

Dear Editor, dear referee

Thank you very much for this opportunity to revise our manuscript. Please find the presentation of what we have done below.

Journal of International Money and Finance

Editor and Reviewer comments:

Reviewer #1: This paper uses an accounting approach to estimate the elasticity of the household consumption expenditure (HCE) deflator to the exchange rate. After estimating these elasticities for many countries, it explores their heterogeneity across countries and over time. The authors find that countries that consume a larger share of imported goods and services experience higher elasticities. Countries vary in the determinants of the HCE deflator elasticity (e.g. consumption of domestic vs. imported good; sector composition). Changes in the use of imported inputs have affected the value of these elasticities over time. Finally, the authors show that the estimated elasticities are well predicted by the share of imported consumption good in GDP and the share of imported inputs in GDP.

- The paper is difficult to read. Part of it is the organisation of the information and another part of it is the exposition. I understand input-output linkages well and still had to think hard about all the relationships discussed in section 2, and various parts of the paper (I'll be specific in my comments below).

Thank you for your comment. We have strived to simplify the exposition of the information and to better organize the paper. For instance, we moved some parts of Section 2 to the appendix. To simplify the main text and make it easier to read, we have redrafted some parts of the paper and put some technical explanations in footnotes.

- The analysis makes assumptions on the degree of the exchange rate pass-through (ERPT) and currency pricing. These assumptions imply estimated elasticities are an upper bound. It would be

great if the authors could incorporate a discussion of the consequences of this for their findings. While I do agree the assumptions bias estimates elasticities upwards, I am not sure the cross-country heterogeneity is correctly identified. If one looks at Figure 1, Taiwan has a greater elasticity than Canada but that might not be the case if the bias from the assumptions on Taiwan's calculations is worse than that on Canada's. This point is particularly important given that cross-country heterogeneity is explored in section 3.1. and 3.2.

We incorporated a discussion of the consequences of our simplifying assumptions in the introduction. In particular, we stress that: "we suppose that all pricing occur using the currency of the producing country. The invoicing decision is an active channel through which producers adjust their prices in relation to their own market power and to local competitive pressures. Prices fixed in the local currency are sticky in the currency of the destination market and irresponsive to changes in the bilateral exchange rate between the local currency and the currency of the producer. By contrast, prices fixed in the producer's or dominant currency have a higher ERPT. Contrary to our hypothesis, a large body of empirical literature suggests that the vast majority of trade is invoiced in a small number of 'dominant currencies', with the U.S. dollar playing a major role. The 'dominant currency paradigm' (\cite{Gopinath2020}) implies that for non-U.S. countries, the ERPT into import prices (in home currency) should be high and driven by the U.S. dollar exchange rate as opposed to the bilateral exchange rate, whereas for the U.S. the pass-through into import prices should be low. \cite{Gopinath2010} also show that there is a large difference in the ERPT of the average good priced in dollars (25\%) versus non-dollars (95\%). Hence, using alternative pricing assumptions would entail lower estimates of the elasticity of consumer prices to the exchange rate."

Regarding the cross-country heterogeneity, we underline in the introduction that "the upward bias stemming from our simplifying assumptions is unlikely to be constant. The magnitude of the bias likely depends on the size of the economy. In particular, it is likely that in large and attractive markets, competitive pressures may push producers to adopt local currency pricing strategies, where exporting firms adapt their mark-ups depending on the destination market to offset exchange rate movements. Hence, we would expect the upward bias in our estimated elasticities to be more pronounced for the largest and most attractive markets represented in our sample."

We have also added a paragraph to discuss these caveats more thoroughly in section 3.1, when we discuss the cross-country heterogeneity. The paragraph reads as follows:

"Caveats and comparison with the existing literature

Our computations rely on several simplifying assumptions which bias our estimates upwards. First, we assume 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. ^{\footnote{For example, the pass-through depends on the intensity of competition in domestic markets: while an exchange rate appreciation lowers the price of imported inputs, a firm with limited competitive pressure may avail of greater profit margins rather than reduce prices in an effort to maintain its market share. Based on Belgian firm-product-level data, \cite{Amiti2014} find that import intensity and market share are key determinants of the ERPT to export prices.}} Hence, pricing-to-market strategies of exporters aiming to defend their market shares would imply a lower exchange rate pass-through. As a result, our estimates provide an upper bound of the HCE deflator elasticity compared to other results in the literature. In addition, we work under the producer pricing assumption. However, in large and attractive markets, competitive pressures may push producers to adopt local currency pricing strategies, where exporting firms adapt their mark-ups depending on the destination market to offset exchange rate movements. Under the local currency pricing paradigm, prices are thus sticky in the currency of the destination market. Hence, using alternative pricing assumptions would entail lower estimates of the HCE deflator elasticity. The magnitude of the upward bias stemming from our simplifying assumptions is unlikely to be constant in our sample given the cross-country heterogeneity. In particular, it is likely that in large and attractive markets, competitive pressures may push producers to adopt local currency pricing strategies, where exporting firms adapt their mark-ups depending on the destination market to offset exchange rate movements. Hence, we would expect the upward bias in our estimated elasticities to be more pronounced for the largest and most attractive markets represented in our sample.

Despite these caveats, our results broadly concur with the literature. \cite{Aydogus2018} examine pass-through to the domestic price level through an input–output model for 26 countries and 27 sectors, using I-O tables from the OECD Stan Database. Just like us, the authors provide an upper bound and conclude that results from the I-O model are not excessively high compared to the ERPT literature. The estimated impacts of an exchange rate shock to the CPI range

from 0.07 for the US to 0.34 for Ireland, with a simple average of 0.18. Overall, elasticities estimated by \cite{Aydogus2018} tend to be slightly higher than ours. For instance, our results concur with \cite{Aydogus2018} for Australia, the US, Brazil or Canada. However, the authors find an elasticity close to 0.16 for France, Germany, Italy and Spain, whereas our results are closer to 0.10. Elasticities estimated by \cite{Aydogus2018} are much higher for Estonia and Ireland (respectively, 0.31 and 0.33 vs 0.15 and 0.18 according to our computations). \cite{Colavecchio2020} focus on the ERPT to consumer prices in the euro area from 1997 to 2019 using local projection techniques.\footnote{To the best of our knowledge, the literature using WIOTs mostly focuses on the transmission of production shocks through input-output linkages. By contrast, we use WIOTs to analyse cost-push inflation. As a result, and despite differences in methodologies, we rely on the ERPT literature to compare our estimates of the HCE deflator with the existing literature.} The authors find a statistically significant linear ERPT to domestic prices of 0.07 for Italy, 0.08 for Belgium and Portugal, 0.09 for Germany, 0.12 for Spain, 0.13 for Austria and Greece, 0.14 for the Netherlands and Finland and 0.23 for Lithuania after two years. \footnote{The linear ERPT to consumer prices estimated by \cite{Colavecchio2020} for the euro area as a whole is not statistically significant.} These figures concur with our estimates ranging from 0.07 to 0.18 for euro area countries (see Figure \ref{fig:WIOD_HC_elasticities})."

In addition, we have added a paragraph to discuss these caveats in section 3.2, when we discuss the impact of an appreciation of the US dollar. The paragraph reads as follows:

\paragraph{Caveats} \ As underlined in Section \ref{subsec:prixconso}, our computations rely on several simplifying assumptions which bias our estimates upwards. Although we assume a full exchange rate pass-through, the theoretical framework underlying the "dominant currency paradigm" (DCP) predicts that pass-through from exchange rates to prices or quantities vary across countries, depending on the share of imports invoiced in dollars. For instance, \cite{Boz2019} find that the dollar pass-through is systematically related to the importing country's dollar invoicing share. According to the authors, importing country's share of imports invoiced in dollars explains 15\% of the variance of dollar pass-through across country pairs. Country pairs with the largest-in-magnitude pass-through of the dollar into prices or quantities tend to be the dyads with the highest importer dollar invoicing share. These findings suggest that the upward bias in our estimates is unlikely to be constant across countries. Since the DCP literature suggests that countries invoicing more in US dollars tend to experience greater US dollar exchange rate pass-through to their import prices, we expect the upward bias in our estimates to be minor for those economies. We assess cross-countries variations in

the upward bias by building on \cite{Boz2020}, which document the role of vehicle currency invoicing for exchange rate pass-through to import prices for around 100 countries since 1990. \footnote{Invoicing data are not available for several large countries, including China and Mexico.} According to \cite{Boz2020}, in 2014 (the year for which we provide estimates of the HCE deflator elasticity in Figure \ref{fig:WIOD_HC_elasticities_USD}), the following countries had the largest share of imports invoiced in US dollar: India (89\% of imports), Brazil (81\% \footnote{In 2017 (data unavailable for 2014).}), Taiwan (80\%\footnote{In 2016 (data unavailable for 2014).}), Indonesia (76\%), South Korea (84\%), Japan (74\%), Turkey (63\%) and Australia (57\%). Invoicing in US dollar was less prevalent in Europe (where invoicing in euro dominates), ranging from around 20\% (Croatia, Estonia, France, Germany, Hungary, Malta, Norway and Slovenia) to 30\% (Denmark, Finland, Ireland, Italy, Poland, Romania, Switzerland, Sweden, the Netherlands). Invoicing in US dollar was close to 40\% in Spain, Lithuania, the UK, Russia and as high as 50\% in Greece. By contrast, it was much lower for Latvia (7\% \footnote{In 2015 (data unavailable for 2014).}) and Luxembourg (11\% \footnote{In 2016 (data unavailable for 2014).}), suggesting that the upward bias in our estimates is particularly pronounced for these two economies.

- The language in the introduction is not always clear. For example: "we assume that the impact of the exchange rate fluctuation is proportional across sector". At page 1 I was not sure to what the proportionality referred, only in section 2.3 I understood that it referred to the use of inputs whose price is affected.

For the sake of clarity, we removed the discussion on the proportionality assumption from the introduction. The implications of this assumption are discussed more precisely in the data section (now Section 1).

I also found confusing the discussion of channels iii) and iv) at page 2. Most readers are unfamiliar with input-output structures and have not thought of all the ways in which shocks propagate from one country to another through input-output linkages.

We simplified the discussion on channels iii) and iv) and redrafted the introduction as follows: "We look into the determinants of the HCE deflator elasticity and the role of global value chains in the transmission of an exchange rate appreciation. We identify the main channels through which the exchange rate impacts the HCE deflator when production processes are global. We find that the main transmission

channels are: i) the prices of imported final goods sold directly to domestic consumers and ii) the prices of imported inputs entering domestic production. These two channels explain three-quarters of the transmission of an exchange rate appreciation to domestic prices. By contrast, other channels reflecting the impact of global value chains (such as the price of exported inputs feeding through imported foreign production) play a more limited role, with marked cross-countries heterogeneity. Hence, only one-fourth of the elasticity of the HCE deflator to the exchange rate is attributable to participation in global value chains."

Similarly, we simplified the discussion on these four channels in Section 4.

- In the introduction, main findings are discussed only for the third and fourth exercise in the paper but not for the first two

As suggested, we redrafted the introduction in order to discuss the main findings of all the exercises performed in the paper. To do so, we added a short summary of the section which focuses on the impact of an appreciation of the US dollar:

"We analyse the impact on the domestic economy of variations in the currency of their trading partners. We show that countries are affected in proportion to their trading links with the country whose currency appreciates. For example, we estimate the impact of an appreciation of the US dollar."

We also better emphasize our contribution to the literature when we refer to the extrapolations performed with up-to-date trade and GDP statistics:

"We show that a precise assessment of the HCE deflator elasticity to the exchange rate can be estimated for recent years without resorting to WIOTs. The construction of World Input- Output tables is data-demanding and WIOTs are typically released with a lag of several years. As a result, WIOTs are not available for the most recent years. For instance, the latest WIOD dataset dates back to 2014. Although the MRIO dataset covers most recent years, it suffers from data quality issues in 2018. To address the data gap in WIOTs, we extrapolate the HCE deflator elasticity from 2015 onwards using up-to-date GDP statistics and trade data on consumption and intermediates. We obtain a reliable estimate of the HCE deflator elasticity up to 2019. While most of the existing literature focuses on average elasticities, computed over a period covering several years, extrapolations allow us to analyse how elasticities change in a more up-to-date way, from one year to another."

We also stress the fact that we used several datasets for the sake of robustness. To the best of our knowledge, such a comprehensive robustness test is seldom performed in the existing literature: "Last but not least, we use several WIOTs databases for the sake of robustness (i.e. WIOD, two distinct releases of the OECD TiVA database and the MRIO database). To the best of our knowledge, such a comprehensive robustness check is seldom performed in the existing literature. Overall, we show that results from different WIOTs converge."

- The motivation and contribution of the paper to the literature should be included in the introduction.

We try to better motivate our paper by adding the following sentences at the beginning of the introduction:

"Over the past two decades, the rise of global value chains has led to a greater use of input-output tables to study international linkages. In this paper, we analyse which countries are most vulnerable to cost-push inflation using world input-output tables. We also document the heterogeneous sensitivity of consumer prices to exchange rate variations across countries, reflecting differences in foreign product content of consumption and intermediate products. Understanding the influence of exchange rate on inflation is indeed critically important for measuring the extent of expenditure switching that follows exchange rate variations, which, in turn, has an impact on real activity. To shed light on these mechanisms, we study the elasticity of the household consumption expenditure (HCE hereafter) deflator to the exchange rate."

Section 1 could be thus incorporated in the introduction.

- I would consider dropping section 1, but including a deeper and more concise discussion of the related literature. This paper relates to the ERPT literature but also to the large macro-trade literature that sheds light on the transmission of shocks across countries through input-output linkages. The contribution of the paper to each of these strands should be clearly discussed.

We shortened Section 1 and incorporated it in the introduction while better explaining our contributions to the related literature.

The discussion of the literature reads:

"Our paper builds on two strands of literature. A first strand of literature documents the exchange rate pass-through to domestic prices (ERPT hereafter). The pass-through depends, among other things, on trade openness, integration in international production chains, firms' pricing strategies and the currency of invoicing for trade. In addition to these structural features, some authors analyse the underlying shocks that cause exchange rate fluctuations (eg. Forbes et al. (2018)), as well as the role of monetary policy (see for instance Ha et al. (2020), who show that the transmission is lower in countries that combine flexible exchange rate regimes and credible inflation targets). Another strand of literature sheds light on the transmission of shocks across countries through input-output linkages (I-O thereafter). The trade in value-added analysis reconciles international trade statistics with national I-O tables, thus allowing to extend Leontief's analysis \citep{Leontief1951} to an international context. Most of this literature focuses on the transmission of production shocks through input-output linkages (e.g. \cite{Johnson2014, Eaton2016}). By contrast, we use WIOTs to analyse cost-push inflation (as do \cite{Aydogus2018}). Our paper contributes to both strands of literature: our computations are based on input-output matrices, while our results are comparable with estimations from the ERPT literature. We make several assumptions to simplify our computations. First, we assume a full exchange rate pass-through (ERPT hereafter) to import prices. Hence, we do not consider the fact that the pass-through might be incomplete, as suggested by a large body of literature (see for example Ortega and Osbat (2020) for a literature review of recent studies relying on various methodologies such as VAR, dynamic simultaneous equations, Bayesian VAR or local projections). For example, Özyurt (2016) shows that in the euro area, the pass-through is partial and has declined in the 2000s. The lowest degree of pass-through is found for Germany, most likely reflecting the large size of the German economy and the high share of local currency pricing. As a result, our estimates provide an upper bound of the HCE deflator elasticity compared to results from the ERPT literature. Second, we suppose that all invoicing occur using the currency of the producing country. The invoicing decision is an active channel through which producers adjust their prices in relation to their own market power and to local competitive pressures. Prices fixed in the local currency are sticky in the currency of the destination market and irresponsive to changes in the bilateral exchange rate between the local currency and the currency of the producer. By contrast, prices fixed in the producer's or dominant currency have a higher ERPT. Contrary to our hypothesis, a large body of empirical literature suggests that the vast majority of trade is invoiced in a small number of 'dominant currencies', with the U.S. dollar playing a major role. The 'dominant currency paradigm' (Gopinath et al. (2020)) implies that for non-U.S. countries, the ERPT into import prices (in home currency) should be high and driven by the U.S. dollar exchange rate as opposed to the bilateral exchange rate, whereas for the U.S. the

pass-through into import prices should be low. Gopinath et al. (2007) also show that there is a large difference in the ERPT of the average good priced in dollars (25%) versus non-dollars (95%). Hence, using alternative pricing assumptions would entail lower estimates of the elasticity of consumer prices to the exchange rate. Despite these simplifying assumptions, our estimates provide an accounting-based gauge of how large the elasticity of consumer prices to the exchange rate could be, considering direct and indirect import content in consumption and global value chain linkages. Furthermore, our results broadly concur with the recent literature. For instance, Colavecchio and Rubene (2020), using local projections techniques, find an ERPT to consumer prices ranging from 0.07 to 0.23 in the euro area. Our results also concur with Aydogus et al. (2018), which examine pass-through to the domestic price level through an input–output model for 26 countries, using I-O tables. The estimated elasticity of the CPI to the exchange rate ranges from 0.07 for the US to 0.34 for Ireland, with a simple average of 0.18 on a sample of 26 countries.

"

- Section 2 should be re-organised. The focus of the section should be on the derivation of the HCE deflator elasticity. The data could be discussed in a separate section.

As suggested, we have re-organised Section 2. We now discuss the data sources and compare the different databases in a separate section (Section 1). As a result, Section 2 only focuses on the derivation of the HCE deflator elasticity.

- I am unsure of the purpose of section 2.1. I am guessing the authors wanted to show that the effect of a change in production costs is different from that due to a change in the exchange rate. But isn't that shown in Online Appendix D?

This section was meant initially as an introduction to the rest of the analysis, but we agree it was redundant. We have moved it to Online Appendix.

- The analysis in section 4.3 is poorly explained. Are all countries included when equation (17) is estimated? What are the estimated coefficients? Why is the estimated specification that in equation (17)? What happens if the time-varying variables are replaced by time fixed-effects?

We have changed that section. We now explain why we do not use the time-fixed effects. We give and comment the regression results of equation 17 (now equation 16) and explain why we are more interested in the goodness-of-fit than the coefficient value and significance per se). We give the number of countries and years over which the equation is estimated. We hope to have thus clarified the discussion and answered your concerns.

- For the exercise in 4.3 to be helpful, it would be good if the authors could validate their estimated elasticities. Is there any other study that for a subset of the sampled countries has obtained relatively precise estimated HCE deflator elasticities? In the abstract, the authors mention their elasticity estimates are in line with the literature- so that should be feasible.

To take into account this comment, we provide more details on results from the literature in the introduction and in Section 3.

%The "in line" remark in the introduction actually refers to our work with confidential "Basic Model Elasticities" from the euro system. We have changed it to : %"We find a modest output-weighted elasticity of around 0.1. This is higher than the rest of the literature because of the accounting nature of our result assuming full pass-through"

%As explained in the introduction, it is difficult to compare our elasticities with the ones in the literature. We have year-specific upper bound whereas the literature computes averages over many years.

We show that overall, our results concur with recent papers relying on similar methodologies.

We added a discussion of the results found in the existing literature in Section 3.1. In particular, we mention that: "our results broadly concur with the literature. \cite{Aydogus2018} examine pass-through to the domestic price level through an input-output model for 26 countries and 27 sectors, using I-O tables from the OECD Stan Database. Just like us, the authors provide an upper bound and conclude that results from the I-O model are not as excessively high compared to the ERPT literature. The estimated impacts of an exchange rate shock to the CPI range from 0.07 for the US to 0.34 for Ireland, with a simple average of 0.18. Overall, elasticities estimated by \cite{Aydogus2018} tend to be slightly higher than ours. For instance, our results concur with \cite{Aydogus2018} for Australia, the US,

Brazil or Canada. However, the authors find an elasticity close to 0.16 for France, Germany, Italy and Spain, whereas our results are closer to 0.10. Elasticities estimated by \cite{Aydogus2018} are much higher for Estonia and Ireland (respectively, 0.31 and 0.33 vs 0.15 and 0.18 according to our computations). \cite{Colavecchio2020} focus on the ERPT to consumer prices in the euro area from 1997 to 2019 using local projection techniques.\footnote{To the best of our knowledge, the literature using WIOTs mostly focuses on the transmission of production shocks through input-output linkages. By contrast, we use WIOTs to analyse cost-push inflation. As a result, and despite differences in methodologies, we compare our estimates of the HCE deflator with the ERPT literature.} The authors find a statistically significant linear ERPT to domestic prices of 0.07 for Italy, 0.08 for Belgium and Portugal, 0.09 for Germany, 0.12 for Spain, 0.13 for Austria and Greece, 0.14 for the Netherlands and Finland and 0.23 for Lithuania after two years. \footnote{The linear ERPT to consumer prices estimated by \cite{Colavecchio2020} for the euro area as a whole is not statistically significant.} These figures concur with our estimates ranging from 0.07 to 0.18 for euro area countries (see Figure \ref{fig:WIOD_HC_elasticities})."

A lot of the correlations highlighted in the paper feel mechanical.

To take into account your comment, we stress that our results are based on an accounting exercise. As such, the results are indeed mechanical, but that is a feature of our method. In particular, we specify in the conclusion that " We perform an accounting exercise based on information contained in world input-output tables. Our accounting approach helps identify which countries and sectors are under pressure to adjust their prices when subject to an exchange rate variation. We make several assumptions to simplify our computations. As a result, our estimates provide an upper bound of the HCE deflator elasticity."

However, to limit the impression that our results are purely mechanical, we stress that our results concur with the ERPT literature. We also try to put them in perspective by providing explanations. For instance, in section 3.1, we comment the cross-country heterogeneity. We try to explain differences in the size of elasticities as follows: "Within the euro area, the elasticity of the HCE deflator differs substantially, ranging 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."

- Page numbers should be included.
- The order of the online Appendices does not follow the order in which they are referred to in the text.
- In section 2, γ_k should be γ_n in the expressions for p_n and x_n .

Thank you for bringing these aspects to our attention : they have been dealt with.