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Global Trade Flows:
Revisiting the Exchange Rate Elasticities*

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Title: Global Trade Flows: Revisiting the Exchange Rate Elasticities[1]

Abstract
This paper contributes to the debate on exchange rate elasticities by providing a set of price and quantity elasticities for 51 advanced and emerging market economies. Specifically, we report for each of these countries the elasticity of trade prices and trade quantities on the export and on the import side, as well as the reaction of the trade balance. To this aim, the paper uses a large database of highly disaggregated bilateral trade flows, covering 5000 products and more than 160 trading partners. We present a range of estimates using standard regression techniques combined with generated repressors that aim to address key omitted variable biases, relating in particular to unobserved marginal costs and competitor prices in the importing market. We also subject our results to a battery of robustness checks that leave the main findings broadly unchanged. Overall, all countries in our sample satisfy the Marshall-Lerner conditions, suggesting that exchange rate changes can play an important role in addressing global trade imbalances.

Keywords: exchange rates, trade elasticities, exchange rate pass-through, competitiveness.
JEL classification: C51, F14, F31, F33, F41.

Titre: Flux commerciaux internationaux: Un réexamen des élasticités taux de change[2]

Résumé
L'objet de cet article est de contribuer au débat sur les élasticités commerce en fournissant les élasticités prix et quantités de 51 pays, recouvrant à la fois des pays avancés et des marchés émergents. Plus particulièrement, nous rapportons pour chacun de ces pays l'élasticité des prix et des quantités au taux de change pour les exportations et pour les importations, ainsi que la réaction de la balance commerciale. À cette fin, l'article utilise une base de données très désagrégée couvrant 5000 secteurs différents et plus de 160 pays partenaires. Nous présentons une gamme de résultats utilisant à la fois des régressions classiques et des méthodes alternatives développées pour les besoins de cet article, qui prennent en compte l'effet de variables non observées, notamment les coûts marginaux et le prix des compétiteurs dans le pays importateur. Les résultats sont soumis à une série de tests de robustesse qui laissent les conclusions principales inchangées. Dans l'ensemble, les résultats indiquent que les conditions de Marshall-Lerner sont respectées dans tous les pays ; ce qui suggère que les taux de change peuvent jouer un rôle important dans la correction des déséquilibres mondiaux de balances commerciales.

Mots-clés: taux de change, élasticités commerce, répercussions du taux de change sur les prix domestiques, compétitivité.
Codes JEL: C51, F14, F31, F33, F41.

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Non-technical summary

The large exchange rate movements recorded in recent years have reignited the debate on the effect of exchange rate changes on trade flows and global imbalances. In particular, prominent observers have expressed concerns that large currency depreciations in key economies may have an effect on their own country's competitiveness and raised the fear of "currency wars" across countries (Mantega, 2010). Meanwhile, the effect of exchange rate changes on domestic prices (exchange rate pass-through) is a factor that receives significant attention among central bankers[3]. In spite of the prevalence of these questions in the policy debate, few papers present a range of trade elasticities across countries.

The aim of the present paper is to contribute to these debates by providing exchange rate trade elasticities (covering both prices and quantities, on the export and on the import side) for 51 countries, of which 26 emerging markets and 25 advanced countries. We use for this purpose a rich database of bilateral trade flows, disaggregated at the six digit level and covering 5000 products. Using disaggregated data avoids the aggregation problems that arise from using aggregate trade data at the country level. More importantly, this database allows us to address two important biases that arise in the context of such regressions, relating to unobserved marginal costs and competitor prices in the importing market. Marginal costs may indeed be correlated with exchange rate changes. One key reason for this is that exports typically have a strong import content: the ceteris paribus loss in competitiveness that arises from an appreciation of the exchange rate can be partly offset by the fact that it lowers the cost of imported inputs. Against this background, incomplete pass-through may stem either from changing profit margins or varying production costs. We are able to explore these issues using the structure of our panel: under the assumption that marginal costs do not vary across destination markets, we can capture them with country-specific time varying fixed effects and check how the response of export prices to exchange rate changes varies in this alternative specification. Meanwhile, the reaction of competitor prices in the importing market is another factor that needs to be taken into account. We also introduce country-specific time varying fixed effects in our specifications for export and import quantities, to control for factors not taken into account in the baseline specification.

The contribution of the paper is therefore twofold. First, this is to our knowledge the only paper that presents a complete set of exchange rate elasticities for 51 countries, covering export prices, export quantities, import prices and import quantities. These results allow us to check whether the Marshall-Lerner conditions[4] hold for the countries in the sample and to derive the reaction of the trade balance following a change in the exchange rate. This first round of results is obtained using fairly standard baseline models that have been widely used in the literature. The second contribution of the paper is to explore the role of unobserved variables such as, for the price

[3] See e.g. recent speeches by Yellen (2015), Fischer (2015) or Forbes (2015).

[4] The Marshall-Lerner conditions are fulfilled if a depreciation (appreciation) results in an improvement (deterioration) of the trade balance. Note that in the paper we use a linear and symmetric specification, so the results of a depreciation are identical in magnitude to those of an appreciation, with the opposite sign.

equations, marginal costs and competitor prices in the importing market, and for the quantity equations other supply and demand factors not captured by GDP changes. We do so by using the panel structure of the dataset and introducing country-specific fixed effects and generated regressors as proxies for unobserved omitted variables.

The main empirical results on this paper can be summarized as follows. First, our baseline estimates indicate that exchange rate pass-through (ERPT) is incomplete for most countries, and that there is substantial heterogeneity in the reaction of export and import prices across countries. On average, the reaction of export prices to exchange rate changes is higher in emerging markets than in advanced economies. For import prices, we do not find significant differences between these two groups of countries. Second, our baseline trade quantity regressions yield elasticities in the ballpark of 0.2-0.4. Third, based on the estimated price and exchange rate elasticities, the results imply that the Marshall-Lerner conditions are satisfied for all countries in the sample. This is largely because pass-through is incomplete in the majority of countries, while export prices in producer currency react significantly to exchange rate changes (two results that are of course two sides of the same coin). As a result, the full Marshall-Lerner conditions (taking into account not only the reaction of trade quantities but also trade prices) are satisfied even though some of the exchange rate trade quantity elasticities are not significantly different from zero.

The fourth set of results stems from our alternative regressions. Controlling for time varying fixed effects substantially modifies the results and their interpretations. For export prices, the median exchange rate pass-through coefficient increases significantly. One possible interpretation is that this alternative specification controls for marginal costs and therefore focuses on the reaction of profit margins only, suggesting that a significant part of the reaction of export prices in producer currency comes from varying costs (associated e.g. to imported costs), rather than changes in profit margins. In the import price equation the alternative specification controls for time varying conditions in the importing countries, and in particular local prices. This alternative specification reduces the pass-through coefficient compared to the baseline (as foreign exporters take into account the reaction of local prices). For the export and import quantity equations, the coefficients are also substantially modified when we turn to the alternative specifications. Finally, when we follow our two step approach the coefficients are again very different (they reflect the differences introduced in each of the two steps). Overall, these different specifications yield complementary insights on the issue of exchange rate elasticities. While the baseline specification is very close in spirit to the macro approach (the magnitude of these elasticities being correlated with existing macro studies), the fixed effect approach goes one step further and helps disentangling the different mechanisms at work when the exchange rate varies. From a policy perspective, the results suggest that exchange rate changes can play an important role in addressing global trade imbalances.

1 Introduction

The large exchange rate movements recorded in recent years have reignited the debate on the effect of exchange rate changes on trade flows and global imbalances. Prominent observers have expressed concerns that large currency depreciations in key economies may have an effect on their own country's competitiveness and raised the fear of "currency wars" across countries (Mantega (2010)). Meanwhile, the effect of exchange rate changes on domestic prices (exchange rate pass-through) is a factor that receives significant attention among central bankers, as witnessed for instance by recent speeches by Yellen (2015), Fischer (2015), or Forbes (2015). In spite of the prevalence of these questions in the policy debate, few papers present a range of trade elasticities across countries. In fact, there is still a debate in the existing literature on how to estimate such elasticities, and whether "elasticity pessimism" (Orcutt (1950)) or "elasticity optimism" (Imbs and Mejean (2015)) should prevail.

The aim of the present paper is to contribute to these debates by providing exchange rate trade elasticities (covering both prices and quantities, on the export and on the import side) for 51 countries, of which 26 emerging markets and 25 advanced economies.[1] We use for this purpose a very rich database of bilateral trade flows, disaggregated at the six digit level and covering 5000 products. More importantly, this database allows to address important biases that arise in the context of such regressions, relating in particular to unobserved marginal costs and competitor prices in the importing market. Marginal costs may indeed be correlated with exchange rate changes. One key reason for this is that exports typically have a strong import content, see Ossa (2015): the ceteris paribus loss in competitiveness that arises from an appreciation of the exchange rate, for instance, can be partly offset by the fact that it lowers the cost of imported inputs. Against this background, incomplete pass-through may stem either from changing profit margins or varying production costs. We are able to explore these issues using the rich structure of our panel: under the assumption that marginal costs do not vary across destination markets, we can capture them with country and product time varying fixed effects and check how the response of export prices to exchange rate changes varies in this alternative specification. Meanwhile, the reaction of competitor prices in the importing market is another factor that needs to be taken into account. When the exchange rate of the exporting country appreciates, for instance, the exporters can reduce the level of pass-through by lowering prices in their (producer country) currency; yet, the extent to which this adjustment is needed is attenuated if local competitors raise their prices (against the backdrop of a depreciation of their currency). We also introduce country-specific time varying fixed effects in our specifications for export and import quantities, as a way to control for factors typically not taken into account in the baseline specification, such as productivity shocks or demand factors not fully captured by GDP fluctuations.

The contribution of the paper is therefore twofold. First, this is to our knowledge the only paper that presents a complete set of exchange rate elasticities for 51 countries, covering export prices, export quantities, import prices and import quantities. These results allow us to check whether the Marshall-Lerner conditions hold for the countries in the sample and to derive the reaction of the trade balance following a change in the exchange rate. This first round of results is obtained using fairly standard baseline models that have been widely used in the literature. The second contribution of the paper is to explore the role of unobserved variables such as, for the price equations, marginal costs and competitor prices in the importing market, and for the quantity equations other supply and demand factors not captured in the baseline specification. We do so by exploiting the panel structure of the dataset and introducing time varying country and product fixed effects and generated regressors as proxies for unobserved omitted variables. We discuss how the results are affected by these modifications to the baseline specification and

[1] The list of countries broadly corresponds to that of the IMF External Balance Assessment (EBA); see full country list in Table 1.

how one should interpret these changes, offering new insights on the determinants of exchange rate pass-through and trade elasticities. Finally, we also subject our baseline results to a variety of robustness checks, which include the following: introducing into our regression additional control variables (e.g. inflation in the price equation), testing for additional lags of the exchange rate variable, and investigating cross-sectoral differences.

Our paper relates to the existing literature in the following way. Empirical papers on the transmission of exchange rate shocks into prices and quantities are generally based on the export pricing models going back to Krugman (1986) and Knetter (1989). The underlying mechanisms, like firm heterogeneity (Atkeson and Burstein (2008) and Berman et al. (2012)), distribution costs (Corsetti and Dedola (2005)), the importance of trade integration (Auer (2015)), the import intensity of exports (Amiti et al. (2014)), strategic complementarities (Amiti et al. (2016)), market structure (Amiti et al. (2016) and Auer and Schoenle (2016)), the lack of information about competitors (Garetto (2016)) as well as the choice of the invoicing currency (Devereux et al. (2015) and Gopinath (2015)), are key in order to understand the aggregate response of exchange rate shocks. If the underlying mechanism is correlated with the exchange rate and not taken into account, the estimation of aggregate exchange rate elasticities can be severely biased. For example, if firms participate in global value chains, their exported products will contain intermediate inputs from abroad. As a result, any change in the exchange rate will affect their marginal costs and their optimal export prices. Similarly, if firms have to maintain a distribution network or change their export price due to competitor price changes in the importing destination, markups will be correlated with the exchange rate and thus affect the optimal pricing decision with respect to the exchange rate. Empirical research on exchange rate elasticities is often separated into two distinct approaches: the "macro" and the "micro" approaches. Papers following the "macro" approach (Leigh et al. (2015), Bussière et al. (2014) for pass-through) estimate the response of aggregate exports and imports to changes in the aggregate price index, like the real effective exchange rate, following mostly a time series analysis for a particular country, or using panel data. By contrast, the "micro" approach (Gaulier et al. (2008), Ruhl (2008), Feenstra et al. (2014), Fitzgerald and Haller (2014) and Imbs and Mejean (2015)) focuses on the bilateral variation in trade and exchange rates at different levels of aggregation (firm or sectoral level).

The idea of using generated regressors, in our case fixed effects, as proxies for unobserved variables was formalized by Pagan (1984). In our two step approach, similar to Schmalensee and Joskow (1986), Baker and Fortin (2001) and Redding and Venables (2004), we first proxy unobserved marginal costs with a generated regressor from a fixed effect regression. In the second step, we use the generated regressor obtained from the first step as explanatory variable in the estimation of the exchange rate pass-through. The main findings of this approach are that exchange rate elasticities change considerably once we proxy for unobserved competitor prices and marginal costs. However, these changes reflect the fact that the economic interpretation that we give to the coefficient is radically different once country specific time varying fixed effects are introduced in the regressions. For instance, in the export price regression, adding these fixed effects removes a substantial source of variation of export prices (in the exporter's currency). The reported elasticities are therefore complementary to the macroeconomic elasticities obtained from standard regressions as they uncover the key mechanisms at play when the exchange rate varies, which is made possible by the rich structure of our dataset.

The main empirical results in this paper can be summarized as follows. First, the baseline regressions suggest that pass-through is incomplete: a 10% nominal depreciation would be associated with a 4.8% rise in import prices (in local currency). This number corresponds to the median across countries but hides substantial heterogeneity.[2] For

[2]In Table 2 and Table 3 we report other key statistics such as the simple mean, a weighted mean using the relative size of nominal

instance, we find that exchange rate pass-though is much lower than the median in the United States (30%) but much higher in Turkey (80%) or Japan (close to 87%). In large European countries such as France, Germany, Italy or the UK the level of pass-though is close to the median.[3] Consistent with our result of incomplete pass-through to import prices, we find that export prices in producer prices react significantly to exchange rate changes, especially for emerging market economies. This reaction of export prices to a change in the exchange rate contributes to an improvement of the trade balance following a depreciation.[4] We also find that the reaction of export prices is positively correlated with that of import prices: the countries that have high exchange rate pass-through to import prices also tend to adjust their export prices significantly. This is either because the determinants of these elasticities are the same, or because imports are used as intermediate inputs (so the countries that have high pass-through can adjust export prices to a greater extent), a point that the alternative specification allows to explore further. Second, export and import quantities also react to exchange rate changes. The median elasticities of the baseline regressions are in the ballpark of 0.2-0.4. Yet, for the two quantity equations too there is significant heterogeneity across countries, especially for the import quantity equation. Indeed, for many countries the coefficient of the exchange rate in this regression is not significant. Third, building on the reaction of export and import prices and quantities, we can derive the overall reaction of the trade balance, taking the example of the 2012 trade balance as a starting point. Overall, the results suggest that a 10% nominal depreciation would be associated with a change in the trade balance of about 2% of GDP (towards a higher surplus, or lower deficit). The above mentioned heterogeneity for the estimated elasticities of export and import quantities and prices and especially the degree of trade openness translate into significant heterogeneity of the trade balance response across countries: while some countries see a small change in their trade balance (noticeably Japan, the United States, and Norway), others witness much larger changes (in particular Hong Kong, Ireland, and Costa Rica, reflecting to a large extent their high openness to trade). Overall, however, we find that the Marshall-Lerner conditions hold for all countries: following a depreciation, the trade balance improves for all of them. This is largely because we consider here the full Marshall-Lerner conditions, i.e. taking into account not just the sum of the export and import quantity elasticities, but also the reaction of export and import prices. To the extent that exchange rate pass-through is incomplete in most countries, and that export prices in producer (exporter) currency react significantly to exchange rate changes, this substantially contributes to the overall improvement of the trade balance.

The fourth set of results stems from our alternative regressions. Controlling for time varying country and product fixed effects substantially modifies the results and their interpretations. For export prices, the median exchange rate pass-through coefficient increases to 87% (from 65% in the baseline). One possible interpretation is that this alternative specification controls for marginal costs and therefore focuses on the reaction of profit margins only, suggesting that a significant part of the reaction of export prices in producer currency comes from varying costs (associated e.g. to imported costs). In the import price equation, the alternative specification controls for time varying conditions in the importing countries, and in particular local prices. This alternative specification reduces the pass-through coefficient compared to the baseline (as foreign exporters take into account the reaction of local prices). Generally, turning to the fixed effects equations reduces the dispersion of the coefficients, suggesting that controlling for unobserved variables removes a substantial source of cross-country heterogeneity. For the export and import quantity equations, the coefficients are also substantially modified when we turn to the alternative specifications. Finally, in the two step approach the coefficients are again different, reflecting the differences introduced

exports and imports, as well as the standard deviation of the coefficients across countries. In Section 4 we comment on selected country specific results and compare aggregate elasticities between advanced and emerging market economies.

[3]The coefficients that we estimated in the baseline regression for export and import prices are positively correlated with existing studies, as explained in Section 4.

[4]Note that our specifications are symmetric and linear, so an appreciation is expected to have the same effect as a depreciation, with the opposite sign.

in each of the two steps; however the overall response of the trade balance to an exchange rate change remains broadly unchanged. Overall, these different specifications yield complementary insights on the issue of exchange rate elasticities. While the baseline specification is very close in spirit to the macro approach (the magnitude of these elasticities being correlated with existing macro studies), the fixed effect approach goes one step further and helps disentangling the different mechanisms at work when the exchange rate varies. From a policy perspective, the results suggest that exchange rate changes can play an important role in addressing global trade imbalances.

The rest of the paper is organized as follows. Section 2 explains the theoretical framework and derives the corresponding estimation equations. Section 3 discusses our empirical strategy. The main results and their interpretations are presented in Section 4. Section 5 provides robustness tests and further results. Section 6 concludes.

2 Theoretical framework

Complete exchange rate pass-through implies that import prices (expressed in the importer's currency) move one to one with changes in the exchange rate, while movements in export prices (expressed in the exporter's currency) are insensitive to currency changes. At the other extreme, exporters could reduce pass-through to zero if they decided to (and could) offset all changes in the exchange rate by adjusting their prices in the exporter's currency. In practice, pass-through estimates are generally between zero and one. This section explains what may affect the degree of exchange rate pass-through.

2.1 Pricing decision of firms

Before presenting the estimation equations, we discuss the pricing decision of exporting firms in different destination markets. We start with a very general accounting framework that is common to most of the pass-through models, see Amiti et al. (2016). Based on this framework, we will derive the estimation equation under general demand and cost structures. Define the export price (fob) that an exporting firm from country i of product k to destination j charges in destination j in importer currency as p_{ijkt}

$$p_{ijkt} = \frac{\theta_{ijkt} mc_{ikt}}{s_{ijt}} \tag{1}$$

where θ_{ijkt} is the markup that a firm of exporting country i in the product class k charges in importing country j at time t. mc_{ikt} is the marginal cost in producer's currency, which are assumed to be the same across all destination markets j. s_{ijt} is the bilateral exchange rate between exporter i and importer j denominated in country i's currency per unit of country j's.[5] Note that the markup specification is very general and allowed to be different in each destination for every product. The corresponding import price (cif) expressed in importer's currency is

$$p_{ijkt} = \frac{\theta_{ijkt} \tau_{ijk} mc_{ikt}}{s_{ijt}} \tag{2}$$

where τ_{ijk} are bilateral product specific trade costs which are assumed to be time invariant. The corresponding import price is the equivalent to the export price if we account for the exchange rate changes between the importer's and the exporter's exchange rate. This general pricing equation relies on two basic assumptions, see Amiti et al.

[5]Given this definition of exchange rates, an increase in s_{ijt} implies a depreciation of country i's currency, which improves its competitiveness in foreign markets.

(2016): (1) the demand is invertible and (2) firms are static profit maximizers under full information, which excludes any form of dynamic price setting considerations. From now on, we assume that these two assumptions are satisfied. However, note that the pricing decision in equation 2 does not depend on the nature of market competition, i.e. allowing for both monopolistic and oligopolistic competition. As a result, we can write the estimation equation of the exchange rate pass-through on export prices in importer's currency as:

$$d\log(p_{[i]jkt}) = \alpha_{[i]} - \beta_{1,[i]} d\log(s_{[i]jt}) + \beta_{2,[i]} d\log(\theta_{[i]jkt}) + \beta_{3,[i]} d\log(mc_{[i]kt}) + e_{[i]jkt} \tag{3}$$

The variable of interest in equation 3 is $\beta_{1,i}$. If we could observe mark-ups (θ_{ijkt}) and marginal costs (mc_{ikt}), all the coefficients in equation 3 should be one. Empirical difficulties arise due to the fact that θ_{ijkt} and mc_{ikt} are usually unobserved and potentially correlated with the exchange rate, which is why pass-through might be incomplete. Concerning the interpretation of the estimated coefficient $\hat{\beta}_{1,i}$, in the case of complete pass-through, i.e. when the exchange rate depreciates ($ds_{ijt} > 0$), the exchange rate change is completely passed on to import prices, $\hat{\beta}_{1,i} = 1$, and the export price in exporter's currency does not change. On the other hand, if the exporter changes the export price one to one with the exchange rate in order to keep the price in the importing country constant, the pass-through coefficient is $\hat{\beta}_{1,i} = 0$. Generally, it may be optimal for the exporter to change the export price only partly with the exchange rate (i.e. incomplete pass-through). In this case the pass-through coefficient lies between zero and one ($0 \leq \hat{\beta}_{1,i} \leq 1$). Next, we discuss the potential reasons why marginal costs and markups are potentially correlated with the exchange rate.

2.1.1 Marginal costs

In general, marginal costs will be correlated with the exchange rate, if exporters buy their intermediate goods from abroad. Based on the detailed firm level data from Belgium, Amiti et al. (2014) show that large exporting firms are simultaneously large importing firms and that these firms basically determine the aggregate pass-through. Due to the reliance on intermediate imports, marginal costs of production will depend on the exchange rate shocks and change the optimal pricing decision of exports. In particular, firms' marginal costs, mc_{ikt}, will be positively correlated with the exchange rate, $\text{Corr}(d\log mc_{ikt}, d\log s_{ijt}) > 0$, because a depreciation of the exporter's exchange rate ($s_{ijt} \uparrow$) increases the marginal costs in terms of local currency. With respect to the direction of the bias, we expect that accounting for the international input-output linkages of firms will increase the exchange rate pass-through. As Amiti et al. (2014) show, large import intensive firms have high export market shares and hence set high export markups. These high markups act as a buffer for the exchange rate fluctuations and will limit the effect of exchange rate shocks on export prices.

On a more macroeconomic scale, exchange rate fluctuations can have a direct impact on wages and thus altering marginal costs of firms through several other channels. First, an exchange rate depreciation increases the consumer price index and reduces real wages. At the same time, the depreciation may also change inflation expectations and thus enter the wage setting mechanism. Second, an exchange rate depreciation increases competitiveness and may increase domestic production, which leads to higher labor demand and wages, see Campa and Goldberg (2001). Third, exchange rate fluctuations may also have a direct impact on domestic labor supply through migration by changing the relative wages across countries, see Mishra and Spilimbergo (2011) for empirical evidence.

2.1.2 Strategic complementarities in price setting

Markups θ_{ijkt} are also likely to adjusted with the exchange rate. One reason is that firms have to pay distribution costs in the destination country, see Corsetti and Dedola (2005) and Berman et al. (2012). In this case, the pricing decision of the exporter and thus the markup, θ_{ijkt}, is a function of the distribution cost, η_{jkt}. This distribution cost has to be paid in the importer's currency. Therefore, any change in the bilateral exchange rate will change the distribution costs and the optimal pricing decision of the exporter. In particular, an appreciation of the importer's currency, which is equivalent to a depreciation of the exporter's currency ($s_{ijt} \uparrow$), increases the distribution cost in the importing destination j, $\text{Corr}(d \log \eta_{jkt}, d \log s_{ijt}) > 0$ and forces the firm to reduce its markup, $\text{Corr}(d \log \theta_{ijkt}, d \log s_{ijt}) < 0$.

An alternative explanation, highlighted by Amiti et al. (2016), relates to strategic complementarities in price setting, where exporters adjust their prices due to changes in competitors' prices in the importing country. Consider the following example. Suppose there is a currency crisis in the importing country and its currency depreciates, which is equivalent to a appreciation of the exporter's currency ($s_{ijt} \downarrow$). If pass-through is not zero, the exporter does not absorb the full currency change and the exporter's price in terms of the importer's currency will increase. In oligopolistic markets, the presence of strategic complementarities in price setting implies that competing firms in the importing country will raise their prices as well, which leads to a further reaction of the exporter and so on until the equilibrium is reached. As a result, exporter's will raise their export price by more than in the absence of strategic complementarities and the observed import pass-through is amplified. Overall, we have a negative correlation between the exchange rate, competitors' prices in the importing destination (p_{-jkt}), i.e. $\text{Corr}(d \log p_{-jkt}, d \log s_{ijt}) < 0$.

In both cases, we have an omitted variable bias that implies a higher observed pass-through if we do not control for changes in export prices due to (1) changes in distribution costs or (2) changes of competitors' prices in the importing country. For this reason, we include importer fixed effects in the empirical specification and expect to observe a lower pass-through compared to the case without importer fixed effects. Next, we present the estimation equation with the empirical specifications.

3 Empirical Analysis

The empirical trade literature often faces a trade-off between sectoral disaggregation, country coverage and data frequency. Bussière et al. (2014), for example, use data on import and export prices at the country level on quarterly frequency. The main drawback of the macro data is that they might be subject to aggregation bias.[6] As a result, aggregate prices make pass-through estimates difficult to discriminate between incomplete pass-through reflecting price discrimination and incomplete pass-through reflecting changes in quality. On the other hand, the product level data used in this paper allows for a rich set of fixed effects that minimize the aggregation bias and partly control for product differentiation issues. Moreover, with the exception of Bussière et al. (2014), in most existing aggregate studies empirical evidence exists only for a small number of developed countries.

Our analysis is based on the BACI database developed by the CEPII, see Gaulier and Zignago (2010), which is based on the United Nations COMTRADE database. The data are harmonized in order to reconcile export and

[6] Mumtaz et al. (2006) find evidence that neglecting cross-sector heterogeneity biases pass-through estimates.

import declaration of values and quantities across countries, where precedence is given to countries with more reliable trade statistics. The main advantage of this database is that it has an extensive country coverage at a high level of disaggregation for many years. The data span from 1995 to 2012 and include around 5,000 HS6 product categories for more than 160 countries.

To proxy export prices at the product level, we compute unit values using harmonized trade quantities and values in current US dollars. These unit values are then converted into importer's currency using the bilateral exchange rate data from the IMF's International Financial Statistics. Note that the export prices are FOB and can be interpreted as wholesale prices rather than retail prices, i.e. they are not directly affected by transportation costs or tariffs. However, it is important to note that unit values may depart from real export prices. In particular, price proxies based on unit values suffer from measurement errors due to product heterogeneity and unobserved quality differences within each 6 digit HS code. To address this issue, we first use product fixed effects that partly control for unobserved, systematic errors. Second, we also exclude annual changes in unit values that are larger than 200%. We consider these large unit value changes as unrealistic measures of price changes. This definition of outliers removes roughly 1 percent of the total number of observations. However, we want to stress that our results below are robust to alternative definitions of outliers, i.e. removing the top 1 percent of price changes in each product category or removing no outliers at all.

Importantly also, all our equations are weighted by the magnitude of the flows: large trading partners and large sectors are given a higher weight. This allows discounting smaller trade flows, which are generally measured less precisely.

3.1 Exchange Rate Pass Through

3.1.1 Baseline regression

We start by describing the export side and then proceed with the import side. Consider exporting country $[i]$. According to equation 3, the exchange rate pass-through coefficient $\beta^X_{[i]}$ can be estimated using the following estimation equation:

$$d\log(p_{[i]jkt}) = \alpha_{[i]} - \beta^X_{[i]} d\log(s_{[i]jt}) + f_{[i]jk} + e_{[i]jkt} \tag{4}$$

where $d\log(p_{[i]jkt})$ is the change of the log of export unit values (prices) of exporting country i to importing country j of product k at time t expressed in the importer's currency and k refers to an HS 6 digit product. $\log(s_{[i]jt})$ is the log of the bilateral nominal exchange rate in terms of the exporting country i with respect to the importing country j at time t.[7] $\beta^X_{[i]}$ measures how exporters change their price according to a change in the exporter's exchange rate and is the coefficient of interest. If $\beta^X_{[i]} = 1$, then exporters do not change their export price in term of exporter's currency and pass the change in the exchange rate completely on to importers, i.e. complete pass-through.

Regression 4 also includes bilateral product fixed effects, $f_{[i]jk}$. They control for the unit of account of the unit values. Unit values are defined as the value of the good divided by the quantity shipped and thus depend on the unit measurement of the underlying trade quantity, i.e. the unit value per kilogram or the unit value per piece

[7] We use the same definition as before.

shipped. Product time fixed effects ensure that we focus only on time changes within a product group and not across products (we do not compare apples and oranges). More importantly, these fixed effects also capture price discrimination of exporters across different importing countries that are constant over time, i.e. trends in relative price changes specific to the pair of countries and the product.

Similar to the export prices, we can estimate exchange rate pass-through into import prices. The country specific import price regression is given by the log linear change of equation 2.

$$d\log(p_{i[j]kt}) = \alpha_{[j]} - \beta^M_{[j]} d\log(s_{ijt}) + f_{i[j]k} + e_{i[j]kt} \tag{5}$$

where $d\log(p_{i[j]kt})$ is the change of the log of import prices in importing country j from exporting country i of product k at time t denoted in importer's currency. The difference with respect to equation 4 is that we estimate the country specific exchange rate elasticity of import prices, $\beta^M_{[j]}$, by using the variation across exporters i. Equation 4 uses the variation across importers j. Concerning the interpretation of the elasticity, if $\beta^M_{[j]} = 0$ the importer's price does not change when the exporter's currency changes. This implies that exporters, who price their goods in the importing country's currency, absorb all changes in the exchange rate, i.e. complete pricing to market and no pass-through. On the other hand, if exporters change their price one to one due to a change in the importer's currency, we have complete pass-through and the elasticity should be $\beta^M_{[j]} = 1$.

Note that there is a relationship between the export and the import exchange rate pass-through. Under the assumption that $\beta^X_{[i]}$ in equation 4 and $\beta^M_{[j]}$ in equation 5 are unbiased and consistently estimated, then the weighted average cross country exchange rate pass-through for exports should be equal to the weighted average of the exchange rate pass-through for imports.[8] At the same time, there is not necessarily a correlation between the import and export exchange rate elasticity at the individual country level. For example, a country may be characterized by complete pass-through on the export side and zero pass-through on the import side.

All our equations are estimated using weighted OLS. We use the value of each bilateral flow to calculate the two-period weights as in the computation of Tornqvist price indices.[9] Table 4 presents the 51 country specific results for the equations 4 and 5. However, before discussing them, note that due to the correlation of the exchange rate with marginal costs and markups these coefficients are likely to be biased. Next, we include a series of fixed effects and explain how they correct for the biases step by step.

3.1.2 Fixed effect regressions

In the augmented specification, we include the following time varying exporter and product fixed effects, $f_{[i]kt}$, in the export price regression 4:

[8] see Appendix.

[9] We follow Gaulier et al. (2008) and define the weighting variable as follows:

$$w_{ijkt} = \frac{1}{2}\left[\frac{V_{ijkt-1}}{V_{it-1}} + \frac{V_{ijkt}}{V_i}\right]$$

where i,j, k, and t refer to the exporting country, the importing country, the product and time.V_{ijkt} is the value of the bilateral trade flow denominated in exporter's currency in the exporting equations and in importer's currency in the importing . $V_{it} = \sum_{jk} V_{ijkt}$ is total exports of country i at time t.

$$d\log(p_{[i]jkt}) = \alpha_{[i]} + \beta^X_{[i]} d\log(s_{[i]jt}) + f_{[i]kt} + f_{[i]jk} + e_{[i]jkt} \tag{6}$$

The $f_{[i]kt}$ fixed effects contain product-time fixed effects, f_{kt}, i.e. product changes over time that are common to all exporters and importers. These fixed effects control, among others, for product specific demand changes over time that are common to all countries (e.g. world demand for cars increases the price of cars relative to bicycles). More importantly, the product time fixed effects also include an exporting country dimension, which address the bias caused by unobserved marginal costs, mc_{ikt}. As discussed in the previous section, for example due to intermediate imports, parts of the marginal costs vary with the exchange rate and induce an upward bias in the $\beta^X_{[i]}$ coefficient. In addition, these fixed effects also capture changes in product specific properties that are common to all importing countries, for example quality upgrading.

The inclusion of these fixed effects implies that $\beta^X_{[i]}$ is identified by heterogeneous exchange rate movements across importing countries. Therefore, the coefficient $\beta^X_{[i]}$ can be seen as the Pricing-to-Market coefficient à la Krugman (1986). To give a concrete example, consider French exporters that sell to Japan and the United States and suppose the Euro depreciates 10 percent against the US dollar and 5 percent against the Japanese Yen. By the arbitrage condition in the foreign exchange rate market, the Japanese Yen appreciates 5 percent against the US dollar. Note that the price adjustment of French exporters due to the common depreciation of the euro against both countries is absorbed by the time varying exporter product fixed effect. The remaining identifying variation is the change in the price of French exporters charged in the US market compared to the one charged in the Japanese market due to the 5 percent appreciation of the Yen against the US Dollar.

Regarding the import price equation 5, the key difference with respect to the export equation 6 lies in the included fixed effects.

$$d\log(p_{ijkt}) = \alpha_{[j]} + \beta^M_{[j]} d\log(s_{ijt}) + f_{jkt} + f_{ijk} + e_{jkt} \tag{7}$$

Instead of exporter-product-time fixed effects, the import price regressions contain importer-product-time fixed effects, f_{jkt}. These fixed effects control for global product specific demand shocks, for the unit of account of unit values as well as any importer time variation that is common to all products, for example higher inflation or product specific technology progress or demand that changes the price level in a particular product category. Based on the discussion in section 2, the importer-product-time controls also for local price changes that are correlated with the exchange rate as well as changes in distribution costs that are common to all exporters.

3.1.3 Two step procedure

One key issue is that we cannot include time varying exporter and importer-product fixed effects because these fixed effects would absorb all exchange rate changes. Note that for any triplet of countries a, b and c, we have $\log s_{ab} = -\log s_{ba}$ and $\log s_{ab} = \log s_{ac} - \log s_{cb}$ by arbitrage. The within transformation with time varying exporter and importer-product fixed effect implies that $\log s_{ab} - \log s_{ac} - \log s_{cb}$ equals zero. In this sense, the exchange rate is a monadic variable, see Head and Mayer (2014). To circumvent this problem, we take advantage of our bilateral data set and follow the suggested two step approach of Baker and Fortin (2001) and Redding and Venables (2004) based on Pagan (1984). First, we proxy unobserved marginal costs with a generated regressor from a fixed effect regression, a method pioneered by Schmalensee and Joskow (1986). In the second step, we use the generated

regressor obtained from the first step as explanatory variable in the estimation of the exchange rate pass-through. To be more explicit, consider again the export price equation 1 and observe that marginal costs are independent form the destination country j. If we estimate the following export price equation for country i

$$d\log(p_{[i]jkt}) = \alpha_{[i]} + \beta^X_{[i]} d\log s_{[i]jt} + f_{[i]kt} + f_{[i]jk} + e_{[i]jkt}$$

then the exporter fixed effect $f_{[i]kt}$ will capture all effects that are specific to the exporter (including unobserved marginal costs) and are independent of the exchange rate. Given our export pricing model, we can proxy marginal costs via a linear function of the estimated fixed effect and an error component ($u_{[i]kt}$), i.e $\widehat{mc_{[i]kt}} = a\hat{f}_{[i]kt} + u_{[i]kt}$.

In the second step, we use this estimated fixed effect as a generated regressor in the import price equation:

$$d\log(p_{i[j]kt}) = \alpha_{[j]} + \beta^M_{[j]} s_{i[j]t} + \gamma_{[j]}\widehat{mc_{ikt}} + f_{[j]kt} + f_{i[j]k} + e_{i[j]kt} \tag{8}$$

where import price pass-through coefficient $\beta^M_{[j]}$ is now consistently estimated, if (1) the exchange rate is uncorrelated to the approximation error, i.e. $Corr(s_{i[j]t}, u_{[i]kt}) = 0$, and (2) the errors are uncorrelated $Corr(u_{[i]kt}, e_{i[j]kt}) = 0$. Given that $\widehat{mc_{[i]kt}}$ is estimated net of the exchange rate, we assume that this assumptions holds. Another important requirement is that the pass-through into import prices is different from the pass-through into export prices, i.e. $\beta^M_{[j]} \neq \beta^X_{[i]}$. Otherwise the estimated coefficient $\beta^X_{[i]}$ would be zero in equation 8.

We can follow a similar approach when estimating the export pass-through coefficient. We reverse the order and run the import price equation in the first stage. In this case, the importer-time fixed effects will capture all unobserved changes that are common to all exporters. Given the import price equation 3, the importer fixed effect will proxy for changes in strategic price setting, $\widehat{\theta_{[j]kt}} = \hat{f}_{[j]kt} + v_{[j]kt}$. The corresponding second stage export price equation is

$$d\log(p_{[i]jkt}) = \alpha_{[i]} + \beta^X_{[i]} d\log(s_{[i]jt}) + \gamma_{[i]}\widehat{\theta_{jkt}} + f_{[i]jk} + f_{[i]kt} + e_{[i]jkt} \tag{9}$$

We obtain a consistent estimate for the export price pass-through, $\beta^X_{[i]}$, if $Corr(s_{[i]jt}, v_{[j]kt}) = 0$ and $Corr(v_{[j]kt}, e_{[i]jkt}) = 0$.

3.2 Quantity elasticities

Before turning to the results of the exchange rate pass-through on prices, we will next discuss the elasticity of trade quantities. The combination of the exchange rate price and quantity elasticities allows computing the reaction of the trade balance and assess whether an exchange rate depreciation will cause a balance of trade improvement. To estimate the elasticity of trade quantities with respect to the exchange rate, we use the following regression specifications for exports

$$d\log(q_{[i]jkt}) = \alpha_{[i]} + \delta^X_{[i]} d\log(s_{[i]jt}) + \vartheta_{[i]} d\log(y_{jt}) + f_{[i]jk} + e_{[i]jkt} \tag{10}$$

and for imports

$$d\log(q_{i[j]kt}) = \alpha_{[j]} + \delta^M_{[j]} d\log(s_{ijt}) + \vartheta_{[j]} d\log(y_{[j]t}) + f_{i[j]k} + e_{i[j]kt}. \tag{11}$$

Equations 10 and 11 are the baseline quantity equations. The dependent variable is the quantity of product k exported from country i to country j at time t. The log change of the importer's GDP, $d\log(y_{jt})$, controls for local demand conditions.[10] Estimating the quantity regressions in log changes is particularly important because we control for the unit of account of the underlying quantity traded, i.e. kilogram, tons or pieces, as well as quality differences across countries that are constant over time. In addition, the time varying product fixed effects, f_{ijk}, account for product specific trends.

Regarding our predictions on the exchange rate elasticities, the impact of a depreciation on export quantities (δ^X) is expected to be positive, while negative for the quantities imported (δ^M).

3.3 Trade balance (Marshall-Lerner conditions)

In order to assess whether exchange rate changes improve or worsen the trade balance, we need price elasticities of exports and imports. To see how exchange rate changes influence the trade balance, we derive the Marshall-Lerner condition. Let's define the trade balance TB_i :

$$TB_i = s_i P_i^X X_i - P_i^M M_i$$

as the difference between the export sales (export price P_i^X, denoted in foreign currency, times volume X_i) multiplied by the nominal effective exchange rate s_i and the import expenditure (import price P_i^M, denoted in domestic currency, times volume M_i). Next, take the derivative of the trade balance with respect to the nominal effective exchange rate s_i[11]:

$$\frac{\partial TB_i}{\partial s_i} = P_i^X X_i + \frac{\partial P_i^X}{\partial s_i} s_i X_i + \frac{\partial X_i}{\partial P_i^X}\frac{\partial P_i^X}{\partial s_i} s_i P_i^X - \left(\frac{\partial P_i^M}{\partial s_i} M_i + \frac{\partial M_i}{\partial P_i^M}\frac{\partial P_i^M}{\partial s_i} P_i^M \right)$$

using the definition of the exchange rate pass-through:

$$\frac{\partial P_i^X}{\partial s_i}\frac{s_i}{P_i^X} = -\beta_i^X \quad \text{and} \quad \frac{\partial P_i^M}{\partial s_i}\frac{s_i}{P_i^M} = \beta_i^M$$

and the price elasticities of trade volumes

$$-\frac{\partial X_i}{\partial P_i^X}\frac{P_i^X}{X_i} = \mu_i^X \quad \text{and} \quad -\frac{\partial M_i}{\partial P_i^M}\frac{P_i^M}{M_i} = \mu_i^M$$

we can rewrite the previous equation as

$$\frac{\partial TB_i}{\partial s_i}\frac{s_i}{TB_i} = \frac{s_i P_i^X X_i}{TB_i}\left(1 - \beta_i^X + \mu_i^X \beta_i^X\right) - \frac{P_i^M M_i}{TB_i}\left(\beta_i^M - \mu_i^M \beta_i^M\right)$$

under the assumption that trade is balanced, the Marshall-Lerner condition under which the trade balance improves after an exchange rate depreciation becomes:

[10] The quantity equations are, for example, consistent with a 2 tier CES demand system, where changes in GDP capture aggregate demand changes, see amongst others Imbs and Mejean (2015), and more generally with aggregate exchange rate regressions in the pricing-to-market literature, see Burstein and Gopinath (2014).

[11] In line with the definition of the bilateral exchange rate, an depreciation of the nominal exchange rate of exporter i increases s_i.

$$\beta_i^X \left(1 - \mu_i^X\right) + \beta_i^M \left(1 - \mu_i^M\right) < 1 \tag{12}$$

In order to verify the Marshall-Lerner conditions, we need to calculate the price elasticities of exports (μ^X) and imports (μ^M). These elasticities can be estimated using the exchange rate as an exogenous shock to prices. Consider the case for exports

$$\frac{\partial \log X_i}{\partial \log s_i} = \frac{\partial \log X_i}{\partial \log P_i^X} \frac{\partial \log P_i^X}{\partial \log s_i} = \frac{\partial \log X_i}{\partial \log P_i^X} \left(-\beta_i^X\right)$$

or, simplifying

$$\mu_i^X = \frac{\delta_i^X}{\beta_i^X}$$

and equivalently for imports, we have

$$\frac{\partial \log M_i}{\partial \log s_i} = \frac{\partial \log M_i}{\partial \log P_i^M} \frac{\partial \log P_i^M}{\partial \log s_i} = \frac{\partial \log M_i}{\partial \log P_i^M} \left(\beta_i^M\right)$$

which simplifies to

$$\mu_i^M = -\frac{\delta_i^M}{\beta_i^M}$$

Next, we discuss the main results of the estimation of the exchange rate elasticities for import and export prices as well as for the corresponding quantity elasticities.

4 Results

4.1 Exchange rate pass through

Figure 1 and Figure 2 plot the baseline results without fixed effects. The corresponding table with the detailed results is at the end of the paper (see Table 4 and 5). Overall, the estimation results show that the coefficients of the key variables are statistically significant, with expected signs and magnitudes for all of the 51 countries.

Starting with export prices, the average elasticity of export prices denominated in importers currency with respect to the exchange rate, i.e. the exchange rate pass-through, is 0.65. However, as Figure 1 shows, there is a lot of heterogeneity across countries. We observe an elasticity of 1 for Switzerland, Norway, Guatemala, Philippines, Chile, Singapore and India, i.e. the exporters from these countries do not change their export prices when the exchange rate varies, implying full pass-through for their trading partners. On the other hand, the following countries adopt a complete pricing-to-market strategy and change their price one-to-one with the exchange rate: Argentina, Costa Rica, Indonesia and Ireland. In these countries, exporters do not change their export price in terms of the importer's currency with the exchange rate since their export elasticity is not significantly different from zero. In general, the average exchange rate elasticity of export prices is higher for advanced economies (on

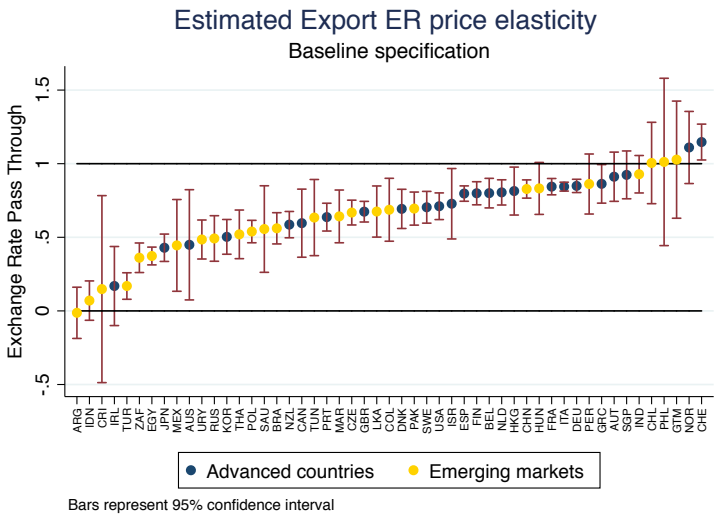


Figure 1: Estimated Exchange Rate Elasticity of Export Prices

Note: This chart reports point estimates of the exchange rate elasticities as shown in Table 4. Trade prices are expressed in the importer's currency so the coefficients can be read directly as "pass-through coefficients" for the importing countries. The blue circles indicate coefficient estimates for advanced economies (AE) and the yellow circles for emerging market economies (EME). The vertical lines denote 95 percent confidence intervals.

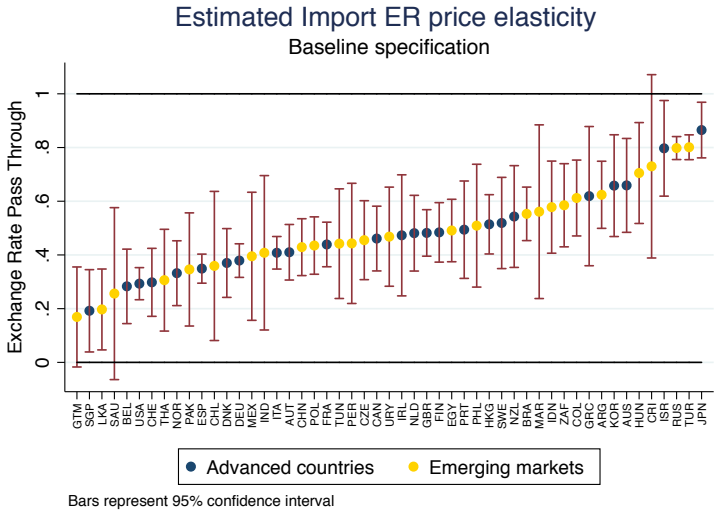
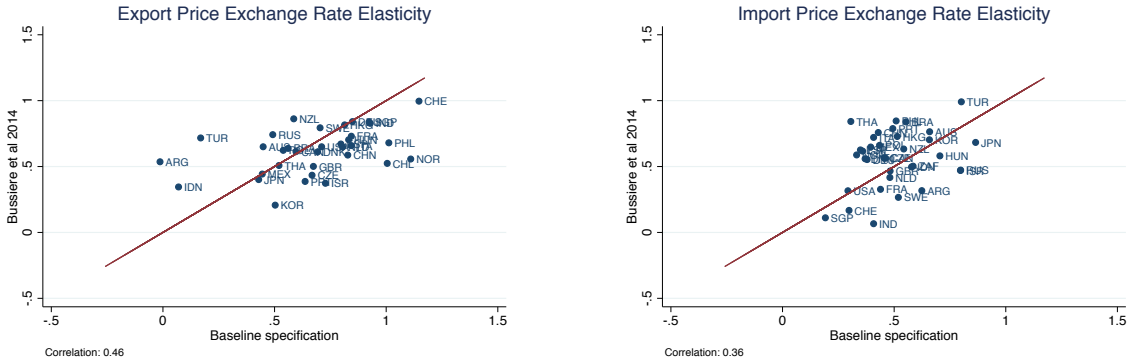


Figure 2: Estimated Exchange Rate Elasticity of Import Prices

Note: This chart reports point estimates of the exchange rate elasticities as shown in Table 4. The blue circles indicate coefficient estimates for advanced economies (AE) and the yellow circles for emerging market economies (EME). The vertical lines denote 95 percent confidence intervals.

average 0.72) than for emerging markets (on average 0.59). A possible explanation may be that exporters from advanced economies have more market power than those from EMEs. Turning to imports, the average exchange rate elasticity is 0.48. Only Costa Rica has a pass-through coefficient that is not significantly different from 1, i.e. we observe incomplete pass-through in most countries. In contrast, countries with a relatively low exchange rate elasticity are Guatemala, Singapore, Sri Lanka and Saudi Arabia. However, there is no significant difference in the import pass-through between emerging (on average 0.49) and advanced economies (on average 0.47).



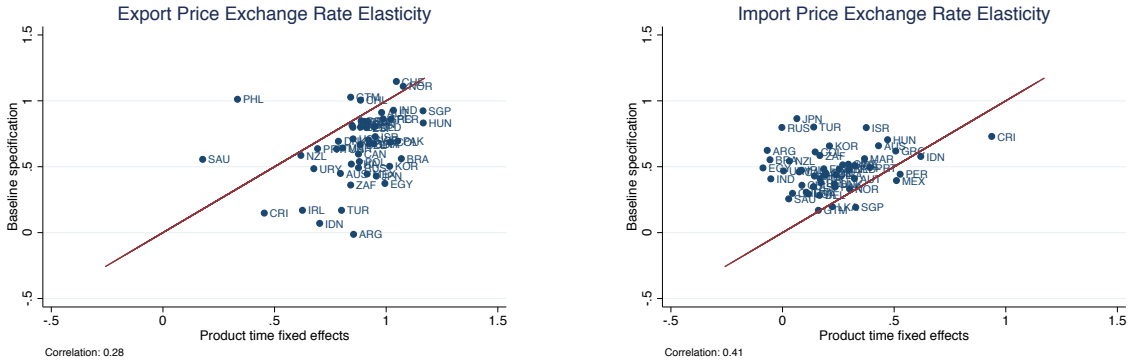
(a) Exports (b) Imports

Figure 3: Export and Import Exchange Rate Pass Through: comparison of estimates of the baseline specification with Bussière et al. (2014).

Note: The red line corresponds to the 45 degree line.

These results are broadly consistent with existing studies for the advanced economies. For the United States, our import pass-through coefficient is estimated to be around 29 percent. This result is in line with Ihrig et al. (2006), who find an estimate of 32 percent, and Corsetti et al. (2007) at 27 percent, as well as Gopinath (2015), who finds 35 percent. Gopinath (2015) also provides recent estimates for Turkey and Japan using aggregate import price data. Our product level based estimates show 80 percent pass-through for Turkey and 87 percent for Japan, which are slightly lower than the 82 and 92 percent respectively found by Gopinath (2015). For the United Kingdom, we find an exchange rate effect of 48 percent, in line with that of Campa and Goldberg (2005), equal to 46 percent, and Bussiere (2013), at 48 percent. More generally, we can compare our elasticities based on product level data with the macro exchange rate pass-through elasticities from Bussière et al. (2014), who investigate a similar sample in terms of country observations, see Figure 3. For exports the correlation is 0.46 and for imports 0.36. In line with Bussière et al. (2014), we also find a strong relationship between the estimated elasticities for export and import prices across countries. The correlation coefficient is 0.52.

In the next step, we can compare the results with no time fixed effects to the 1 step regression with time varying country and product fixed effects and analyze the severity of the marginal cost bias for exports and price complementarity bias for imports. Figure 4 shows the comparison for export (Figure 4(a)) and for import prices (Figure 4(b)) by plotting the 1 step estimates on the horizontal axis and the baseline estimates on the vertical axis. In the case of export prices, we observe that, with the exceptions of the Philippines and Saudi Arabia and to a lesser extend Chile and Guatemala, the 1 step estimates are higher than the baseline ones. Net of changes in the marginal costs, the average exchange rate pass through increases substantially from 0.65 to 0.87. Note that this implied bias is consistent with our pricing model, which suggests a positive correlation between marginal costs and exchange rate changes, see section 2.1.2. Similarly, in the case of imports, we observe that with the correction of (importer-)time

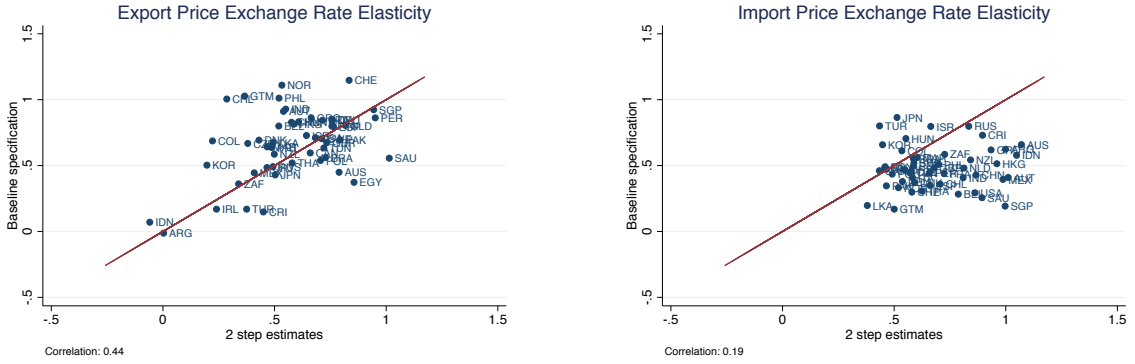


(a) Exports (b) Imports

Figure 4: Export and Import Exchange Rate Pass Through: comparison of estimates of the baseline specification with the fixed effect specification.

Note: The red line corresponds to the 45 degree line.

fixed effects the estimates are lower than the baseline ones with the exception of Costa Rica, Singapore, Mexico, Peru and Indonesia. Neglecting price adjustments caused by complementarities in price setting in the importing destination reduces the average exchange rate pass-through into import prices substantially from 0.49 to 0.22. The direction of the bias is consistent with the pricing model in section 2.1.1. Price adjustments are positively correlated with the exchange rate and, if omitted from the regression, cause a downward bias in the exchange rate pass-through to import prices.[12]



(a) Exports (b) Imports

Figure 5: Export and Import Exchange Rate Pass Through: comparison of baseline estimates with the 2 step approach

Note: The red line corresponds to the 45 degree line.

Finally, we can compare the 2 step results with the baseline specification of no time fixed effect. Doing so simultaneously controls for marginal costs and local price changes that are correlated with the exchange rate. Figure 5 shows the comparison for export (Figure 5(a)) and for import prices (Figure 5(b)) by plotting the 2 step estimates on the horizontal axis and the baseline estimates on the vertical axis. In the case of exports, based on the 2 step approach,

[12]It is a bias given the framework outlined in section 2. Having said that, the baseline regressions are very informative nonetheless as they report the reaction of prices and quantities to exchange rate changes as observed in the aggregate data. On the other hand, the fixed effect regressions shed light on the role of specific factors that determine the aggregate response of trade prices and quantities to changes of the exchange rate.

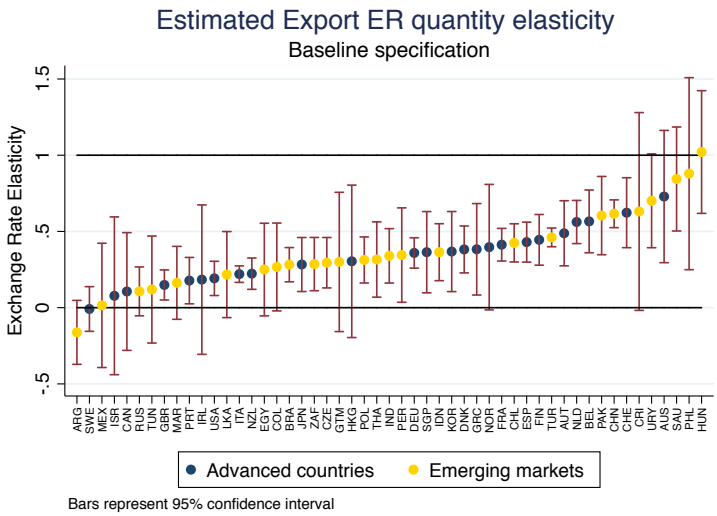


Figure 6: Estimated Quantity Elasticity for Exports

Note: This chart reports point estimates of the exchange rate elasticities as shown in Table 5. The blue circles indicate coefficient estimates for advanced economies (AE) and the yellow circles for emerging market economies (EME). The vertical lines denote 95 percent confidence intervals.

the reaction of export prices in importer currency to exchange rate changes is the lowest with 0.57, compared to 0.65 with no time fixed effects and to 0.87 with only product time fixed effects. Note that these changes are again consistent with the correlation implied by the pricing equation in section 2. In the case of export prices, controlling for marginal costs increases the elasticity, while controlling for local prices reduces the elasticity. As for imports, if we proxy for marginal costs and local prices the average pass-through is the highest with 0.68 compared to 0.49 in the case of no fixed effects and to 0.22 with product fixed effects only. Again, the direction of the bias is consistent with the pricing model.

4.2 Quantity elasticities

This subsection presents the estimated baseline quantity elasticities. Looking at the export side, Figure 6 plots the quantity elasticities reported in Table 5. Note that all countries have either a zero or a positive quantity elasticity of exports, i.e. an exchange rate depreciation raises the export quantity. While the average elasticity across all countries is 0.35, advanced economies tend to have a slightly higher average elasticity with 0.37 compared to an average elasticity of 0.32 for emerging markets. However, this difference is not statistically significant. Countries with a high elasticity are the Philippines and Hungary with 0.88 and 1. On the other hand, countries with low export quantity elasticities that are not significantly different from zero are Argentina, Sweden and Mexico. In general, countries whose export quantities react more strongly to exchange rate changes tend to be countries characterized by a high exchange rate elasticity of export prices (in the importing country's currency, i.e. high pass-through). The cross-country correlation between the two type of elasticities is 0.4.

Turning to import quantity elasticities, our results in Table 5 and plotted in Figure 7 show that all countries have either a zero or a negative quantity elasticity, i.e. an exchange rate depreciation reduces the quantity of goods imported. The average cross-country elasticity is -0.2 and insignificant between the two country groups. The average elasticity of emerging markets is -0.22 and -0.19 for advanced economies. Countries with strong reactions of import quantities are Costa Rica, Peru, Colombia, Morocco and Israel with elasticities smaller than -0.5. At

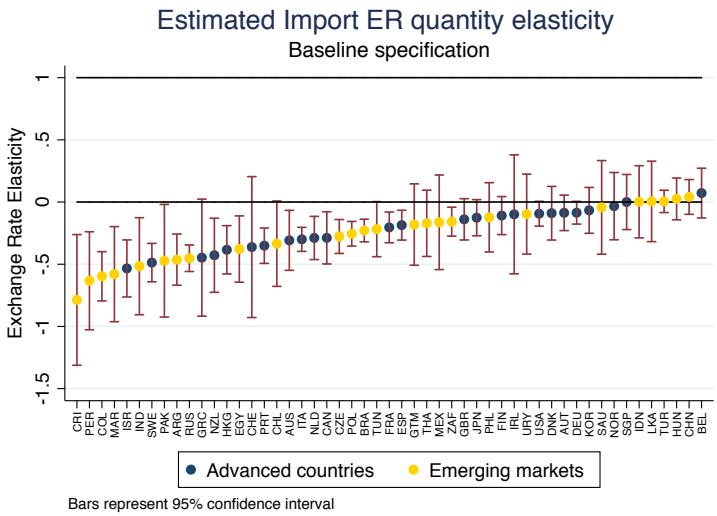


Figure 7: Estimated Quantity Elasticity for Imports

Note: This chart reports point estimates of the exchange rate elasticities as shown in Table 5. The blue circles indicate coefficient estimates for advanced economies (AE) and the yellow circles for emerging market economies (EME). The vertical lines denote 95 percent confidence intervals.

the same time, for many countries we do not find a response that is significantly different from zero suggesting that import demand in most countries depends more on income and the business cycle rather than to the exchange rate, see Hooper et al. (2002). Similar to the export quantity elasticities, countries with a stronger reaction in import prices tend to have stronger reactions in their import volumes. The correlation between the import price and quantity elasticities is 0.36.

Table 5 also shows that the estimated coefficient of GDP in both, export and import, quantity equations is close to or slightly above one. In theory, there is no reason why this coefficient should be different from one, but this is a common result in the empirical literature. One potential explanation is that GDP is a crude measure of demand that does not take into account the different import contents of GDP components (see Bussiere et al. (2013) for instance).

As in the price equations, we also introduce country and product time varying fixed effects in the quantity equations. The coefficients are affected but to a lesser extent than in the price equations. On average, we find that the median elasticity of export quantity increases from 0.35 to 0.47. One possible explanation is that the time varying fixed effects capture supply factors not taken into account in the baseline specification, such as productivity shocks, which are associated with an appreciation of the exchange rate and a simultaneous increase in export quantities. Taking the factors into account increases the elasticity. We note that the increase in quantity elasticities is in line with the higher elasticity of export prices when changing from the baseline to the fixed effect regression. By contrast, switching to the fixed effect specification leaves the elasticity broadly unchanged for import volumes (a slight increase from -0.25 to -0.22).

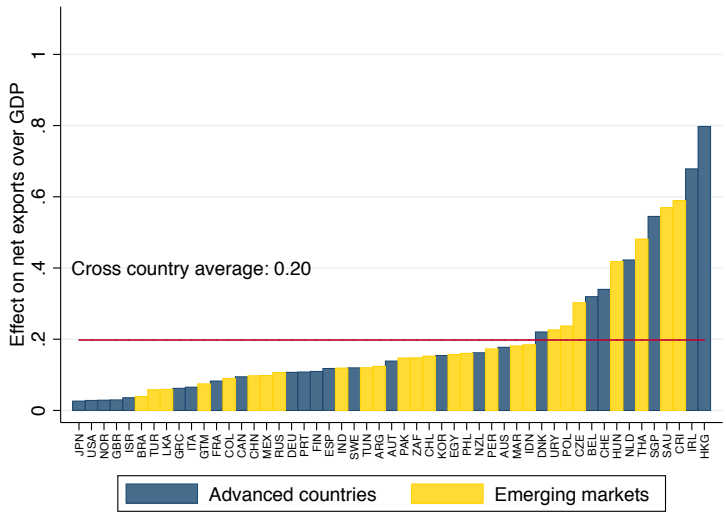


Figure 8: Effect on net exports over GDP based on estimated exchange rate elasticities and data on exports, imports and GDP in 2012.

4.3 The reaction of the trade balance

Based on these results, we can now verify the Marshall-Lerner conditions by plugging in the estimated price and quantity elasticities given in Table 4 and 5 into equation 12. Our estimates imply that the Marshall-Lerner conditions are verified for all countries. In addition, we can calculate the implied effect of a nominal exchange rate depreciation on net exports (which equals a change in output assuming no changes in consumption, investment and government spending) as:

$$\frac{\partial TB_i}{\partial s_i}\frac{s_i}{Y_i} = \frac{s_i P_i^X X_i}{Y_i}\left(1-\beta_i^X+\mu_i^X\beta_i^X\right) - \frac{P_i^M M_i}{Y_i}\left(\beta_i^M-\mu_i^M\beta_i^M\right)$$

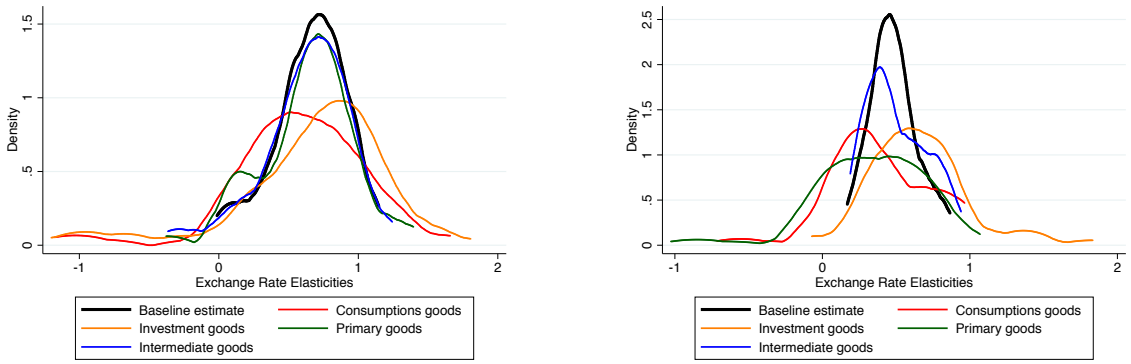
To calculate the implied effect, we use data on the shares of exports and imports with respect to GDP ($s_i P_i^X X_i/Y_i$ and $P_i^M M_i/Y_i$) as of 2012. Combining the estimates in Table 4 and 5 together with the trade shares, we find that on average a 10 percent depreciation in the exchange rate increases net exports by 2.0 percent of GDP to be compared with 1.7 according to Leigh et al. (2015). Table 10 and Figure 8 show the precise estimates for all countries in our sample. Countries with the strongest effects are Hong Kong and Ireland. For those countries, a 10 percent depreciation translates into a 7 to 8 percentage increase in net exports over GDP. Countries where the exchange rate has only marginal effects on the domestic economy are Japan, United States, Norway and Great Britain. For these countries, a 10 percent depreciation improves net exports by less than 0.3 percent. Cross country differences reflect to a large extent their openness to trade (the correlation between the trade balance effect and the openness index is 0.76).

Instead of using the baseline estimates, we also calculate the response of the trade balance to exchange rate changes using the coefficients of the 2 step fixed effect approach reported in Table 8 and 9. The average implied response of the trade balance to a 10 percent exchange rate depreciation is 2.8 percent of GDP, notably higher than in the baseline. However, the cross-country ranking in terms of magnitude of the effect remains broadly unchanged. The correlation between the two estimates is 0.75.

5 Additional robustness tests and further results

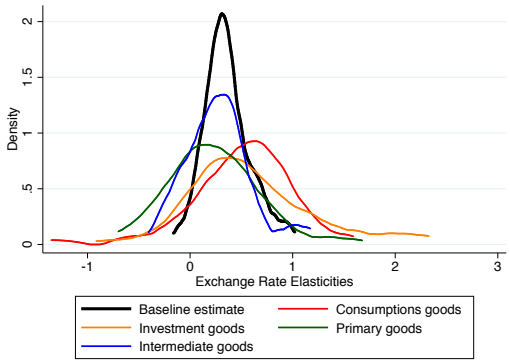
The aim of this section is to provide a set of additional tests of robustness and further interpretation of some results. As a first robustness tests, we added control variables in the baseline regression; specifically, we added inflation of the exporting country to capture aggregate changes in the production cost and inflation of the importing country to account for changes in the price of local goods. The results for prices are presented in Tables 11 and 12, while Tables 13 and 14 report the estimates for trade volumes. Including inflation leaves the results broadly unchanged. For export prices and quantities, the mean elasticity changes from 0.65 to 0.64 and from 0.35 to 0.47 respectively but these differences are not significant. Similarly, when we compare the mean elasticity for import prices (0.51 versus 0.48) and quantities (0.30 versus 0.28), their changes are not statistically significant either. The correlation with our baseline coefficients is very high, i.e. above 0.75, with the exception of the import quantities coefficients where the correlation is 0.64. Overall, our baseline approach captures well aggregate changes in competitiveness caused by inflation.

As extensions to our baseline results, we also consider an augmented version of the model, where we include two lags of the exchange rate to analyze the time effects of the exchange rate adjustments. The results are in Tables 15 to 18. Note that for the majority of countries all the exchange rate effects materialize within one year (most of the lagged variables are not significant).

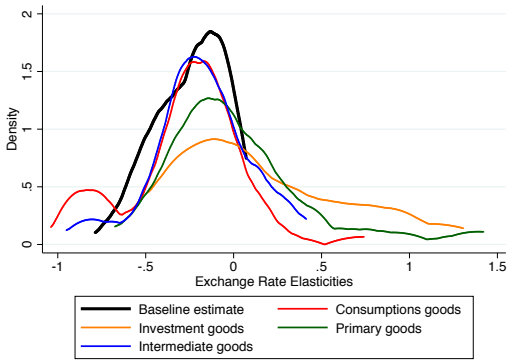


(a) Export prices

(b) Import prices



(c) Export volumes



(d) Import volumes

Figure 9: Kernel distribution of estimated exchange rate elasticities across countries in each of the 4 sectors

Next, we estimate country specific price and quantity exchange rate elasticities for different product classes, in particular, investment, intermediate, consumption and primary goods. The regression specification for import prices in sector s looks like the following:

$$d\log(p_{i[j]kt}) = \alpha_{[js]} - \beta_{[js]} d\log(s_{ijt}) + f_{i[j]k} + e_{i[j]kt} \tag{13}$$

where $\beta_{[js]}$ is the exchange rate pass through coefficient of sector s in country j. To classify HS 6 codes into the respective sectors, we use the Broad Economic Categories (BEC) of the United Nations. To better visualize the results, we plot the Kernel distribution of the different exchange rate estimates. Figure 9(a) and Figure 9(b) show the distribution for price, while Figure 9(c) and Figure 9(d) for quantity elasticities across countries. Note that in all 4 graphs the baseline estimates are closest to the estimates for intermediate goods suggesting that aggregate elasticities are mainly driven by trade in the intermediate good sector, which is the largest sector by covering almost 50 percent of world trade in our data. For the other sectors, the results are more mixed. While the median is broadly similar across sectors, the elasticities tend to be much more dispersed across countries, particularly for primary goods. In addition, we analyze to what extend the variation in the aggregate exchange rate elasticities can be explained by common sector specific elasticities. To do so, we regress the coefficients obtained from equation 13 on sector (f_s) and country (f_j) fixed effects , i.e.

$$\hat{\beta}_{js} = f_s + f_j + e_{js}, \tag{14}$$

and calculate the share of variation explained by sectoral fixed effects. Overall, the results suggest that the aggregate response of the exchange rate elasticities is mainly driven by country fixed effects rather than by sector specific variation. The regression where sectoral fixed effects explain the most is the export quantity with 29 percent, while country fixed effects explain 71 percent.[13]

Finally, we also experimented with unweighted regressions instead of weighted regressions. Unweighted regressions change the estimated coefficients significantly. In particular, the estimated pass-through coefficients for exports are higher and the ones for imports are lower (i.e. more pricing to market). Still, we prefer the *weighted regression* results as it is sensible to give more weight to price changes in categories and partner countries that have a high trading volume if we want our results to be comparable to those obtained using aggregate data. Another potential concern is that our definition of outliers might influence our results. Indeed, we dropped all those observations with price changes above 200 percent ($-\log(1+2) < d\log(p_{ijkt}) < \log(1+2)$). Instead of choosing a fixed cut off of 200 percent, we experimented also with throwing out observations that are in the top 1 percentile of the price changes in each product category for each exporting and importing country. The results are very similar to our baseline estimates.[14]

[13] One concern is that the obtained result is self-evident since we only consider 4 sectors. Thus, we re-estimate equation 13 for each HS 4 digit product category (1250 categories) and calculate the explanative power of the sectoral variation with respect to the overall variation using equation 14. Again, we find that for all 4 regressions country fixed effects explain a much larger share than sectoral fixed effects. Detailed results are available upon request.

[14] We do not to report them in order to save space. Detailed results are available upon request.

6 Conclusion

This paper estimates exchange rate price and quantity elasticities for imports and exports for 51 countries. The analysis is based on a rich database of bilateral trade flows with 160 partner countries and about 5000 different products. We present standard regressions and complement these baseline results with alternative specifications, building on the multidimensional panel structure of the dataset. In particular, these alternative specifications allow us to explore the role of unobserved variables such as marginal costs and competitor prices in the importing market. We also present a battery of robustness results, controlling for additional lags of the data, and additional control variables, in particular.

The main empirical results on this paper can be summarized as follows. First, our estimates indicate that exchange rate pass-through (ERPT) is incomplete for most countries, and that there is substantial heterogeneity in the reaction of export and import prices across countries. The estimates reveal that, on average, the exchange rate elasticity of export prices is higher in emerging markets than in advanced economies, suggesting that exporters from advanced economies have more market power than their counterparts in emerging market economies. For import prices, we also find substantial heterogeneity across countries but no significant difference between emerging market and advanced economies. Second, our baseline trade quantity regressions yield elasticities in the ballpark of 0.2-0.4. Third, based on the estimated price and quantity exchange rate elasticities, the results imply that the Marshall-Lerner conditions are satisfied for all countries in the sample. This is largely because pass-through is incomplete in the majority of countries, while export prices in producer (exporter) currency react significantly to exchange rate changes (two results that are of course two sides of the same coin). As a result, the full Marshall-Lerner conditions (taking into account not only the reaction of trade volumes but also trade prices) are satisfied even though some of the exchange rate quantity elasticities are not significantly different from zero (especially on the import side). Cross country differences in the reaction of the trade balance reflect to a large extent their openness to trade.

Fourth, controlling for time varying country and product fixed effects substantially modifies the results and their interpretations. For export prices, the median exchange rate pass-through coefficient increases substantially. One possible interpretation is that this alternative specification controls for marginal costs and therefore focuses on the reaction of profit margins only, suggesting that a significant part of the reaction of export prices in producer currency comes from varying costs (associated e.g. to imported costs). In the import price equation the alternative specification controls for time varying conditions in the importing countries, and in particular local prices. This alternative specification also reduces the pass-through coefficient compared to the baseline (as foreign exporters take into account the reaction of local prices). Generally, turning to the fixed effects equations reduces the dispersion of the coefficients, suggesting that controlling for unobserved variables removes a substantial source of cross-country heterogeneity. For the export and import quantity equations, the coefficients are also substantially modified when we turn to the alternative specifications.

Overall, these different specifications yield complementary insights on the issue of exchange rate elasticities. While the baseline specification is very close in spirit to the macro approach (the magnitude of these elasticities being correlated with existing macro studies), the fixed effect approach goes one step further and helps disentangling the different mechanism at work when the exchange rate varies. From a policy perspective, the results suggest that exchange rate changes can play an important role in addressing global trade imbalances.

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7 Tables

Table 1: Countries in the sample

Country Iso Code	Country Name	**Country Iso Code**	Country Name
ARG	Argentina	ISR	Israel
AUS	Australia	ITA	Italy
AUT	Austria	JPN	Japan
BEL	Belgium	KOR	South Korea
BRA	Brazil	LKA	Sri Lanka
CAN	Canada	MAR	Morocco
CHE	Switzerland	MEX	Mexico
CHL	Chile	NLD	Netherlands
CHN	China	NOR	Norway
COL	Columbia	NZL	New Zealand
CRI	Costa Rica	PAK	Pakistan
CZE	Czech Republic	PER	Peru
DEU	Germany	PHL	Philippines
DNK	Denmark	POL	Poland
EGY	Egypt	PRT	Portugal
ESP	Spain	RUS	Russia
FIN	Finland	SAU	Saudi Arabia
FRA	France	SGP	Singapore
GBR	United Kingdom	SWE	Sweden
GRC	Greece	THA	Thailand
GTM	Guatemala	TUN	Tunisia
HKG	Hong Kong	TUR	Turkey
HUN	Hungary	URY	Uruguay
IDN	Indonesia	USA	United States
IND	India	ZAF	South Africa
IRL	Ireland		

Table 2: Summary statistics on exchange rate elasticities for export volumes and prices

	Median	Mean	Std. Dev.
Unweighted			
Price elasticity - baseline	0.655	0.687	0.217
Price elasticity - product time fixed effects	0.866	0.885	0.184
Price elasticity - 2 way fixed effects	0.570	0.576	0.226
Quantity elasticity - baseline	0.347	0.345	0.222
Quantity elasticity - product time fixed effects	0.469	0.431	0.280
Quantity elasticity - 2 way fixed effects	0.364	0.353	0.250
Weighted by trade in 2012 $(X + M) \div 2$			
Price elasticity - baseline	0.704	0.711	0.177
Price elasticity - product time fixed effects	0.897	0.902	0.130
Price elasticity - 2 way fixed effects	0.627	0.683	0.185
Quantity elasticity - baseline	0.348	0.359	0.188
Quantity elasticity - product time fixed effects	0.450	0.418	0.205
Quantity elasticity - 2 way fixed effects	0.351	0.353	0.188
Advanced Economies			
Price elasticity - baseline	0.719	0.797	0.155
Price elasticity - product time fixed effects	0.897	0.911	0.127
Price elasticity - 2 way fixed effects	0.631	0.664	0.178
Quantity elasticity - baseline	0.337	0.368	0.185
Quantity elasticity - product time fixed effects	0.442	0.428	0.184
Quantity elasticity - 2 way fixed effects	0.370	0.353	0.169
Emerging Market Economies			
Price elasticity - baseline	0.592	0.597	0.252
Price elasticity - product time fixed effects	0.837	0.878	0.224
Price elasticity - 2 way fixed effects	0.511	0.493	0.254
Quantity elasticity - baseline	0.356	0.315	0.257
Quantity elasticity - product time fixed effects	0.495	0.458	0.350
Quantity elasticity - 2 way fixed effects	0.358	0.355	0.312

Table 3: Summary statistics on exchange rate elasticities for import volumes and prices

	Median	Mean	Std. Dev.
Unweighted			
Price elasticity - baseline	0.480	0.468	0.161
Price elasticity - product time fixed effects	0.220	0.188	0.192
Price elasticity - 2 way fixed effects	0.682	0.625	0.192
Quantity elasticity - baseline	-0.245	-0.204	0.202
Quantity elasticity - product time fixed effects	-0.217	-0.158	0.268
Quantity elasticity - 2 way fixed effects	-0.520	-0.447	0.233
Weighted by trade in 2012 $(X + M) \div 2$			
Price elasticity - baseline	0.452	0.429	0.161
Price elasticity - product time fixed effects	0.178	0.166	0.129
Price elasticity - 2 way fixed effects	0.720	0.724	0.181
Quantity elasticity - baseline	-0.166	-0.126	0.157
Quantity elasticity - product time fixed effects	-0.172	-0.132	0.155
Quantity elasticity - 2 way fixed effects	-0.483	-0.438	0.157
Advanced Economies			
Price elasticity - baseline	0.472	0.473	0.158
Price elasticity - product time fixed effects	0.228	0.232	0.126
Price elasticity - 2 way fixed effects	0.692	0.662	0.196
Quantity elasticity - baseline	-0.217	-0.186	0.165
Quantity elasticity - product time fixed effects	-0.215	-0.158	0.168
Quantity elasticity - 2 way fixed effects	-0.473	-0.438	0.140
Emerging Market Economies			
Price elasticity - baseline	0.487	0.462	0.167
Price elasticity - product time fixed effects	0.212	0.164	0.242
Price elasticity - 2 way fixed effects	0.671	0.614	0.191
Quantity elasticity - baseline	-0.271	-0.223	0.232
Quantity elasticity - product time fixed effects	-0.219	-0.150	0.341
Quantity elasticity - 2 way fixed effects	-0.564	-0.470	0.292

Table 4: Estimates of Exchange Rate Elasticities for export and import prices for the baseline specification

	Export Prices		Import Prices	
	ER	SE	ER	SE
ARG	-0.013	0.089	0.624**	0.064
AUS	0.449*	0.191	0.659**	0.089
AUT	0.911**	0.085	0.410**	0.053
BEL	0.800**	0.051	0.283**	0.071
BRA	0.561**	0.054	0.553**	0.051
CAN	0.596**	0.118	0.461**	0.061
CHE	1.147**	0.062	0.298**	0.065
CHL	1.005**	0.141	0.359*	0.142
CHN	0.828**	0.032	0.429**	0.054
COL	0.687**	0.109	0.612**	0.072
CRI	0.148	0.324	0.730**	0.174
CZE	0.668**	0.043	0.455**	0.075
DEU	0.849**	0.023	0.379**	0.032
DNK	0.693**	0.068	0.370**	0.065
EGY	0.373**	0.031	0.491**	0.059
ESP	0.797**	0.027	0.349**	0.028
FIN	0.799**	0.040	0.484**	0.056
FRA	0.844**	0.028	0.439**	0.042
GBR	0.674**	0.036	0.482**	0.044
GRC	0.863**	0.067	0.619**	0.132
GTM	1.027**	0.203	0.169	0.095
HKG	0.814**	0.083	0.514**	0.056
HUN	0.832**	0.090	0.705**	0.096
IDN	0.070	0.068	0.578**	0.087
IND	0.928**	0.065	0.408**	0.147
IRL	0.169	0.137	0.473**	0.115
ISR	0.728**	0.122	0.797**	0.091
ITA	0.844**	0.015	0.408**	0.031
JPN	0.429**	0.047	0.865**	0.053
KOR	0.503**	0.060	0.658**	0.097
LKA	0.675**	0.089	0.197*	0.077
MAR	0.642**	0.091	0.561**	0.165
MEX	0.445**	0.159	0.395**	0.122
NLD	0.805**	0.044	0.481**	0.072
NOR	1.110**	0.125	0.332**	0.062
NZL	0.586**	0.046	0.543**	0.097
PAK	0.695**	0.057	0.346**	0.107
PER	0.862**	0.104	0.443**	0.114
PHL	1.012**	0.290	0.509**	0.117
POL	0.539**	0.039	0.435**	0.054
PRT	0.637**	0.048	0.494**	0.093
RUS	0.492**	0.079	0.798**	0.022
SAU	0.556**	0.150	0.256	0.163
SGP	0.924**	0.083	0.192*	0.078
SWE	0.704**	0.055	0.519**	0.087
THA	0.520**	0.084	0.306**	0.097
TUN	0.634**	0.132	0.442**	0.104
TUR	0.169**	0.046	0.801**	0.024
URY	0.485**	0.068	0.468**	0.094
USA	0.711**	0.046	0.293**	0.031
ZAF	0.361**	0.051	0.585**	0.079

Table 5: Estimates of Exchange Rate Elasticities for export and import volumes for the baseline specification

	Export Volumes				Import Volumes			
	ER	(SE)	log(GDP) Importer	(SE)	ER	(SE)	log(GDP) Importer	(SE)
ARG	-0.162	0.107	1.281	1.697	-0.463**	0.105	1.463**	0.158
AUS	0.729**	0.221	1.639*	0.712	-0.308*	0.123	1.506*	0.644
AUT	0.488**	0.109	1.208**	0.214	-0.087	0.073	1.935**	0.208
BEL	0.566**	0.105	1.658**	0.162	0.072	0.102	1.507**	0.241
BRA	0.282**	0.057	1.705**	0.283	-0.229**	0.047	0.025	0.655
CAN	0.106	0.197	1.533**	0.445	-0.288**	0.107	1.217*	0.483
CHE	0.623**	0.117	1.416**	0.329	-0.362	0.289	0.470	0.379
CHL	0.425**	0.064	1.409**	0.316	-0.335	0.175	1.220**	0.372
CHN	0.616**	0.047	1.114**	0.166	0.041	0.071	0.411	0.482
COL	0.267	0.147	1.319*	0.517	-0.597**	0.101	1.631*	0.766
CRI	0.631	0.331	1.157	0.752	-0.787**	0.268	1.275	0.982
CZE	0.295**	0.084	1.190**	0.161	-0.277**	0.070	0.958**	0.241
DEU	0.359**	0.051	1.307**	0.055	-0.086	0.047	1.158**	0.184
DNK	0.382**	0.079	0.911**	0.119	-0.090	0.110	1.281**	0.211
EGY	0.250	0.155	0.612	0.402	-0.378**	0.136	1.028**	0.382
ESP	0.430**	0.067	1.174**	0.145	-0.186**	0.061	1.092**	0.222
FIN	0.445**	0.085	1.538**	0.245	-0.109	0.078	1.603**	0.232
FRA	0.413**	0.055	0.861**	0.202	-0.204**	0.063	1.932**	0.113
GBR	0.149**	0.050	1.321**	0.147	-0.139	0.085	1.227**	0.235
GRC	0.383*	0.153	0.945**	0.213	-0.447	0.240	1.657**	0.327
GTM	0.300	0.233	0.179**	0.049	-0.181	0.167	1.820	0.963
HKG	0.304	0.255	0.416	0.329	-0.384**	0.099	0.394	1.000
HUN	1.021**	0.205	1.429**	0.408	0.025	0.086	1.179**	0.263
IDN	0.364**	0.095	0.604**	0.224	0.002	0.148	0.891**	0.231
IND	0.340**	0.091	0.912**	0.114	-0.516*	0.199	2.036	2.409
IRL	0.184	0.250	2.008**	0.610	-0.099	0.244	2.072**	0.246
ISR	0.078	0.264	1.788**	0.475	-0.534**	0.117	1.403	0.916
ITA	0.220**	0.028	1.262**	0.077	-0.300**	0.049	1.360**	0.132
JPN	0.283**	0.090	1.913**	0.141	-0.126	0.074	1.574**	0.359
KOR	0.368**	0.134	1.353**	0.267	-0.067	0.094	1.533**	0.370
LKA	0.217	0.144	1.380**	0.414	0.005	0.165	0.243	0.520
MAR	0.163	0.122	1.313**	0.293	-0.580**	0.195	0.525**	0.158
MEX	0.015	0.208	1.636**	0.468	-0.163	0.194	1.189*	0.541
NLD	0.562**	0.072	1.356**	0.106	-0.289**	0.089	1.905**	0.207
NOR	0.397	0.210	0.626**	0.229	-0.033	0.138	0.489**	0.127
NZL	0.223**	0.052	0.759**	0.174	-0.428**	0.152	1.626	1.684
PAK	0.604**	0.131	1.597**	0.239	-0.472*	0.231	1.465	1.203
PER	0.345*	0.158	1.132**	0.364	-0.633**	0.201	1.376**	0.242
PHL	0.879**	0.321	0.944	2.388	-0.123	0.142	0.604	0.388
POL	0.313**	0.077	1.730**	0.242	-0.255**	0.051	1.271**	0.262
PRT	0.177*	0.078	1.034**	0.113	-0.351**	0.073	1.286**	0.214
RUS	0.107	0.082	0.756**	0.203	-0.452**	0.054	0.946**	0.137
SAU	0.844**	0.174	2.023*	0.779	-0.043	0.192	0.598**	0.203
SGP	0.364*	0.136	0.568	0.518	0.000	0.113	0.003	0.253
SWE	-0.009	0.075	1.697**	0.135	-0.487**	0.079	2.036**	0.260
THA	0.316*	0.126	0.938**	0.227	-0.171	0.136	1.591**	0.205
TUN	0.119	0.179	1.310	0.728	-0.218	0.113	0.099	0.154
TUR	0.461**	0.031	1.391**	0.131	0.005	0.046	1.533**	0.160
URY	0.701**	0.157	1.313	0.671	-0.097	0.164	0.649	0.327
USA	0.192**	0.057	0.694**	0.115	-0.094	0.051	1.761**	0.556
ZAF	0.286**	0.089	1.172*	0.516	-0.158*	0.060	1.317	1.208

Table 6: Estimates of Exchange Rate Elasticities for export and import prices for the one step estimation

	Export Prices		Import Prices	
	ER	SE	ER	SE
ARG	0.854**	0.195	-0.069	0.118
AUS	0.795	0.396	0.430**	0.072
AUT	0.979**	0.079	0.322**	0.078
BEL	0.885**	0.054	0.166**	0.050
BRA	1.068**	0.045	-0.056	0.028
CAN	0.876**	0.060	0.075	0.125
CHE	1.046**	0.054	0.045	0.104
CHL	0.885**	0.054	0.087	0.267
CHN	0.913**	0.050	0.143	0.106
COL	1.020**	0.110	0.146	0.077
CRI	0.454**	0.168	0.937	0.565
CZE	0.884**	0.041	0.192**	0.052
DEU	0.888**	0.022	0.172**	0.026
DNK	0.786**	0.053	0.232**	0.036
EGY	0.994**	0.091	-0.088	0.061
ESP	0.911**	0.033	0.139**	0.036
FIN	0.851**	0.032	0.185**	0.045
FRA	0.902**	0.028	0.239**	0.043
GBR	0.923**	0.059	0.254**	0.032
GRC	0.986**	0.070	0.507**	0.159
GTM	0.841**	0.074	0.161	0.117
HKG	0.847**	0.091	0.270**	0.080
HUN	1.166**	0.139	0.471**	0.096
IDN	0.702**	0.082	0.619**	0.212
IND	1.032**	0.037	-0.052	0.242
IRL	0.625**	0.132	0.085	0.105
ISR	0.951**	0.086	0.375**	0.104
ITA	0.918**	0.017	0.168**	0.021
JPN	0.956**	0.039	0.064*	0.027
KOR	1.015**	0.085	0.210**	0.052
LKA	0.944**	0.059	0.223	0.212
MAR	0.805**	0.069	0.367*	0.183
MEX	0.915**	0.143	0.510**	0.113
NLD	0.948**	0.042	0.299**	0.061
NOR	1.077**	0.124	0.300**	0.054
NZL	0.618**	0.068	0.031	0.117
PAK	1.051**	0.117	0.235**	0.064
PER	1.023**	0.127	0.527**	0.154
PHL	0.334	0.487	0.322*	0.137
POL	0.880**	0.042	0.188**	0.030
PRT	0.693**	0.054	0.392**	0.075
RUS	0.876**	0.030	-0.003	0.032
SAU	0.178	0.346	0.028	0.216
SGP	1.165**	0.159	0.328**	0.110
SWE	0.921**	0.046	0.295**	0.073
THA	0.844**	0.076	0.106	0.118
TUN	0.778**	0.154	0.195**	0.051
TUR	0.800**	0.027	0.140**	0.042
URY	0.676**	0.187	0.005	0.144
USA	0.852**	0.063	0.117	0.063
ZAF	0.841**	0.117	0.167	0.087

Table 7: Estimates of Exchange Rate Elasticities for export and import volumes for the one step estimation

	Export Volumes				Import Volumes	
	ER	(SE)	log(GDP) Importer	(SE)	ER	(SE)
ARG	0.369	0.264	1.281	1.697	-0.030	0.175
AUS	0.951*	0.446	1.639*	0.712	0.127	0.104
AUT	0.480**	0.099	1.208**	0.214	0.214	0.109
BEL	0.529**	0.115	1.658**	0.162	0.107	0.086
BRA	0.588**	0.094	1.705**	0.283	-0.131	0.113
CAN	0.282**	0.085	1.533**	0.445	0.113	0.149
CHE	0.405**	0.111	1.416**	0.329	0.693	0.500
CHL	0.586**	0.068	1.409**	0.316	0.325	0.265
CHN	0.418**	0.061	1.114**	0.166	0.036	0.093
COL	0.445**	0.153	1.319*	0.517	0.253*	0.112
CRI	0.329*	0.138	1.157	0.752	1.309*	0.632
CZE	0.574**	0.082	1.190**	0.161	0.072	0.086
DEU	0.385**	0.042	1.307**	0.055	0.140**	0.040
DNK	0.439**	0.083	0.911**	0.119	0.080	0.074
EGY	0.560	0.578	0.612	0.402	0.220	0.191
ESP	0.502**	0.061	1.174**	0.145	0.187*	0.090
FIN	0.378**	0.076	1.538**	0.245	0.155	0.098
FRA	0.402**	0.047	0.861**	0.202	0.175**	0.062
GBR	0.391**	0.082	1.321**	0.147	0.086	0.049
GRC	0.455**	0.156	0.945**	0.213	0.402	0.222
GTM	-0.046	0.266	0.179**	0.049	0.107	0.271
HKG	0.310	0.261	0.416	0.329	0.463**	0.165
HUN	0.930**	0.187	1.429**	0.408	0.042	0.154
IDN	0.365**	0.127	0.604**	0.224	0.565	0.394
IND	0.480**	0.069	0.912**	0.114	0.208	0.162
IRL	0.013	0.306	2.008**	0.610	0.386*	0.191
ISR	0.431**	0.140	1.788**	0.475	0.569**	0.141
ITA	0.428**	0.028	1.262**	0.077	0.269**	0.044
JPN	0.650**	0.082	1.913**	0.141	0.010	0.041
KOR	0.739**	0.098	1.353**	0.267	0.206**	0.067
LKA	0.202	0.132	1.380**	0.414	-0.558	0.445
MAR	0.243*	0.113	1.313**	0.293	0.480*	0.188
MEX	0.646**	0.210	1.636**	0.468	0.450**	0.133
NLD	0.464**	0.066	1.356**	0.106	0.251*	0.099
NOR	0.323	0.194	0.626**	0.229	0.158	0.101
NZL	0.348**	0.114	0.759**	0.174	-0.009	0.178
PAK	0.743**	0.213	1.597**	0.239	0.453*	0.202
PER	0.036	0.159	1.132**	0.364	0.810*	0.323
PHL	1.494**	0.409	0.944	2.388	0.068	0.170
POL	0.807**	0.067	1.730**	0.242	0.282**	0.085
PRT	0.204*	0.093	1.034**	0.113	0.205*	0.097
RUS	-0.010	0.066	0.756**	0.203	0.175**	0.049
SAU	1.095**	0.130	2.023*	0.779	0.091	0.263
SGP	0.585**	0.168	0.568	0.518	0.132	0.141
SWE	0.666**	0.115	1.697**	0.135	0.147	0.077
THA	0.204	0.156	0.938**	0.227	0.126	0.123
TUN	0.120	0.223	1.310	0.728	0.115	0.163
TUR	0.808**	0.079	1.391**	0.131	0.237*	0.103
URY	0.471	0.288	1.313	0.671	-0.004	0.197
USA	0.300**	0.064	0.694**	0.115	0.120	0.064
ZAF	0.405	0.209	1.172*	0.516	-0.014	0.183

Table 8: Estimates of Exchange Rate Elasticities for export and import prices for the 2 step approach

	Export Prices		Import Prices	
	ER	SE	ER	SE
ARG	0.003	0.236	0.999**	0.113
AUS	0.789*	0.378	1.070**	0.077
AUT	0.540**	0.088	1.011**	0.068
BEL	0.519**	0.048	0.788**	0.064
BRA	0.728**	0.056	0.586**	0.106
CAN	0.660**	0.076	0.434**	0.156
CHE	0.834**	0.075	0.580**	0.142
CHL	0.286*	0.110	0.707*	0.274
CHN	0.576**	0.043	0.867**	0.080
COL	0.222**	0.035	0.535**	0.104
CRI	0.450	0.451	0.896	0.653
CZE	0.380**	0.056	0.576**	0.071
DEU	0.757**	0.024	0.537**	0.035
DNK	0.430**	0.051	0.591**	0.055
EGY	0.856**	0.165	0.460**	0.117
ESP	0.764**	0.029	0.662**	0.065
FIN	0.757**	0.033	0.458**	0.056
FRA	0.715**	0.034	0.724**	0.058
GBR	0.734**	0.046	0.679**	0.038
GRC	0.664**	0.110	0.934**	0.209
GTM	0.366*	0.152	0.500**	0.151
HKG	0.586**	0.076	0.960**	0.082
HUN	0.608**	0.138	0.553**	0.110
IDN	-0.059	0.030	1.048**	0.208
IND	0.550**	0.053	0.809**	0.224
IRL	0.240	0.195	0.467**	0.154
ISR	0.643**	0.118	0.664**	0.182
ITA	0.759**	0.018	0.582**	0.051
JPN	0.503**	0.034	0.513**	0.103
KOR	0.197**	0.036	0.448**	0.116
LKA	0.494**	0.116	0.380**	0.109
MAR	0.467**	0.089	0.603*	0.240
MEX	0.409**	0.139	0.987**	0.129
NLD	0.817**	0.043	0.813**	0.078
NOR	0.533**	0.079	0.519**	0.076
NZL	0.499**	0.075	0.842**	0.164
PAK	0.794**	0.109	0.465**	0.139
PER	0.951**	0.162	0.657**	0.183
PHL	0.520	0.269	0.698**	0.188
POL	0.706**	0.042	0.491**	0.042
PRT	0.487**	0.079	0.586**	0.085
RUS	0.493**	0.052	0.834**	0.043
SAU	1.014**	0.109	0.894**	0.169
SGP	0.944**	0.108	0.997**	0.167
SWE	0.712**	0.043	0.589**	0.069
THA	0.579**	0.091	0.625**	0.114
TUN	0.721**	0.150	0.572**	0.116
TUR	0.375**	0.034	0.435**	0.077
URY	0.466*	0.180	0.548**	0.176
USA	0.683**	0.051	0.862**	0.053
ZAF	0.339**	0.094	0.726**	0.154

Table 9: Estimates of Exchange Rate Elasticities for export and import volumes for the 2 step approach

	Export Volumes		Import volumes	
	ERC	SE	ERC	SE
ARG	0.264	0.242	0.842**	0.148
AUS	0.911*	0.412	0.476**	0.079
AUT	0.333**	0.100	0.562**	0.081
BEL	0.487**	0.107	0.438**	0.077
BRA	0.500**	0.086	0.285**	0.074
CAN	0.256**	0.093	0.365*	0.150
CHE	0.417**	0.102	0.638	0.335
CHL	0.269*	0.107	0.646**	0.213
CHN	0.310**	0.058	0.405**	0.100
COL	0.223*	0.086	0.576**	0.107
CRI	-0.133	0.285	1.521*	0.580
CZE	0.494**	0.077	0.288**	0.106
DEU	0.353**	0.036	0.420**	0.040
DNK	0.379**	0.091	0.428**	0.083
EGY	0.652	0.564	0.467**	0.145
ESP	0.448**	0.057	0.492**	0.091
FIN	0.333**	0.074	0.262**	0.090
FRA	0.363**	0.041	0.438**	0.069
GBR	0.343**	0.078	0.447**	0.048
GRC	0.402*	0.151	0.672**	0.136
GTM	-0.131	0.222	0.443	0.242
HKG	0.195	0.248	0.774**	0.098
HUN	0.566*	0.222	0.248*	0.121
IDN	-0.074	0.119	0.809*	0.321
IND	0.408**	0.068	0.416*	0.182
IRL	-0.080	0.286	0.603**	0.205
ISR	0.315*	0.142	0.713**	0.155
ITA	0.430**	0.029	0.527**	0.048
JPN	0.369**	0.060	0.158*	0.060
KOR	0.199**	0.032	0.378**	0.085
LKA	0.220*	0.106	0.156	0.127
MAR	0.184	0.112	0.742**	0.197
MEX	0.401*	0.185	0.864**	0.155
NLD	0.435**	0.067	0.549**	0.078
NOR	0.330	0.218	0.363**	0.110
NZL	0.341**	0.114	0.404*	0.159
PAK	0.679**	0.205	0.686**	0.187
PER	0.073	0.274	1.000**	0.301
PHL	0.630*	0.292	0.423*	0.175
POL	0.756**	0.068	0.472**	0.080
PRT	0.330*	0.131	0.340**	0.106
RUS	-0.181	0.095	0.795**	0.068
SAU	0.937**	0.099	0.620**	0.184
SGP	0.530**	0.155	0.417**	0.105
SWE	0.566**	0.098	0.399**	0.074
THA	0.112	0.125	0.406**	0.150
TUN	0.165	0.208	0.407**	0.147
TUR	0.876**	0.083	0.506**	0.074
URY	0.657	0.408	0.386*	0.158
USA	0.257**	0.059	0.568**	0.035
ZAF	0.442*	0.187	0.264	0.430

Table 10: Trade openness and effect of a 1 percent depreciation of the exchange rate on net exports over GDP

	Exports over GDP	Imports over GDP	Effect on Net Exports
ARG	0.174	0.148	0.124
AUS	0.195	0.204	0.177
AUT	0.507	0.475	0.139
BEL	0.762	0.745	0.320
BRA	0.107	0.118	0.039
CAN	0.291	0.310	0.095
CHE	0.642	0.535	0.340
CHL	0.381	0.317	0.152
CHN	0.262	0.232	0.097
COL	0.159	0.178	0.090
CRI	0.382	0.409	0.589
CZE	0.662	0.631	0.303
DEU	0.423	0.371	0.107
DNK	0.497	0.436	0.220
EGY	0.213	0.266	0.157
ESP	0.255	0.268	0.118
FIN	0.387	0.374	0.110
FRA	0.260	0.279	0.083
GBR	0.287	0.311	0.030
GRC	0.221	0.307	0.062
GTM	0.258	0.363	0.075
HKG	2.194	2.135	0.798
HUN	0.826	0.773	0.418
IDN	0.243	0.224	0.184
IND	0.220	0.263	0.119
IRL	0.957	0.782	0.679
ISR	0.350	0.330	0.036
ITA	0.252	0.271	0.065
JPN	0.152	0.140	0.026
KOR	0.494	0.462	0.154
LKA	0.224	0.307	0.059
MAR	0.332	0.431	0.181
MEX	0.299	0.311	0.098
NLD	0.720	0.636	0.423
NOR	0.398	0.286	0.029
NZL	0.305	0.282	0.162
PAK	0.135	0.194	0.147
PER	0.266	0.235	0.173
PHL	0.348	0.366	0.160
POL	0.405	0.423	0.237
PRT	0.299	0.374	0.108
RUS	0.292	0.211	0.107
SAU	0.497	0.331	0.570
SGP	1.993	1.728	0.545
SWE	0.462	0.407	0.120
THA	0.713	0.639	0.481
TUN	0.501	0.548	0.120
TUR	0.212	0.268	0.058
URY	0.263	0.253	0.226
USA	0.124	0.158	0.028
ZAF	0.286	0.274	0.148

8 Appendix

To show that the import and the export exchange rate pass-through are linked, consider the following simplified example. Suppose there are three countries: France, the United Kingdom and the United States. Based on equation 5, we can write the import exchange rate pass-through of the US as follows :

$$\log\left(\frac{p_{US,i,t}}{p_{US,i,t-1}}\right) = \beta_{US}^{M} \log\left(\frac{s_{US,i,t}}{s_{US,i,t-1}}\right)$$

where $p_{US,i,t}$ is the import price of the US from exporter i at the time t and β_{US}^{M} is the import price elasticity. Equivalently, we can write the change in the import price to the US as a function of the export price elasticity of all i countries, i.e. France and the UK. Consider the export price of France to the US in US dollars:

$$\log\left(\frac{p_{US,FR,t}}{p_{US,FR,t-1}}\right) = \beta_{FR}^{X} \log\left(\frac{s_{US,FR,t}}{s_{US,FR,t-1}}\right)$$

Then the import price of the US can be written as follows:

$$\log\left(\frac{p_{US,FR,t}}{p_{US,FR,t-1}}\right) + \log\left(\frac{p_{US,UK,t}}{p_{US,UK,t-1}}\right) = \beta_{US}^{M}\left(\log\left(\frac{s_{US,FR,t}}{s_{US,FR,t-1}}\right) + \log\left(\frac{s_{US,UK,t}}{s_{US,UK,t-1}}\right)\right)$$

and substituting the equation of the export elasticity into the import elasticity, we get:

$$\beta_{FR}^{X} \log\left(\frac{s_{US,FR,t}}{s_{US,FR,t-1}}\right) + \beta_{UK}^{X} \log\left(\frac{s_{US,UK,t}}{s_{US,UK,t-1}}\right) = \beta_{US}^{M}\left(\log\left(\frac{s_{US,FR,t}}{s_{US,FR,t-1}}\right) + \log\left(\frac{s_{US,UK,t}}{s_{US,UK,t-1}}\right)\right)$$

Thus, the import pass-through coefficient is a weighted average of all export pass-through coefficients of all trading partners. More generally, we can write the link between the import and elasticity elasticity for an arbitrary number of trading partners J:

$$\left(\prod_{j=1}^{J} \log\left(\frac{s_{US,j,t}}{s_{US,j,t-1}}\right)\right)^{\beta_j^X} = \prod_{j=1}^{J} \log\left(\frac{s_{US,j,t}}{s_{US,j,t-1}}\right)^{\beta_{US}^{M}}$$

In this case, the import pass-through is the geometric mean of the changes in the exchange rates compared to the foreign currency and should lie between the lowest and the highest export pass-through coefficient.

Table 11: Estimates of Exchange Rate Elasticities for export prices with inflation as control variable

	Export Prices					
	ER	(SE)	Inflation - Exp.	(SE)	Inflation - Imp.	(SE)
ARG	0.113	0.101	0.000**	0.000	0.374*	0.147
AUS	0.215	0.322	0.690*	0.326	0.946	1.025
AUT	0.924**	0.109	-0.129	0.071	0.561**	0.155
BEL	0.767**	0.064	0.454	0.727	0.165*	0.081
BRA	0.537**	0.056	0.027	0.181	0.649**	0.116
CAN	0.482**	0.122	0.178	0.231	0.655	0.533
CHE	0.809**	0.079	-0.625**	0.128	-0.181	0.160
CHL	1.043**	0.160	-1.019	0.737	-0.546	0.313
CHN	0.845**	0.032	0.000**	0.000	-0.149	0.150
COL	0.651**	0.141	0.130	0.212	0.884	0.590
CRI	0.361	0.256	0.603	0.535	-0.200	0.166
CZE	0.589**	0.050	0.251	0.129	0.327**	0.065
DEU	0.829**	0.027	0.174**	0.046	0.119**	0.029
DNK	0.681**	0.074	0.269*	0.116	0.221	0.131
EGY	0.310**	0.042	0.551**	0.094	0.396*	0.195
ESP	0.777**	0.033	-0.045	0.358	0.105	0.060
FIN	0.734**	0.058	0.577	0.998	0.271*	0.104
FRA	0.831**	0.034	-0.158	0.085	0.100	0.068
GBR	0.663**	0.046	0.188**	0.045	0.439**	0.077
GRC	0.743**	0.101	0.140	0.070	0.238*	0.095
GTM	0.813**	0.242	1.133	0.750	0.471	0.507
HKG	0.791**	0.093	-0.681*	0.260	0.193	0.241
HUN	0.798**	0.106	0.163	0.157	0.298	0.196
IDN	0.063	0.074	0.271	0.195	0.124**	0.029
IND	0.886**	0.074	0.293	0.232	0.344*	0.163
IRL	0.261	0.407	0.585	1.324	0.970	1.049
ISR	0.726*	0.305	-0.228	0.502	-0.035	0.224
ITA	0.811**	0.025	-0.151**	0.050	0.217**	0.029
JPN	0.407**	0.050	0.131*	0.056	0.547**	0.088
KOR	0.668**	0.069	0.256*	0.114	0.502**	0.150
LKA	0.632**	0.086	0.518**	0.188	0.461**	0.133
MAR	0.453**	0.099	0.354*	0.165	0.700**	0.126
MEX	0.414	0.217	0.055	0.215	0.714	0.884
NLD	0.727**	0.053	-0.753*	0.326	0.413**	0.133
NOR	0.704**	0.110	0.193	0.176	0.969*	0.421
NZL	0.590**	0.045	0.220**	0.069	0.368*	0.162
PAK	0.734**	0.057	0.906**	0.157	0.843**	0.221
PER	0.668**	0.120	-0.122	0.065	0.637**	0.232
PHL	0.946**	0.306	0.314*	0.127	-0.730	2.051
POL	0.476**	0.041	-0.001	0.134	0.408**	0.084
PRT	0.512**	0.068	0.268	0.415	0.260*	0.118
RUS	0.852**	0.099	0.964**	0.315	0.335	0.248
SAU	0.210	0.112	-0.784**	0.212	-0.811	1.033
SGP	1.167**	0.151	-0.249	0.249	-0.617	0.347
SWE	0.618**	0.057	0.781	0.470	0.539**	0.104
THA	0.500**	0.095	0.567	0.451	0.723**	0.241
TUN	0.585**	0.140	1.189	1.041	0.260	0.321
TUR	0.542**	0.044	0.258**	0.046	0.508**	0.068
URY	0.793**	0.106	0.182**	0.039	-0.283	0.312
USA	0.848**	0.058	0.128	0.071	-0.758**	0.138
ZAF	0.364**	0.052	0.942*	0.355	0.126**	0.019

Table 12: Estimates of Exchange Rate Elasticities for import prices with inflation as control variable

	Import Prices					
	ER	(SE)	Inflation - Exp.	(SE)	Inflation - Imp.	(SE)
ARG	0.854**	0.062	0.166**	0.045	0.000**	0.000
AUS	0.706**	0.089	0.243	0.334	-0.241	0.124
AUT	0.401**	0.054	0.023	0.130	0.120*	0.057
BEL	0.357**	0.099	0.541	0.581	0.126	0.122
BRA	0.537**	0.059	0.384	0.250	0.123	0.062
CAN	0.419**	0.068	0.562*	0.264	-0.403**	0.088
CHE	0.381**	0.082	0.437	0.296	-0.244	0.152
CHL	0.339*	0.152	-0.758	0.991	0.000**	0.000
CHN	0.471**	0.077	0.256	0.234	0.000**	0.000
COL	0.533**	0.075	-0.213	0.269	0.708**	0.127
CRI	0.568**	0.208	-0.036	0.424	-0.328	0.800
CZE	0.606**	0.057	0.634**	0.205	-0.006	0.217
DEU	0.439**	0.042	0.316**	0.111	0.309**	0.067
DNK	0.423**	0.074	0.430**	0.108	0.849	0.851
EGY	0.590**	0.069	0.709**	0.150	0.607**	0.203
ESP	0.404**	0.039	0.258**	0.088	0.149	0.104
FIN	0.623**	0.093	0.552*	0.220	0.166**	0.056
FRA	0.505**	0.056	0.320**	0.109	0.549	1.258
GBR	0.497**	0.052	0.407**	0.111	0.126*	0.053
GRC	0.737**	0.178	0.449	0.359	0.160	0.094
GTM	0.273**	0.093	0.622*	0.274	0.542	0.567
HKG	0.702**	0.135	-1.164	1.712	-0.525	0.321
HUN	0.776**	0.081	0.651*	0.261	0.406**	0.128
IDN	0.647**	0.057	0.515	0.510	0.485	0.262
IND	0.674**	0.193	0.189	0.108	-0.225	0.124
IRL	0.537**	0.139	0.573	0.392	0.479	0.465
ISR	0.921**	0.089	0.795**	0.178	0.687	0.377
ITA	0.520**	0.053	0.391**	0.106	0.082	0.809
JPN	0.718**	0.067	0.868**	0.207	0.237	0.160
KOR	0.548**	0.097	0.427**	0.123	0.496**	0.083
LKA	0.118	0.110	-0.872	0.720	1.123**	0.334
MAR	0.742**	0.183	0.784**	0.221	0.193*	0.089
MEX	0.087	0.113	0.201**	0.059	-0.146**	0.017
NLD	0.583**	0.089	0.639*	0.251	-0.203	0.736
NOR	0.404**	0.063	0.425**	0.155	0.289	0.550
NZL	0.569**	0.108	0.147*	0.065	0.146	0.261
PAK	0.213	0.121	0.511*	0.249	0.140**	0.025
PER	0.410**	0.119	0.090	0.297	0.145**	0.022
PHL	0.522**	0.139	0.533	0.521	1.084	0.696
POL	0.551**	0.032	0.662**	0.226	-0.038	0.081
PRT	0.551**	0.085	0.223	0.230	0.157	0.094
RUS	0.711**	0.027	0.317**	0.061	0.817**	0.051
SAU	0.099	0.215	-0.401	0.428	0.188**	0.036
SGP	0.375**	0.100	0.817*	0.349	0.209*	0.099
SWE	0.564**	0.081	0.435**	0.114	0.269	0.450
THA	0.257**	0.087	0.728*	0.277	0.174*	0.070
TUN	0.596**	0.164	0.600*	0.265	0.219*	0.085
TUR	0.715**	0.044	0.628**	0.101	0.252**	0.043
URY	0.431**	0.070	-0.491	0.543	0.370**	0.059
USA	0.228**	0.055	0.093	0.110	0.350	0.231
ZAF	0.430**	0.059	0.398	0.229	0.280**	0.037

Table 13: Estimates of Exchange Rate Elasticities for export volumes with inflation as control variable

	Export Volumes					
	ER	(SE)	Inflation - Exp.	(SE)	Inflation - Imp.	(SE)
ARG	0.149	0.131	0.000**	0.000	-0.178	0.111
AUS	0.903**	0.240	-0.696	4.137	0.130	0.109
AUT	0.711**	0.133	0.261*	0.098	0.767**	0.175
BEL	0.776**	0.128	0.205*	0.077	0.996**	0.143
BRA	0.250**	0.062	0.174**	0.025	0.775**	0.190
CAN	0.321	0.170	0.167	0.241	1.194*	0.472
CHE	0.906**	0.105	1.051**	0.132	0.212**	0.044
CHL	0.397**	0.114	-0.194*	0.074	0.171**	0.041
CHN	0.695**	0.056	0.000**	0.000	0.817**	0.146
COL	0.385	0.204	0.127**	0.037	-0.221**	0.077
CRI	0.748**	0.130	0.843	2.668	0.257*	0.113
CZE	0.611**	0.092	0.282**	0.031	0.957**	0.149
DEU	0.511**	0.054	0.208	0.598	0.634**	0.047
DNK	0.467**	0.088	0.289	0.954	0.805**	0.150
EGY	0.284*	0.136	-0.155	0.097	0.446	0.391
ESP	0.703**	0.079	0.251**	0.063	0.123**	0.010
FIN	0.749**	0.107	-0.215*	0.106	1.083**	0.152
FRA	0.568**	0.076	0.558**	0.074	0.856**	0.106
GBR	0.464**	0.079	0.123	0.063	0.645**	0.090
GRC	0.713**	0.201	0.208*	0.084	0.630**	0.219
GTM	0.553	0.291	0.749	0.981	0.292	0.436
HKG	0.173	0.295	0.321	0.265	-0.376	0.601
HUN	0.595**	0.173	0.369**	0.047	0.320	0.207
IDN	0.190	0.101	-0.431	0.226	0.463	0.348
IND	0.468**	0.111	-0.139**	0.029	0.629*	0.285
IRL	0.069	0.282	-0.131	0.147	-0.081	0.834
ISR	0.348	0.266	0.178*	0.080	0.840**	0.293
ITA	0.520**	0.033	0.664**	0.044	0.518**	0.042
JPN	0.179	0.099	0.395**	0.063	-0.095	0.156
KOR	0.531**	0.115	0.760**	0.192	0.230	0.313
LKA	0.261	0.149	-0.370	0.256	0.456	0.513
MAR	0.293*	0.143	0.144	0.123	0.303	0.215
MEX	0.373	0.279	0.135**	0.032	1.099	1.227
NLD	0.729**	0.085	0.863	0.529	0.946**	0.115
NOR	0.458*	0.202	0.204**	0.075	0.633	0.426
NZL	0.239**	0.053	-0.117	0.894	0.485	0.289
PAK	0.852**	0.136	-1.174**	0.311	0.678	0.377
PER	0.199	0.101	0.202**	0.064	0.087	0.325
PHL	0.661	0.507	0.160	0.259	1.199	1.734
POL	0.254*	0.095	0.197**	0.023	0.120	0.215
PRT	0.452**	0.122	0.561**	0.091	0.642**	0.161
RUS	0.305**	0.051	0.282	0.166	-0.089	0.257
SAU	0.730**	0.150	0.678	0.436	0.313*	0.148
SGP	0.637**	0.187	0.773	2.635	0.150**	0.021
SWE	0.328**	0.096	-0.539	0.908	0.546**	0.187
THA	0.388**	0.125	0.223**	0.057	0.498*	0.222
TUN	0.013	0.166	-0.382	0.253	0.707	0.472
TUR	0.305**	0.065	0.286**	0.082	0.041	0.135
URY	0.661**	0.185	0.020	0.636	0.156**	0.053
USA	0.389**	0.070	0.250**	0.067	0.131**	0.017
ZAF	0.426**	0.121	-0.973	1.056	0.743*	0.331

Table 14: Estimates of Exchange Rate Elasticities for import volumes with inflation as control variable

	Import Volumes					
	ER	(SE)	Inflation - Exp.	(SE)	Inflation - Imp.	(SE)
ARG	-0.492**	0.104	0.902	0.521	0.000**	0.000
AUS	-0.236	0.123	0.173**	0.064	0.548**	0.158
AUT	-0.143	0.089	0.150**	0.030	0.611	0.647
BEL	-0.135	0.123	0.639	0.495	0.915	0.922
BRA	-0.204**	0.043	1.003**	0.249	-0.095	0.404
CAN	-0.325**	0.091	0.259	0.282	0.316**	0.098
CHE	-0.037	0.218	0.249**	0.087	0.646**	0.186
CHL	-0.332	0.178	0.254**	0.086	0.000**	0.000
CHN	-0.040	0.104	0.420	0.248	0.000**	0.000
COL	-0.584**	0.133	-0.179	0.392	0.595**	0.046
CRI	-0.966*	0.361	0.551	1.361	0.518**	0.101
CZE	-0.286**	0.079	0.084	0.224	0.285**	0.022
DEU	-0.007	0.058	0.454**	0.113	-0.170*	0.081
DNK	-0.247*	0.121	0.667**	0.201	0.817	0.935
EGY	-0.385*	0.182	0.202	0.479	-0.097	0.427
ESP	-0.138*	0.053	0.159	0.201	0.364**	0.069
FIN	-0.197*	0.092	1.187**	0.196	-0.253**	0.060
FRA	-0.138*	0.057	0.448**	0.125	0.443**	0.089
GBR	-0.036	0.111	0.696**	0.174	-0.156*	0.068
GRC	-0.737*	0.337	-0.337	0.499	0.393**	0.100
GTM	-0.260	0.178	0.273	0.373	0.124*	0.057
HKG	-0.018	0.217	0.201	0.146	0.665*	0.304
HUN	-0.270**	0.082	0.049	0.257	0.296**	0.028
IDN	-0.284*	0.117	0.238**	0.068	-1.011**	0.293
IND	-0.642*	0.245	-0.594	0.638	0.229	0.160
IRL	-0.472	0.261	0.816	1.085	-0.057	0.422
ISR	-0.440**	0.141	0.798*	0.349	-0.486	0.375
ITA	-0.303**	0.053	-0.015	0.125	0.211**	0.076
JPN	-0.133	0.099	0.054	0.139	0.243	0.123
KOR	-0.096	0.066	0.327	0.253	0.302**	0.074
LKA	-0.162	0.206	0.203	0.118	-0.151	0.566
MAR	-0.628*	0.245	-0.108	0.318	0.649**	0.139
MEX	-1.229**	0.144	0.137	0.076	0.341**	0.021
NLD	-0.257*	0.119	0.387	0.257	0.283	0.823
NOR	-0.007	0.154	0.438	0.501	-0.352**	0.125
NZL	-0.364*	0.175	0.149	0.082	-0.128	0.236
PAK	-0.216	0.219	-0.470	0.649	-0.239**	0.073
PER	-0.688**	0.214	-0.150	0.306	0.197**	0.036
PHL	-0.113	0.185	0.631	0.547	-0.660	1.136
POL	-0.347**	0.062	0.034	0.252	0.221**	0.013
PRT	-0.247**	0.083	0.485*	0.182	0.218**	0.065
RUS	-0.624**	0.059	0.589**	0.142	0.531**	0.118
SAU	-0.183	0.261	1.127*	0.447	-0.143**	0.041
SGP	-0.104	0.147	0.167	0.366	-0.229	0.126
SWE	-0.129	0.103	0.910**	0.148	-0.732	0.473
THA	-0.226	0.177	1.118**	0.355	0.490	0.821
TUN	-0.412**	0.136	-0.084	0.355	-0.841	0.880
TUR	-0.683**	0.109	-0.876**	0.210	1.178**	0.111
URY	-0.278*	0.118	0.161	0.126	-0.165**	0.057
USA	-0.069	0.056	0.094	0.111	-0.028	1.000
ZAF	-0.050	0.081	1.186**	0.284	-0.318**	0.062

Table 15: Estimates of Long Run Exchange Rate Elasticities for export prices

	Export Prices					
	ER	(SE)	LAG.ER	(SE)	LAG.2.ER	(SE)
ARG	0.073	0.085	-0.353**	0.096	-0.102	0.055
AUS	0.652**	0.195	0.304	0.256	-0.465	0.380
AUT	1.055**	0.106	-0.093	0.110	0.113	0.106
BEL	0.839**	0.079	-0.110	0.067	0.073	0.057
BRA	0.537**	0.059	0.101	0.060	-0.037	0.048
CAN	0.511**	0.128	0.306*	0.140	-0.068	0.093
CHE	0.869**	0.076	0.196*	0.075	-0.631**	0.191
CHL	1.174**	0.184	0.078	0.128	0.234*	0.100
CHN	0.890**	0.042	-0.202**	0.043	-0.016	0.049
COL	0.687**	0.082	0.054	0.099	-0.378*	0.163
CRI	-0.286	0.321	0.286	0.257	-0.022	0.190
CZE	0.677**	0.047	0.101*	0.045	-0.060	0.036
DEU	0.895**	0.025	-0.078**	0.022	0.081*	0.032
DNK	0.704**	0.082	-0.078	0.048	0.058	0.049
EGY	0.502**	0.071	-0.295**	0.109	0.200**	0.071
ESP	0.851**	0.030	-0.003	0.037	0.042	0.034
FIN	0.805**	0.046	0.040	0.042	0.027	0.035
FRA	0.916**	0.030	-0.113*	0.045	0.055	0.068
GBR	0.727**	0.062	0.060	0.050	-0.028	0.044
GRC	0.763**	0.136	0.206*	0.078	-0.032	0.058
GTM	1.134**	0.239	-0.314	0.214	0.361*	0.164
HKG	0.864**	0.094	-0.133	0.128	0.222*	0.105
HUN	1.021**	0.166	0.100	0.191	0.118	0.128
IDN	0.007	0.065	0.254**	0.053	0.032	0.049
IND	0.937**	0.074	0.160*	0.062	-0.120*	0.055
IRL	0.418	0.423	-0.410	0.356	0.359	0.377
ISR	0.699	0.394	0.562	0.393	-0.312	0.287
ITA	0.904**	0.022	-0.047	0.027	0.033	0.018
JPN	0.505**	0.053	-0.236**	0.055	0.106**	0.026
KOR	0.513**	0.067	0.217**	0.061	0.029	0.059
LKA	0.675**	0.102	-0.025	0.067	-0.117	0.066
MAR	0.685**	0.130	-0.419	0.239	0.262	0.152
MEX	0.221	0.261	0.128	0.268	-1.150	0.608
NLD	0.855**	0.058	-0.201**	0.065	0.107*	0.048
NOR	0.791**	0.143	-0.081	0.188	-0.415	0.236
NZL	0.550**	0.049	0.170**	0.051	-0.071	0.045
PAK	0.641**	0.068	0.352**	0.115	-0.165	0.099
PER	0.815**	0.124	-0.132	0.098	0.260	0.184
PHL	0.801**	0.296	-0.520	0.646	0.839**	0.310
POL	0.524**	0.041	0.085*	0.039	-0.059*	0.025
PRT	0.620**	0.062	0.010	0.075	0.125*	0.060
RUS	0.614**	0.077	-0.403**	0.090	0.158**	0.038
SAU	0.636**	0.220	-0.490**	0.143	-0.197**	0.054
SGP	0.956**	0.079	-0.065	0.061	-0.072	0.115
SWE	0.773**	0.063	0.056	0.072	0.043	0.074
THA	0.480**	0.095	0.357**	0.117	-0.154	0.097
TUN	0.878**	0.119	-0.310*	0.146	0.164	0.096
TUR	0.417**	0.035	0.014	0.028	-0.082**	0.020
URY	0.547**	0.062	-0.262**	0.042	0.135*	0.060
USA	0.830**	0.055	-0.173**	0.046	0.164**	0.059
ZAF	0.345**	0.066	0.103	0.081	0.088	0.061

Table 16: Estimates of Long Run Exchange Rate Elasticities for import prices

	Import Prices					
	ER	(SE)	LAG.ER	(SE)	LAG.2.ER	(SE)
ARG	0.671**	0.056	0.185*	0.092	0.182	0.156
AUS	0.563**	0.124	0.325**	0.112	-0.280*	0.115
AUT	0.494**	0.056	0.115	0.079	0.023	0.069
BEL	0.306**	0.056	-0.070	0.092	-0.010	0.061
BRA	0.588**	0.053	-0.165**	0.033	0.069	0.035
CAN	0.441**	0.059	-0.094	0.064	-0.229*	0.101
CHE	0.262**	0.066	-0.233	0.131	0.155	0.098
CHL	0.256	0.214	-0.338	0.437	-0.053	0.066
CHN	0.381**	0.047	0.184**	0.058	-0.173*	0.077
COL	0.847**	0.081	-0.165	0.099	-0.374**	0.107
CRI	0.713**	0.191	0.244	0.587	0.246	0.385
CZE	0.462**	0.072	-0.121	0.114	0.071	0.072
DEU	0.365**	0.042	0.032	0.082	-0.137**	0.042
DNK	0.391**	0.057	0.085	0.044	-0.068	0.050
EGY	0.409**	0.077	0.239**	0.071	-0.214	0.110
ESP	0.363**	0.044	0.016	0.073	-0.061*	0.026
FIN	0.547**	0.075	-0.257*	0.117	-0.012	0.042
FRA	0.421**	0.072	0.002	0.105	-0.072*	0.035
GBR	0.439**	0.043	0.043	0.054	-0.032	0.044
GRC	0.641**	0.134	0.341	0.308	-0.379	0.367
GTM	0.129	0.153	0.465**	0.136	-0.273	0.184
HKG	0.782**	0.077	-0.015	0.158	-0.093	0.132
HUN	0.725**	0.103	-0.247	0.146	0.100	0.056
IDN	0.660**	0.113	-0.119	0.077	-0.035	0.085
IND	0.431*	0.177	0.243	0.433	0.196	0.155
IRL	0.547**	0.150	0.042	0.122	0.093	0.139
ISR	0.867**	0.105	-0.189	0.124	-0.159	0.109
ITA	0.432**	0.047	-0.070	0.084	-0.008	0.027
JPN	0.957**	0.061	0.251**	0.057	-0.130	0.065
KOR	0.683**	0.083	-0.215**	0.072	-0.022	0.068
LKA	0.102	0.080	0.146	0.095	-0.210**	0.076
MAR	0.650**	0.189	-0.087	0.133	0.025	0.040
MEX	0.507**	0.097	-0.874**	0.130	1.616**	0.149
NLD	0.469**	0.096	-0.116	0.086	-0.051	0.067
NOR	0.362**	0.065	-0.037	0.077	0.088	0.072
NZL	0.588**	0.082	-0.043	0.098	0.009	0.093
PAK	0.298**	0.097	0.054	0.166	0.014	0.111
PER	0.521**	0.118	0.023	0.093	-0.004	0.052
PHL	0.528**	0.126	-0.076	0.159	0.048	0.109
POL	0.443**	0.051	-0.166	0.114	0.078	0.060
PRT	0.458**	0.114	-0.136	0.116	0.014	0.060
RUS	0.842**	0.027	-0.085**	0.024	-0.062**	0.021
SAU	0.105	0.279	0.504	0.330	-0.200	0.114
SGP	0.121	0.085	-0.043	0.063	-0.388**	0.091
SWE	0.476**	0.082	-0.181	0.091	-0.119	0.074
THA	0.188	0.134	0.066	0.129	-0.249*	0.115
TUN	0.445**	0.112	-0.029	0.099	0.041	0.070
TUR	0.832**	0.032	-0.033	0.035	0.125**	0.039
URY	0.206**	0.074	-0.034	0.098	-0.175	0.100
USA	0.316**	0.036	0.020	0.043	0.023	0.070
ZAF	0.498**	0.071	0.283*	0.118	-0.124	0.063

Table 17: Estimates of Long Run Exchange Rate Elasticities for export volumes

	Export Volumes					
	ER	(SE)	LAG.ER	(SE)	LAG.2.ER	(SE)
ARG	0.001	0.098	-0.470**	0.136	-0.217**	0.071
AUS	0.876**	0.173	-0.076	0.203	-0.281	0.309
AUT	0.567**	0.137	-0.064	0.124	-0.011	0.117
BEL	0.583**	0.124	-0.071	0.079	-0.119*	0.058
BRA	0.434**	0.061	0.246**	0.068	0.140*	0.055
CAN	0.329	0.214	0.158	0.110	0.021	0.106
CHE	0.810**	0.119	0.406**	0.105	-0.806**	0.148
CHL	0.722**	0.099	-0.052	0.151	0.298**	0.097
CHN	0.966**	0.056	0.080	0.050	-0.030	0.055
COL	0.380	0.197	-0.124	0.186	-0.460	0.241
CRI	0.618*	0.275	1.064	0.742	-0.193	0.928
CZE	0.350**	0.086	0.476**	0.086	-0.070	0.076
DEU	0.542**	0.056	0.018	0.028	-0.058	0.035
DNK	0.405**	0.064	0.057	0.053	-0.105	0.088
EGY	0.526*	0.213	-0.222	0.160	0.202	0.164
ESP	0.652**	0.070	-0.006	0.076	-0.152*	0.066
FIN	0.416**	0.096	0.246**	0.089	-0.304**	0.077
FRA	0.474**	0.040	-0.004	0.092	-0.159	0.105
GBR	0.580**	0.090	-0.165**	0.058	-0.028	0.053
GRC	0.596**	0.174	-0.005	0.210	-0.108	0.133
GTM	0.813	0.432	0.343	0.243	0.350	0.237
HKG	0.595*	0.247	-0.351*	0.136	0.267	0.344
HUN	1.062**	0.246	0.231	0.203	0.450*	0.195
IDN	0.517**	0.084	-0.126	0.071	-0.105	0.065
IND	0.448**	0.077	-0.016	0.086	0.108	0.098
IRL	0.642	0.377	-0.555	0.435	0.372	0.343
ISR	0.556	0.307	0.725**	0.175	-0.396	0.243
ITA	0.664**	0.041	-0.099*	0.039	-0.097**	0.026
JPN	0.432**	0.100	0.058	0.074	0.297**	0.052
KOR	0.910**	0.158	0.176**	0.060	0.253*	0.104
LKA	0.435**	0.158	-0.011	0.112	-0.143	0.088
MAR	0.606**	0.133	-0.257	0.164	0.186	0.126
MEX	0.033	0.236	0.562	0.290	-0.823	0.481
NLD	0.608**	0.091	-0.257**	0.084	0.119*	0.059
NOR	0.786**	0.215	-0.318	0.226	-0.009	0.097
NZL	0.540**	0.067	-0.118	0.083	0.123	0.069
PAK	0.630**	0.174	0.301	0.216	-0.403*	0.166
PER	0.476**	0.157	-0.030	0.190	-0.054	0.119
PHL	1.120	0.685	0.391	0.524	1.574**	0.553
POL	0.576**	0.084	0.289**	0.075	-0.248**	0.062
PRT	0.347*	0.139	-0.050	0.130	0.098	0.083
RUS	0.410**	0.090	-0.032	0.039	0.116*	0.051
SAU	1.280**	0.305	-0.374*	0.141	-0.424**	0.103
SGP	0.617**	0.141	0.412**	0.121	-0.243	0.135
SWE	0.418**	0.106	-0.137	0.074	-0.188	0.112
THA	0.597**	0.146	0.495**	0.099	0.219*	0.094
TUN	0.423**	0.114	-0.742*	0.341	-0.101	0.162
TUR	0.534**	0.047	0.132*	0.052	0.209**	0.036
URY	0.640**	0.153	0.214	0.249	0.221*	0.096
USA	0.622**	0.076	-0.059	0.070	0.159*	0.078
ZAF	0.405**	0.086	0.101	0.212	-0.074	0.111

Table 18: Estimates of Long Run Exchange Rate Elasticities for import volumes

	Import Volumes					
	ERC	(SE)	LAG.ERC	(SE)	LAG.2.ERC	(SE)
ARG	-0.384**	0.106	0.170	0.135	0.392	0.196
AUS	-0.131	0.166	0.615**	0.137	-0.263	0.156
AUT	-0.287**	0.086	0.175*	0.079	0.365**	0.074
BEL	-0.623**	0.102	-0.201	0.121	0.259**	0.083
BRA	-0.103*	0.049	-0.221**	0.048	-0.095	0.068
CAN	-0.319**	0.086	0.068	0.074	-0.096	0.112
CHE	-0.605*	0.251	-0.363	0.302	0.464	0.465
CHL	-0.432	0.229	-0.187	0.374	-0.195**	0.065
CHN	-0.124	0.092	0.228**	0.070	0.056	0.075
COL	-1.054**	0.170	-0.936**	0.149	-0.559**	0.172
CRI	-0.623*	0.286	1.019	0.814	-0.819*	0.394
CZE	-0.589**	0.066	-0.404**	0.059	0.076	0.080
DEU	-0.150*	0.058	0.104*	0.048	0.041	0.047
DNK	-0.458**	0.097	0.056	0.053	0.052	0.083
EGY	-0.361*	0.144	0.066	0.098	-0.061	0.161
ESP	-0.268**	0.074	0.166**	0.058	0.063	0.041
FIN	-0.278**	0.088	0.002	0.086	0.217*	0.088
FRA	-0.292**	0.098	0.109	0.110	0.131**	0.048
GBR	-0.106	0.070	0.381**	0.047	0.162*	0.062
GRC	-0.622*	0.285	0.590	0.356	-0.292	0.532
GTM	-0.254	0.320	0.203	0.241	0.040	0.261
HKG	-0.242	0.149	-0.068	0.174	0.406*	0.162
HUN	-0.172	0.108	-0.295**	0.083	-0.209**	0.073
IDN	-0.192	0.173	0.223*	0.084	-0.102	0.082
IND	-0.584**	0.208	0.546	0.396	0.104	0.186
IRL	-0.544	0.347	0.252	0.164	0.104	0.163
ISR	-0.598**	0.135	-0.244	0.173	-0.078	0.133
ITA	-0.252**	0.047	0.110*	0.051	0.102**	0.035
JPN	-0.188	0.109	0.179**	0.047	-0.060	0.070
KOR	-0.109*	0.048	0.072	0.063	-0.069	0.072
LKA	-0.044	0.182	0.199	0.130	0.248*	0.111
MAR	-0.704**	0.202	-0.119	0.159	0.008	0.088
MEX	-1.145**	0.133	-1.182**	0.156	0.785**	0.077
NLD	-0.497**	0.122	0.020	0.081	0.050	0.080
NOR	-0.056	0.144	0.189*	0.094	0.307	0.170
NZL	-0.274	0.162	0.730**	0.189	-0.164	0.097
PAK	-0.600*	0.294	0.447	0.238	-0.058	0.190
PER	-0.458*	0.204	-0.069	0.161	0.152	0.140
PHL	-0.015	0.152	0.057	0.095	-0.349	0.252
POL	-0.454**	0.050	-0.075	0.053	0.146**	0.040
PRT	-0.277**	0.081	0.014	0.125	0.100	0.076
RUS	-0.032	0.069	0.112*	0.044	-0.310**	0.044
SAU	-0.053	0.347	0.580	0.322	-0.078	0.130
SGP	-0.036	0.141	-0.111	0.099	-0.007	0.103
SWE	-0.043	0.067	0.085	0.080	0.160**	0.054
THA	-0.089	0.181	-0.119	0.108	-0.387**	0.093
TUN	-0.388**	0.128	0.231*	0.099	0.117	0.129
TUR	-0.447**	0.088	-0.476**	0.064	-0.335**	0.064
URY	-0.091	0.141	-0.405**	0.096	-0.336**	0.116
USA	-0.094	0.068	0.103**	0.036	0.084	0.070
ZAF	-0.135	0.074	0.313**	0.106	-0.258	0.165

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