Cost-push inflation and world input-output tables/Analyzing cost-push inflation using world input-output tables

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*This column analyses cost-push inflation using world input-output datasets (WIOTs). In the light of the recent surge in commodity prices following Russia’s invasion of Ukraine, we illustrate which countries are most vulnerable to energy-cost-push inflation. Eastern and central European economies are particularly exposed to a rise Russian hydrocarbon prices. In a second step, we use WIOTs to document the heterogeneous reactions of consumer prices to exchange rate variations across countries, reflecting differences in foreign product content of consumption and intermediate products.*

With the rise of global value chains, numerous researchers have used world input-output tables (WIOTs) to shed light on international economics issues. These tables are helpful to measure exposure to international risk (Borin, Mancini and Taglioni 2022), allocate carbon emissions across countries (Airebule, Cheng and Ishikawa 2022) or look into the beneficiary of trade-generated income (Bohn, Brakman and Dietzenbache 2021). In a recent paper (Camatte et al., 2021) we use WIOTs to analyze cost-push inflation.

In this column, we illustrate the vulnerability of Western economies to a rise in energy prices. We pay particular attention to country-specific exposures to Russian hydrocarbons.

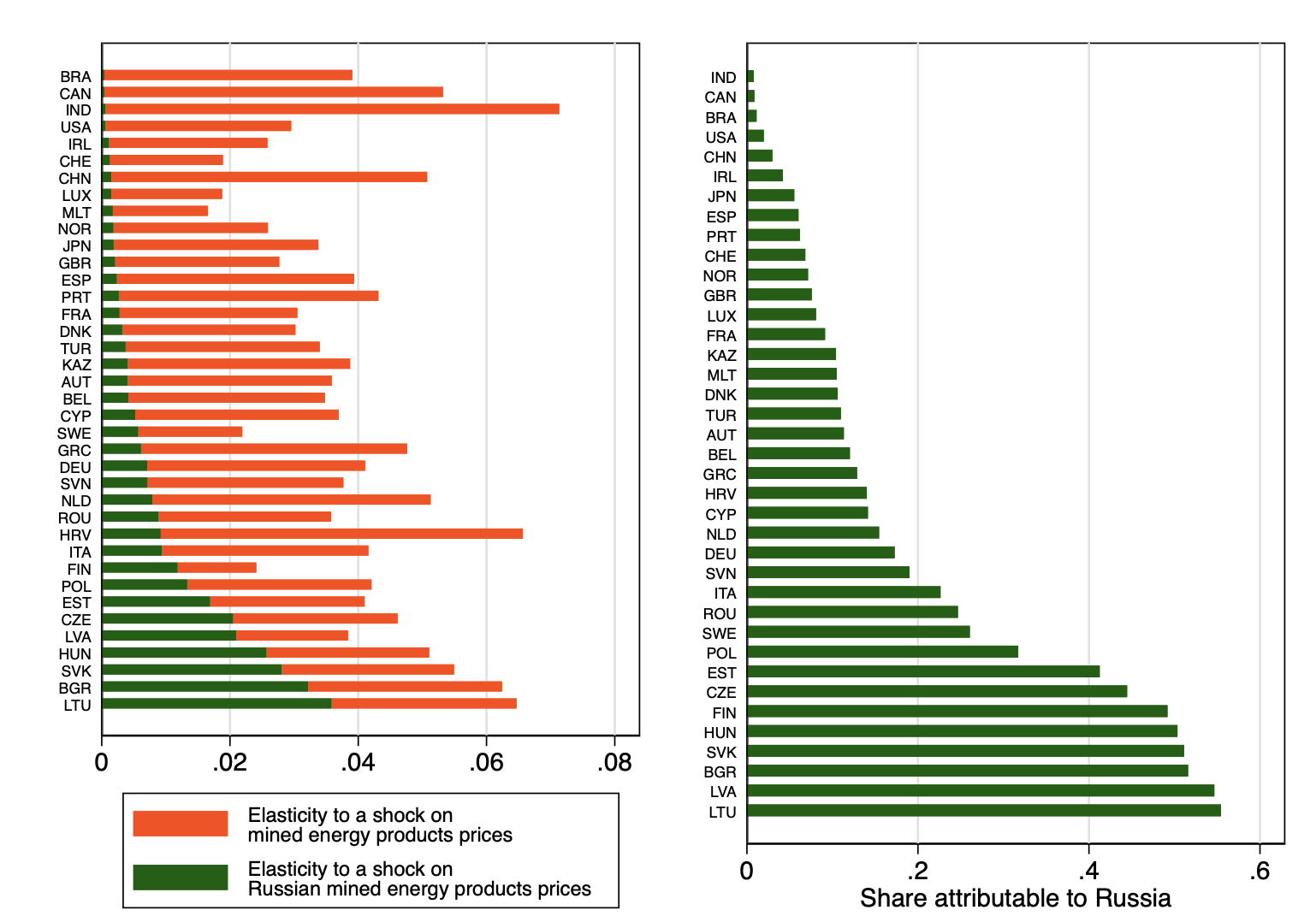
In a second stage, we use WIOTs to illustrate the impact of exchange rate movement on inflation.

# Vulnerability to hydrocarbon prices

Soaring commodity prices in the wake of Russia’s invasion of Ukraine have shed light on the vulnerability of Western economies to energy-price cost-push inflation. Germany is particularly vulnerable to an increase in Russian natural gas prices (Afunts, Cate, Helmschrott and Schmidt 2022). Using WIOTs covering most advanced and emerging economies, we illustrate which countries are most affected by a rise in energy prices. Our accounting approach aims to illustrate interdependencies and vulnerabilities to cost-push inflation. Hence, we do not intend to assess the economic impact of the war in Ukraine. Such an assessment would require in-depths studies with sophisticated behavioral assumptions to account for product substitution and price adjustments.

Figure 1 represents the elasticity of consumer prices to a shock on energy prices. Central and eastern European economies are most affected by a shock on Russian hydrocarbon prices.

Figure 1 : Vulnerability to hydrocarbon prices and Russian hydrocarbon price increases, WIOD



An important caveat is that our computations rely on the latest version of WIOD, which was published in 2016.

Indeed, the construction of World Input-Output tables is data-demanding and WIOTs are typically released with a lag of several years. To address this concern, we propose below a simple accounting tool to fill the data gap for the most recent years.

# Elasticity of consumer prices to exchange rate variations over two decades

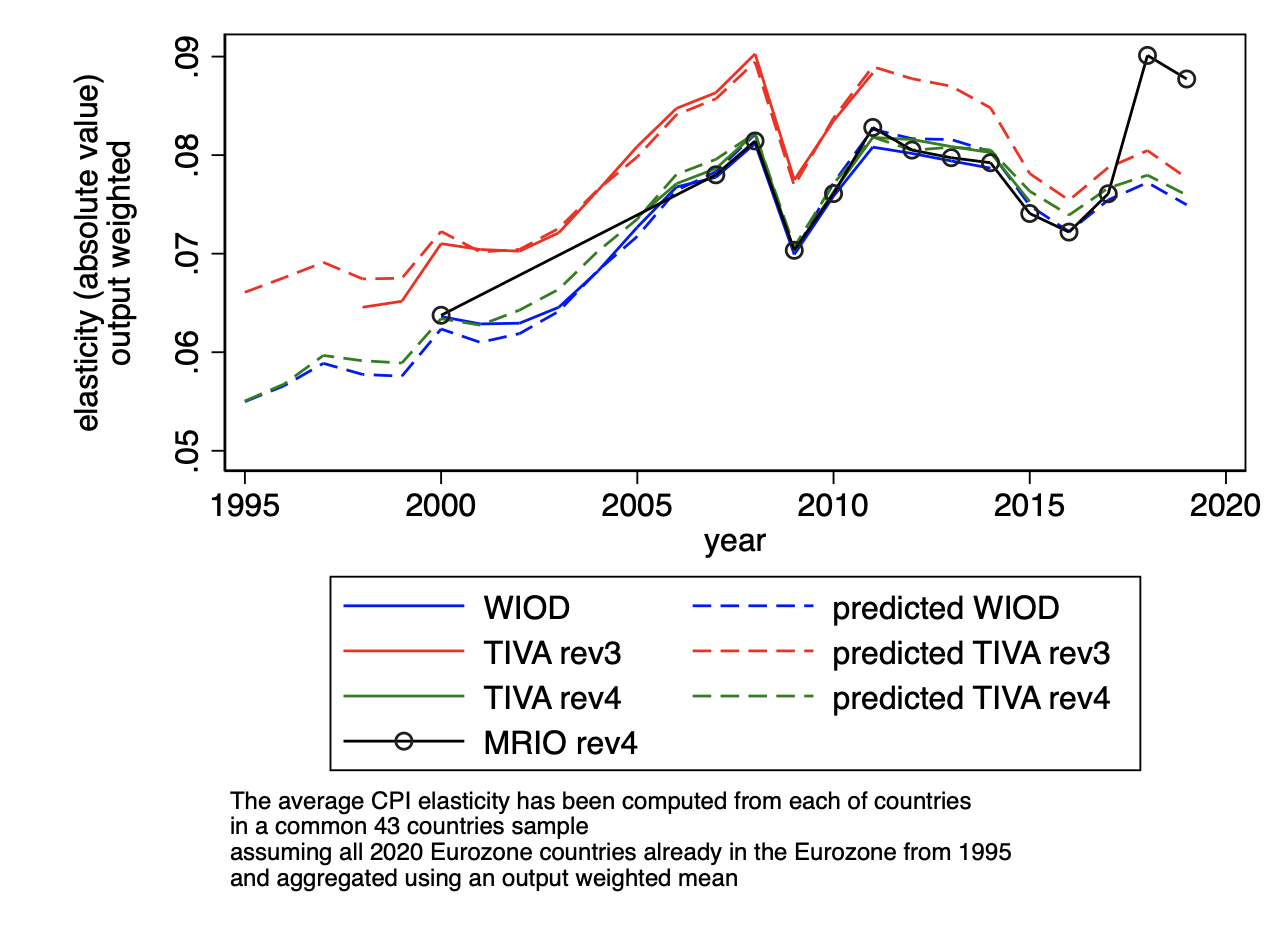
World input-output tables are also helpful to illustrate how exchange rate movements impact inflation. The transmission of exchange rate movements differs across countries. It depends, among other things, on their respective trade openness, the relative integration of sectors and firms in international production chains and the currency of invoicing for trade. In a recent paper (Camatte et al., 2021), we analyze the impact of exchange rate variations on domestic consumer prices using several datasets covering most advanced and emerging economies, from 1995 to 2019.

In line with the existing literature, we find that in response to a 1% appreciation of the domestic currency, domestic consumer prices decrease by around 0.10% on average at the world level. The impact of exchange rate variations on consumer prices has remained broadly stable over the past two decades. We find that the mean output-weighted elasticity of consumer prices slightly increased from 2000 to 2008. After peaking in 2008, the elasticity sharply declined in 2009 and has hovered around 0.1 in subsequent years.

Our results are likely an upper bound since our accounting approach relies on the simplifying assumption that exchange rate fluctuations completely pass-through to import prices. However, a large body of literature suggests that the pass-through is incomplete, even in the long run, as a result of slow nominal price adjustments or the pricing-to-market behaviour of firms. Hence, using alternative assumptions would entail lower estimates. Still, our estimates are useful to compare the pure accounting vulnerability of different economies to an exchange rate shock.

Interestingly, Figure 2 shows that our findings are robust to using two different datasets (TiVA from the OECD and WIOD). We also show that a precise assessment of the impact of exchange rate variations on consumer prices can be estimated without resorting to world input output tables. The construction of World Input-Output tables is data-demanding and WIOTs are typically released with a lag of several years. As a result, most WIOTs are not available for the most recent years. To fill the data gap, we extrapolate the impact of exchange rate variations on consumer prices using up-to-date GDP and trade statistics on imported consumption and intermediary goods. The dotted line on Figure 2 shows that we obtain a reliable estimate. We thus provide a simple accounting tool to estimate the percentage change in prices in response to exchange rate variations for the most recent years.

Figure 2: Elasticity of domestic prices to exchange rate shocks.



Sources: WIOD, TIVA, MRIO, World Bank, BACI and Camatte et al. (2021)

# Heterogeneity and channels of the effect of exchange rate variations on consumer prices

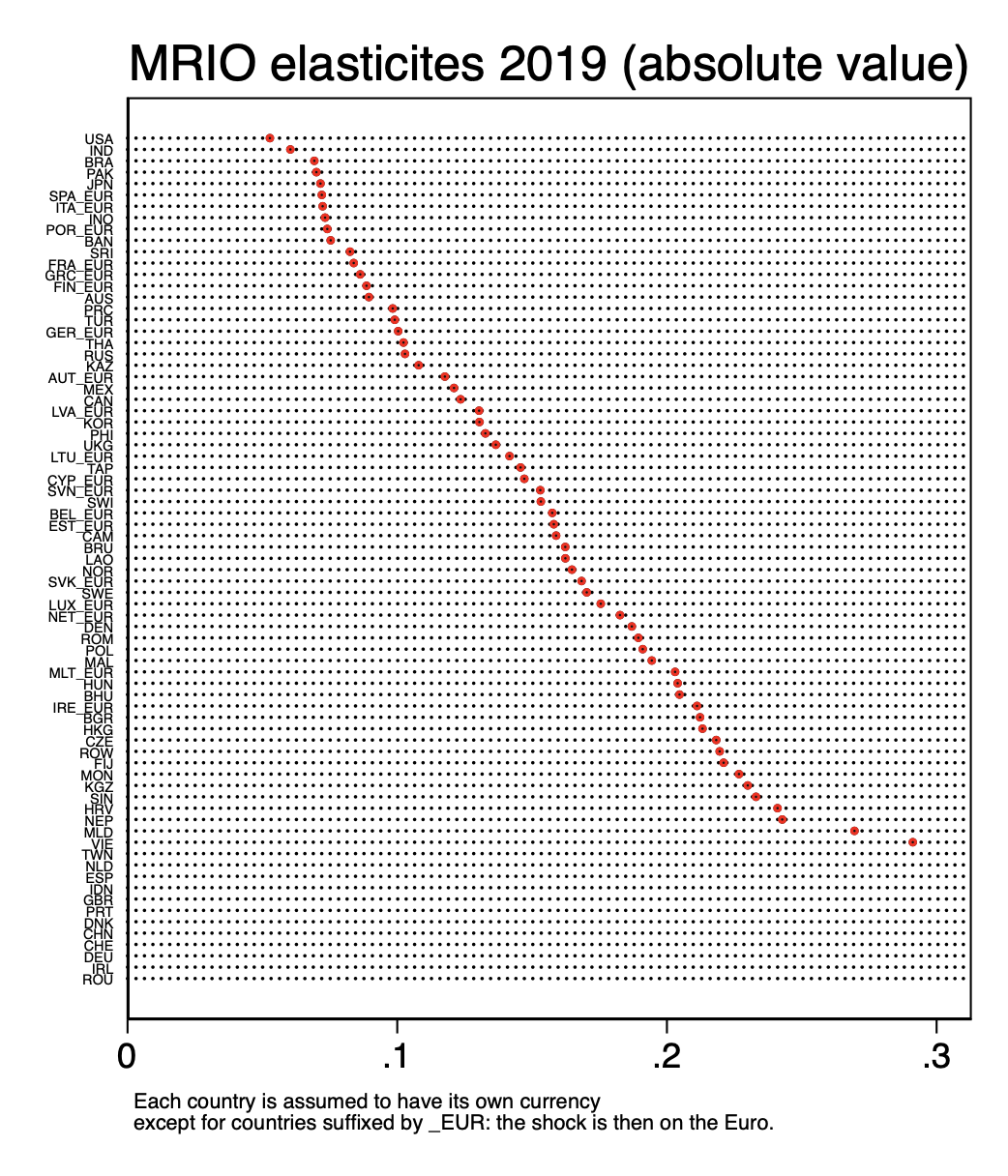
Depending on the country, the impact of a 1% exchange rate fluctuation on domestic prices ranges from 0.05% to 0.22%, reflecting different degrees of openness to trade and differences in foreign product content in domestic consumption. The elasticity is lower for large advanced and developing countries. For instance, we find an elasticity of 0.06 for the US.

Within the euro area, the elasticity of domestic consumer prices differs substantially.

It ranges from 0.07 in Italy to 0.18 in Ireland, a small open economy with a large traded sector and a large share of trade outside the euro area. For larger countries (France, Germany, Italy and Spain) and countries whose trade is concentrated with euro area partners (such as Portugal and Greece), the elasticity is close to 0.10%, reflecting a lower degree of openness to trade%. The elasticity is twice higher for small open economies like Luxembourg, Malta, Slovakia and Ireland.

The value of the elasticity is closely, but not perfectly, related to the share of imported goods and services in household consumption. Overall, the higher a country’s import share in consumption, the higher the elasticity of domestic consumer prices to the exchange rate.

Figure 3 Elasticity of consumer prices to a shock in the domestic currency (\*\*Le faire en extrapolé pour 2019)



We also analyse the role of global value chains in the transmission of an exchange rate appreciation. We identify four channels through which an exchange rate appreciation impacts consumer prices when production processes are global:

i) the price of imported final goods sold directly to domestic consumers;

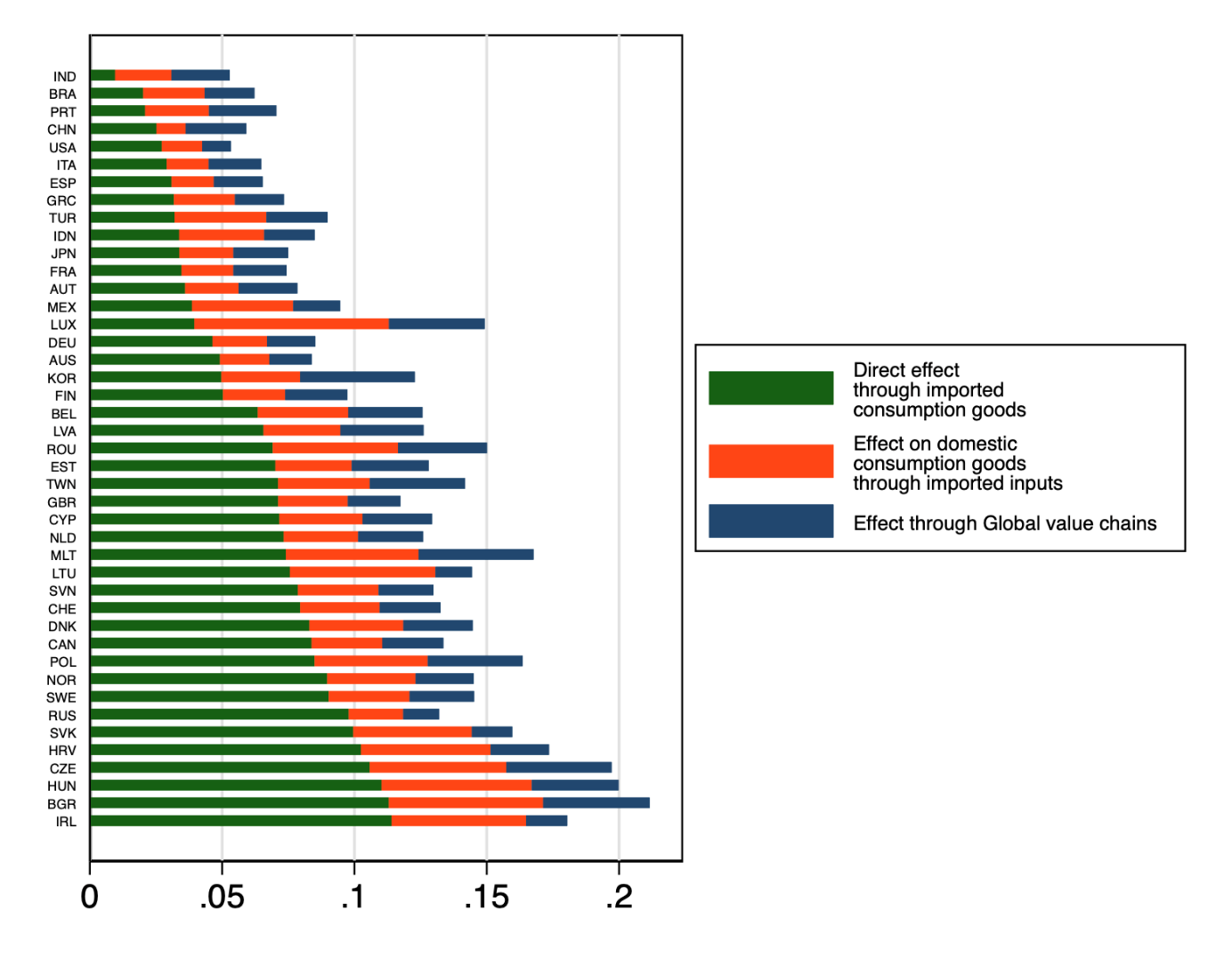
ii) the price of imported inputs entering domestic production;

iii) the price of exported inputs feeding through imported foreign production;

iv) changes in domestic and foreign production costs in turn pass through to the price of inputs for domestic and foreign goods, causing further production costs variations through input-output linkages.

We find that the first two channels explain three-quarters of the transmission of an exchange rate appreciation to domestic prices. The last two channels, which reflect the impact of participation in global value chains, play a limited role, with marked across-countries heterogeneity.

Figure 4 : Channels of the exchange rate shock effect on consumer prices (WIOD, 2014) -- \*\* À faire en couleur\*\*



# Conclusion

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