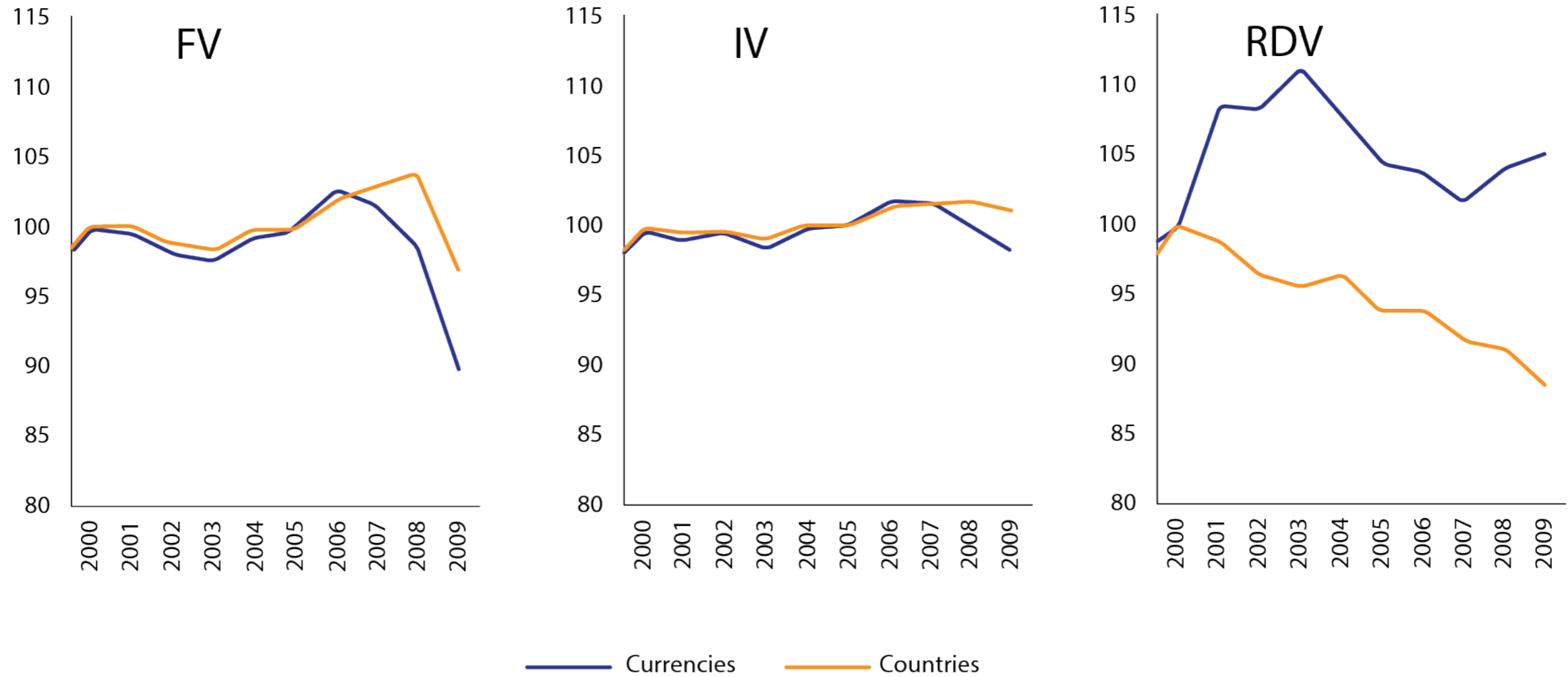
Second, we show that a greater share of exports that return as imports in a country sharing the same currency (the RDV index) weakens the exchange rate responsiveness of exports. Simply put, if the final demand driving one's exports is located at home or in a country with the same currency, a devaluation can do little to boost those trade flows.

Third, an increase in the share of exports used in the destination country to produce further re-exports which are ultimately consumed in a third country (the IV index) increases the responsiveness of trade flows to the direct trading partner's nominal effective exchange rate, creating significant inter-dependence across countries. This mechanism underlines the high degree of international interconnection that characterise today's production processes.

When assessing the consequences of currency movements on exports, one must be cautious about accounting for the extent of currency unions and currency pegs. Indeed, when measuring the share of foreign value-added in exports, one should not account for imports stemming from countries sharing the same currency as the price of those are not affected by a devaluation. The same argument applies when constructing the domestic value added that is re-imported home or the share that is re-exported and absorbed in a third country. The definition of what is home and foreign must be based on currency, not countries. As shown in Figure 1, the time series variation of indices based on countries and currencies do not display the same properties.

Interestingly, the estimates presented in Figure 2 show not only that a higher participation in international production decreases the exchange rate elasticity of exports, but also that it is possible for a currency devaluation to actually reduce a sector's exports to a specific destination. As a polar case, imagine a sector that sources a significant share of its input from a country with a different currency, sells its good abroad, which are is re-imported

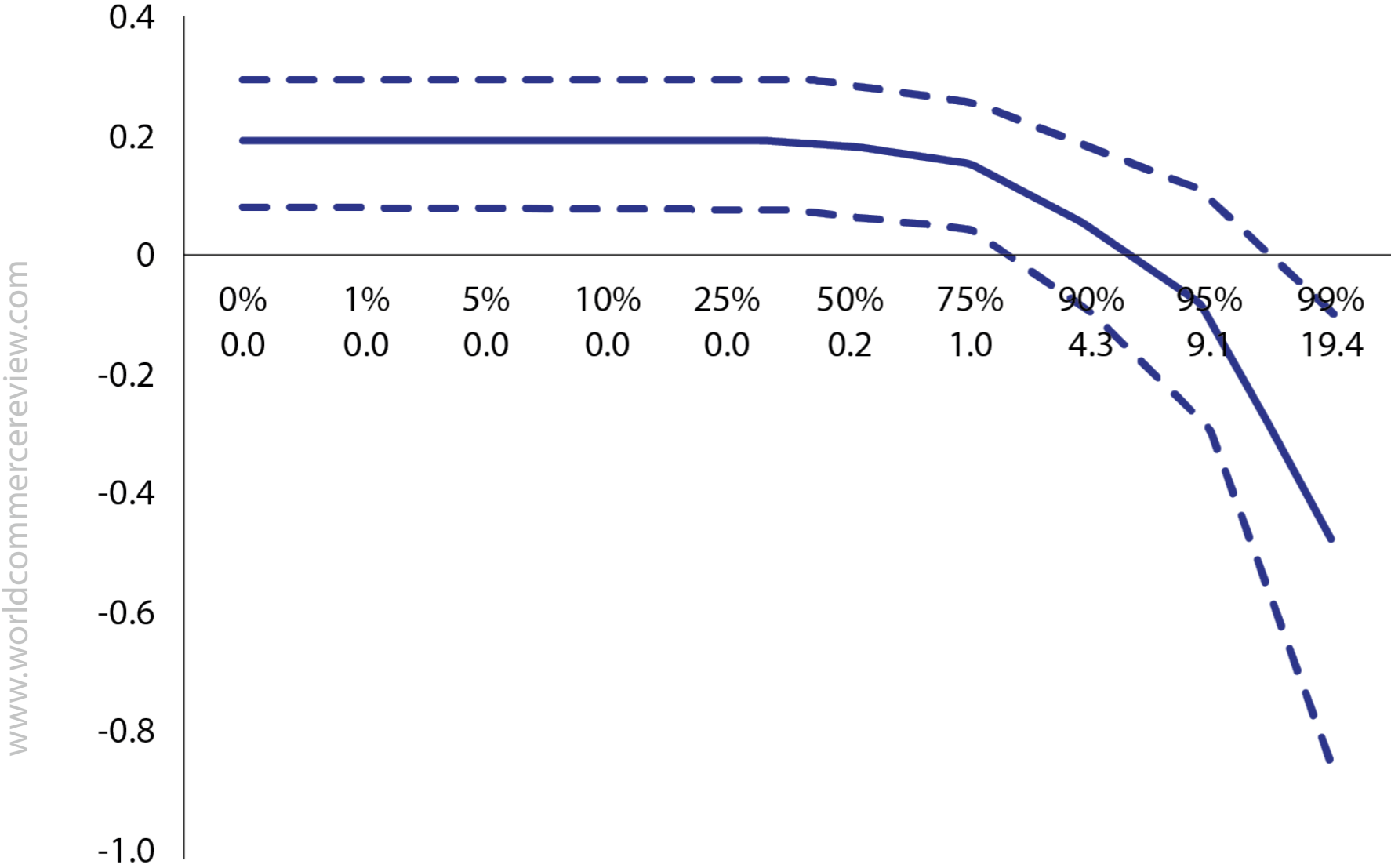
Figure 1. Time series properties of three indices of global value chain participation



Notes: Computations based on WIOD database. Indices are normalised at 100 in 2000 and show differences in time series properties of indices based on countries (yellow) and currencies (blue). FV is the foreign value added in exports, IV is the domestic value added in exports that is used for re-exports and ultimately absorbed abroad, RDV is the domestic value added in exports that ultimately returns home.

Source: de Soyres et al. (2018).

Figure 2. Elasticity of export volumes to exchange rates for different quantiles of FV and RDV indices



Notes: The horizontal axis corresponds to the different quantiles of both FV and RDV indices observed in the data and based on currencies. The curve plots the corresponding elasticity of export volumes to exchange rates. For sectors with the highest level of both FV and RDV, the corresponding elasticity is negative, meaning that a devaluation would decrease exports.

Source: de Soyres et al. (2018).

back for domestic consumption. In such a case, due to the foreign value-added part, a devaluation would increase the production price in domestic currency.

Moreover, since final demand is located at home, consumers simply see an increase in the final price and hence decrease consumption. The fact that the good was exported and then re-imported means that the lower domestic consumption will translate into a decrease in the country's exports. Such a negative effect of devaluation on export volumes underlines the importance of using precise input-output data when forecasting the effect of currency changes.

Policy implications

In order to precisely assess the consequences of international input-output linkages on exchange rate elasticities, policymakers would do well to produce indices of global value chain participation based on currencies rather than countries. This would allow them to track the origin of the imported inputs but also the country of final consumption for all their exports.

Looking ahead, the development of global value chains is likely to decrease the sensitivity of exports to exchange rates. However, this conjecture depends on where countries expand their international footprint. For example, for countries developing a regional value chain, several forces are at play.

Sourcing inputs from a country with the same currency has no impact on the relationship between exports and exchange rate, but exports returning to a country with the same currency decreases the elasticity. Hence, future

developments in international linkages might have different impact depending on the joint evolution of both global value chain participation and common currency areas. ■

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