Global Trade Analysis Project
https://www.gtap.agecon.purdue.edu/

This paper is from the
GTAP Annual Conference on Global Economic Analysis
https://www.gtap.agecon.purdue.edu/events/conferences/default.asp

Distribution services and differential producer and consumer price impacts of trade

Joseph Francois
University of Linz and CEPR

Miriam Manchin
University College London,IIDE and LdA

Hanna Norberg
IIDE & Lund University

April, 2010

Abstract: We examine the differential impact of import prices on consumer and producer prices. This includes an analytical decomposition of factors, like distribution costs, oligopoly markups, and distribution sector market power that contribute to variations in pass-through. Differences between consumer and producer price pass-through is evidence of market power in the trade and distribution sector. We then examine these relationships in the euro-zone Members for the period 1996-2006. This sample is characterized by a common trade policy and identical exchange rate changes, as well as a well-integrated set of markets at the industry level with relatively segmented trade and distribution sectors. We quantify the transmission of border price changes, from both tariff changes and exchange rate movements, into both European producer prices and consumer prices. There is substantially more impact on European producer prices than on consumer prices. The degree of consumer price impact varies substantially across countries and products. Part of this variation in pass-through is linked to market structure in the retail and distribution sectors.

Key words: Pass-through, imports and prices, European Union

JEL codes: F42, F36, F14

1. Introduction

The rather extensive literature on pass-through has focused mainly on whether the effects of changes in exchange rate are being passed through to the importing country at different levels. However, since being pointed out both by Feenstra (1987) and Dornbusch (1987), that the mechanism behind exchange rate pass-through and real border price pass-through are analogous and, can thus be expected to work the same way for tariff reductions as well, there have been few studies on the pass-through of changes of trade policy too (Bloningen and Hayes (2002), Raff and Scmitt (2008). The focus of the exchange- rate studies have been the pass-through to import prices, (e.g. Campa and Goldberg (2005), Campa et al (2005), Feinberg (2008), Gaulier at al. (2008)) domestic producer prices, (e.g. see Feinberg (1989), Feinberg and Kaplan (1992), Feinberg (1996)) as well as consumer prices (e.g. Campa and Goldberg (2006), Frankel et al (2005), Hellerstein (2006), Ihrig et al. (2006) and Mishkin (2008)). In general, pass-through has been shown to be less than complete. In particular, while border prices are shown to be quite sensitive to changes in import prices, consumer prices have been shown to be much less so. Also, it is well shown that, there is a high level of heterogeneity when looking at pass-through across both industries and countries. The literature has offered a number of different explanations for the incomplete pass-throughs. For import prices, the underlying reasons range from domestic pricing (Bachetta and van Wincoop (2003)), law of one price, (Betts and Kehoe (2006)), currency pricing and strategies of the exporting firms, (Campa and Goldberg (2005 and 2006)) trade costs (Fitzgerald (2008)) and frequency of price adjustments (Gopinath and Itskohoki (2008)). To explain the lesser pass-through to consumer prices, research has pointed to costs added in the distribution sector, i.e. Burstein et al. (2003) show that the share of the distribution costs for the average consumer good is between 40 and 60 percent. Also, another important factor in determining the pass-through to consumers is the level of competition in the retail sector, e.g. Feenstra et al (1996), (Feinberg (1986) and onwards), Yang (1997). For theoretical models on the importance of the distribution sector, see Corsetti and Dedola (2005), Richardson (2004), Raff and Schmitt (2008), Francois and Wooton (2009), as well as the survey by Francois and Hoekman (2009).

Over the last decade, several sectors have experienced substantial reductions in import barriers in Europe. The aim of this paper is to quantify the extent to which European consumers have actually benefited from import price decreases over the past ten years, linked especially to tariff changes. Here, we examine the differential impact of changes in import prices on consumer and producer prices in the EU. In so doing, we analytically decompose factors, like distribution

costs, oligopoly markups, and distribution sector market power that are expected to contribute to variations in pass-through. Differences between consumer and producer price pass-through can be interpreted as market power in the trade and distribution sector. We then examine these relationships in the EMU-12 Members for the period 1996-2006. This country sample is characterized by a common trade policy, identical exchange rate changes, as well as a well-integrated set of markets at the industry level bit with relatively segmented trade and distribution sectors. Next, we go on to quantifying the transmission of border price changes, from both tariff changes and exchange rate movements, into both European producer prices and consumer prices. The results show that there is substantially more impact on European producer prices than on consumer prices. Furthermore, the degree of consumer price impact varies considerably across both countries and products. Part of this variation in pass-through is shown to be linked to market structure in the retail and distribution sectors.

The rest of this paper is organized as follows. In section two, we offer a theoretical framework from which we derive the basic estimating equations for the empirical exercise in section three. Meanwhile, section four offers concluding comments.

2. Theory

We start by developing of an analytical framework where consumers buy a mix of imported and competing domestic goods. These goods reach consumers through a trade and distribution sector that exercises market power (oligopoly) vis-à-vis consumers, and also market power vis-à-vis domestic and foreign suppliers (oligopsony). The result is that international trade and the transmission of prices and trade costs to consumers (and consuming downstream industries in the case of intermediate goods) depends on a double margin mechanism linking border prices to consumer prices and competing producer prices. This mechanism is itself a function of varying degrees of oligopoly and oligopsony power.

In formal terms, we assume that imports are supplied by a foreign or external sector according to the import supply function in equation (1) below.

(1) $$P_{cif} = F(q_M) \quad F' > 0$$

In equation (1), P_{cif} is the c.i.f. price before duties, and valued at the foreign exchange rate, while q_M is the quantity of imports. We convert P_{cif} to a landed price for imports, P_M, by applying the exchange rate e and the tariff $T = 1 + t$. This yields equation (2).

(2) $$P_M = e \cdot T \cdot P_{cif} = e \cdot T \cdot F(q_M)$$

There is also a home[2] or internal industry that competes with imports in supplying the trade and distribution chain that leads to final consumers. It is also characterized by a standard upward sloping supply schedule.

(3) $$P_H = S(q_H) \quad S' > 0$$

In equation (3), q_H is home supply, and P_H is the price paid to home or internal market producers. To round out the basic conditions for the market, we add consumer demand, where price is inversely related to total supply.

(4) $$P_D = D(q_M + q_H) = D(Q) \quad D' < 0$$

In equation (4), P_D represents domestic prices at the final consumer level.

We now introduce *n* intermediaries (distribution and trade firms) who buy goods *q* at price P_M or P_H, incur an intermediation cost, and then sell these goods on to consumers at price P_D. These intermediary or middle firms behave in Cournot-Nash fashion, setting quantities bought and sold to maximize profits. Profit for any firm *j* is then:

(5) $$\pi_j = (P_C - P_M) \cdot q_{Mj} + (P_C - P_H) \cdot q_{Hj} - C(q_M + q_H)$$

In equation (5), π_j is firm profit, q_{Mj} and q_{Hj} are firm sales of imports and domestic goods, and $C(\cdot)$ the total cost for intermediate trade and distribution services assumed to be a function of total volume. Assuming a constant per-unit cost ς for trade and distribution services, the first order conditions for profit maximization are:

(6) $$\partial \pi_j / \partial q_{Hj} = q_j D' \partial Q / \partial q_{Hj} + P_C - P_H - q_{Hj} S' \partial q_H / \partial q_{Hj} - \varsigma = 0$$

(7) $$\partial \pi_j / \partial q_{Mj} = q_j D' \partial Q / \partial q_{Mj} + P_C - P_M - q_{Mj} F' \partial q_M / \partial q_{Mj} - \varsigma = 0$$

With standard Cournot-Nash assumptions, from the first order conditions for profit maximization (6) and (7) we can derive the following equilibrium relationships between prices at the border P_M from external suppliers, factory gate prices P_H for internal market suppliers, and prices for consumers on store shelves P_C.

(8) $$\left(\left(\frac{q_j}{Q}\right)\varepsilon_D^{-1} + 1\right) P_C = \left(\left(\frac{q_{Hj}}{Q_H}\right)\varepsilon_{SH}^{-1} + 1\right) P_H + \varsigma$$

[2] Note that for the empirics that follow, it makes sense to think of a "European" domestic industry, and a competing extra-European industry. We could elaborate the present structure to include numerous sources of supply, with varying degrees of oligopsony power captured through the first derivatives of the corresponding supply curves.

(9) $$\left(\left(\frac{q_j}{Q}\right)\varepsilon_D^{-1}+1\right)P_C=\left(\left(\frac{q_{Mj}}{Q_M}\right)\varepsilon_{SM}^{-1}+1\right)P_M+\varsigma$$

In equations (8) and (9), $\varepsilon_D$is the elasticity of demand corresponding to equation (4), ε_{SH} is the elasticity of supply corresponding to equation (3), ε_{SM} is the elasticity of import supply corresponding to equations (1) and (2). To streamline what follows, we now introduce the following additional notation:

(10) $$\phi_j=\left(n^{-1}\varepsilon_{Sj}^{-1}+1\right)\quad j=H,M$$

(11) $$\mu=\left(n^{-1}\varepsilon_D^{-1}+1\right)^{-1}$$

where ϕ represents oligopsony price-cost margin coefficients (the difference between producer price and perceived marginal cost) , and μ represents oligopoly price-cost markup coefficients (the difference between price and perceived marginal revenue). We refer to these in the text that follows as mark-down (ϕ) and mark-up (μ) coefficients. They represent the spread between consumer price and marginal cost (μ), and between marginal cost and producer or supply price(ϕ). With these terms we can simplify equations (8) and (9). This yields (12) and (13) below.

(12) $$P_C=\mu\left(\phi_H P_H+\varsigma\right)$$

(13) $$P_C=\mu\left(\phi_M P_M+\varsigma\right)$$

From the first order conditions, (10)-(13) are mappings of marginal revenue, marginal cost, and prices in our Cournot-Nash double margin model with both domestic and foreign sources of supply. Because marginal revenues are the same on the left hand side, equations (12) and (13) also give us an immediate link between producer prices P_H and the internal price for landed imports P_M that reflects relative monopsony power.

Taking derivatives, we can relate changes in consumer prices and internal producer prices to a mix of market power measures, pass-through coefficients, and border prices for external goods. Starting from equation (13), we have

(14) $$\hat{P}_C=\hat{\mu}+\frac{\phi_M P_M}{\left(\phi_M P_M+\varsigma\right)}\left(\hat{\phi}_M+\hat{P}_M\right)=\left(\hat{\mu}+\gamma_M\hat{\phi}_M\right)+\gamma_M\hat{P}_M$$

where $\gamma_M=\phi_M P_M\left(\phi_M P_M+\varsigma\right)^{-1}$ is the share of imports in total marginal cost for intermediaries. From a similar manipulation of equation (12), combined with substitution from equation (14), we can also link internal producer prices directly to import prices.

(15) $$\hat{P}_H=\gamma_H^{-1}\left(\gamma_M\hat{\phi}_M-\gamma_H\hat{\phi}_H\right)+\gamma_H^{-1}\gamma_M\hat{P}_M$$

where $\gamma_H = \phi_H P_H (\phi_H P_H + \varsigma)^{-1}$ is the share of domestic goods in total marginal cost for intermediaries. Together, equations (14) and (15) give us a measure of pass-through from border prices to both internal producer prices and consumer prices. Based on equations (10)-(15) we make the following observations.

> Observation 1: The direct pass-through from changes in border prices to changes in consumer prices is reduced with a greater service sector cost component ς such that the term γ_M is reduced. (See equation 14.)

> Observation 2: Changes in consumer prices also depend, in part, on changes in market power as exercised against both consumers and suppliers. (Again see equation 14.)

> Observation 3: On the producer price side, the direct pass-through from changes in border prices to changes in internal producer prices depends on cost share differences. (See equation 15.)

> Observation 4: Overall, the difference between import price and producer price changes also follows in part from changes in oligopsony power. (Again see equation 15).

The combined definitions of market power coefficients in equation (10)-(11) also point to possible indirect mechanisms linking trade policy to both producer and consumer prices. This is because the market power terms in equations (10) and (11) enter in equations (14) and (15). We therefore make the following additional observations.

> Observation 5: When lower sales volumes (with increased border protection) lead to discernibly less elastic consumer demand, import protection will lead to rising markups μ.

> Observation 6: At the same time, where higher import volumes following liberalization also mean less elastic import supply, import protection will lead to falling markdowns ϕ_M. (This is clear from differentiation of equation 10).

Observation 7: If increased import volumes from trade liberalization lead to a combination of more inelastic import supply and increasingly elastic consumer demand, the impact of import policy changes on total margins (the combined effect of changes in μ and ϕ_M) and hence on price will be ambiguous, even while the composition of retailer and distribution margins on imports will shift from consumer level markups to more market power exercised against foreign suppliers.

Observation 8: A change in import supply such that supply is more elastic (unlike as stated in Observation 6) means lower markdowns (less leverage on supply price). This could follow for example from significant growth on the part of supplying countries. (This is clear from differentiation of equation 10).

Cases where Observation 5 applies preclude iso-elastic demand curves, while Francois and Wooton (forthcoming) explore the linear case. Alternatively, trade liberalization should lead to increasing retailer margins. This is clear from differentiation of equation (10).

3. Empirics

a. Estimating framework and data

We next turn to empirics, based on the framework developed above. In the empirics that follow, we estimate equations (14) and (15), estimating the rate of pass-through itself, and changes in market power. The focus here is on the euro-zone countries[3] characterized by a common trade policy and common currency with uniform exchange rate movements. We estimate versions of equations (14) and (15) as a system:

$$(16) \qquad \hat{P}_C = \left(\hat{\mu} + \gamma_M \hat{\phi}_M\right) + \gamma_M \hat{P}_M = b_{0C} + b_{1C}\hat{P}_M$$

$$(17) \qquad \hat{P}_H = \gamma_H^{-1}\left(\gamma_M \hat{\phi}_M - \gamma_H \hat{\phi}_H\right) + \gamma_H^{-1}\gamma_M \hat{P}_M = b_{0H} + b_{1H}\hat{P}_M$$

Equation (16) and (17) map differences in landed import prices and both consumer and producer prices to changes in market power and service cost margins. In particular, the term $b_{0C} = \left(\hat{\mu} + \gamma_M \hat{\phi}_M\right)$ in equation (16) measures changes in market power in the case of consumer

[3] Belgium-Luxembourg, Germany, Ireland, Greece, Spain, France, Italy, Netherlands, Austria, Portugal, Finland, furthermore we also include Denmark given that during the period it had a fixed peg to the euro.

prices which is a combination of markups, and an interaction of markdowns with services sector costs. On the other hand, the term $b_{0H} = \gamma_H^{-1}\left(\gamma_M \hat{\phi}_M - \gamma_H \hat{\phi}_H\right)$ in equation (17) measures changes in market power in case of producer prices and is a combination of markdown and services sector cost interactions. The share of imports in total marginal cost for intermediaries, $b_{1c} = \gamma_M$, provides a proxy for the pass-through rate in the case of consumer prices, while a measure for the pass-through for producer prices is provided by $b_{1H} = \gamma_H^{-1}\gamma_M$ which are cost share differences.

In the empirics that follow, we index the coefficients in equations (16) and (17) over both euro-zone Member States and consumer products. First, we examine producer and consumer price pass-through and changes in market power across euro-zone countries. We follow this with a more disaggregated analysis by further exploring changes in market power and pass-through rates at sectoral level and at combinations of euro-zone Member States and sectors.

We work with data from a number of different sources, namely EUROSTAT (consumer prices, import protection), COMTRADE (trade data), WITS (import protection) and the IMF (exchange rates). Organizing the data has involved mapping detailed trade data to detailed consumer price series for all individual member states. Our trade and price data cover the period 1996-2005. The HICP (harmonized index of consumer prices) data on prices contain both detailed product prices, and the general level of consumer prices. Trade data include quantity, and value of trade data for detailed product categories[4]. In order to be able to merge trade and price data, which were reported in different product classifications, we have mapped HS1996 trade data into CPCv.1.0 classification and then mapped this classification into COICOP classification in which the price data is recorded[5]. The product sectors, by HICP category, are listed in the Table 5 in the Annex. From the trade data, unit value indexes were calculated with the same base year (1996) as the consumer price indexes and were deflated. In addition, we have merged import protection data with our trade and price data. This is based on HS1996 data from WITS, supplemented with OECD/GTAP data on protection for food sectors. Once we have matched and merged data from various sources, our final dataset includes trade, price and import protection data over the period 1996-2006.

[4]About 8% of the data had missing quantities. Since for the analysis we use unit values, missing observations had to be eliminated from the analysis, together with observations where the quantities were not recorded in weight.

[5] The merging of these two data sets, have resulted in a few products, for which there were no corresponding product codes in HS, which consequently had to be omitted from the analysis.

There are three different price variables in our dataset, each is an index of prices (1996=100) and is deflated. $\hat{P}_C$ is consumer price index at detailed product level. $\hat{P}_M$ is the landed price of imports which is calculated from import unit values by applying the applied tariff rates, deflating and calculating the price index with 1996 being the base year. Finally, $\hat{P}_H$ is the producer price index. Since data on producer prices are not available we use unit value data of intra-EU trade as a proxy for producer prices. Given that the internal market of the EU is fully integrated, not only tariffs but most of non-tariff barriers are also abolished on within EU trade thus intra-EU unit values should provide a good proxy for producer prices in the EU market.

b. results by country

In this section we focus on consumer and producer price pass-through rates as well as on country specific changes in the market power term. We present results for all euro-zone member countries as an aggregate and for each country separately.

Table 1 shows the estimated consumer and producer pass-through rates (corresponding to b_0 in equation 16 and 17).[6] While there are important differences between countries, the producer pass-through rates are always much higher than the consumer price pass-through rates, which is comparable to the results from previous studies (e.g. Feinberg (2008), Hellerstein (2006)). At the aggregate, euro-zone level, there is a 12% pass-through from import prices to consumer prices and a 52% pass-through in producer prices[7]. In accordance with Gaulier et al (2008) findings on exchange rate pass-through, the pass-through rates are shown to differ greatly across countries.. While the producer pass-through rates are significant for all countries, for Denmark and Greece we do not find the consumer pass-through to be significant. Germany has the highest producer pass-through with 86% correspondence between import prices and producer prices. The lowest producer pass-through rate occurs in Greece where the pass-through from import prices to producer prices is only 19%. The pass-through rates for consumer prices are lower in all the countries than producer pass-through rates; with the highest being in Ireland with 15%.

As pointed out in Observation 1 and 3, the magnitude of the pass-through is shown to depend on cost share differences and the service sector cost component. The important differences in pass-through rates between countries thus, are due to important (SIGNIFICANT?

[6] Detailed regression results are presented in Table 1 in the Annex.

[7] Recent research (e.g. Taylor (2000) has shown that there has been a significant decline in the rates of exchange rate pass-through, which might serve as an explanation for our level of consumer price pass through being lower than those presented in for example Feenstra (1987).

otherwise we have two "important" in the same sentence) differences in service sector costs and market power of retailers vis-à-vis domestic and foreign suppliers.

Observation 2 and 4, which we derived from equation 14 and 15, state that differences in prices also follow from changes in market power. Thus, in addition to supplying pass-through rates, our estimated equations also provide results on average changes in market power over the period (1996-2006). Table 2 presents these changes for consumer markets and producer markets (corresponding to b_1 in equation 16 and 17).[8] A negative sign implies a reduction in the market power over the period, while a positive sign means an increase in the market power during 1996-2005. As can be seen from the Table 2, there has been a significant decrease in the market power in consumer markets in all countries during the period, with the highest reduction taking place in Ireland and the smallest decrease in France. Meanwhile, the market power vis-à-vis producers shows a more mixed picture. In Denmark, Spain, France, Austria, and Finland no significant changes occurred. Significant reduction in market power took place in Netherlands and Portugal while an increase took place in Belgium-Luxembourg, Germany, Greece, and Italy.

Since reductions in import protection took place over the period these findings are in line with Observations 5, 6, and 7. According to Observation 5, reductions in import protection will lead to a decrease in markups. On the other hand, Observation 6 states that lowering import protections will result in increasing markdowns if increases in import supply results in lower supply elasticity. Combining these two observations (Observation 7) leads to ambiguous effects of changes in markups/markdowns on consumer prices depending on which effect dominates since both markups and markdowns influence consumer prices (see equation 16). Based on our results reductions in markups are shown to have dominated the effects in most of the countries, as we found a reduction in the market power over the period for consumer markets.

c. results by industry

In this section we discuss results for disaggregated product pass-through coefficients and changes in the market power at sectoral level. Table 3 shows pass-through rates for consumer and producer prices for aggregate sectors and some important product categories within those aggregates (while detailed regression results are presented in the Annex in Table 4[9]). Overall, our results correspond well with previous studies on Exchange rate pass-trhough, e.g. Campa et al (2005), where the levels of pass-through are shown to differ greatly across products.

[8]Detailed regression results are presented in Table 1 in the Annex.

[9] Table 5 in the Annex describes which products belong to each aggregate category and detailed regression results are presented in Table 2 and 3 in the Annex.

Consumer pass-through is insignificant for food products as an aggregate, while producer pass-through is 7.4% albeit significant only at 10%. These results are driven by some food products that tend to be highly protected and regulated, which results in low or insignificant pass-through to consumer prices and to producer prices. On the other hand, non-alcoholic beverages have a pass-through rate of 11% in consumer prices and 54% in producer prices.

Industrial goods, which include all manufacturing products, show a 3.3% correspondence between consumer prices and landed import prices, and a much higher, 76% correspondence between producer prices and import prices. Excluding energy products from the aggregate results in a higher, 8.4% pass-through rate for consumer prices, and a lower, 42% pass-through for producer prices.

To investigate this further, we disaggregate non-energy industrial goods into three categories; durable, non-durable, and semi-durable industrial goods. Durable industrial goods have the highest pass-through rate in producer prices which is about 72%, and corresponding to a much lower, 17% pass-through in consumer prices. Within durable industrial goods there are important differences between product categories. While there is no significant link between import prices and consumer prices in vehicles (which is most probably due to complex regulations and protection) the pass-through from import prices to producer prices in the same product category is about 53%. Most of the other durable industrial products show a significant pass-through from import prices to consumer prices; IT products displaying a 33% pass-through rate, transport products 14%. Semi-durable industrial goods have the highest correspondence between consumer prices and import prices which amounts to 21%. Within semi-durable goods both clothing and footwear products have rather high and significant pass-through rates. Finally, non-durable industrial goods have the lowest consumer price pass-through rates among industrial goods amounting to 1.6% only while the producer pass-through rate is higher, about 26%.

d. results for the textiles and clothing industry

During the course of the examined period, important external liberalization took place in clothing and footwear products, due to the gradual abolition of Agreement on Textiles and Clothing (ATC). Table 4 provides results on changes in market power for each country in clothing and footwear products (corresponding to b_1 in equation 16 and 17).[10] While all

[10] Detailed regression results are presented in Table 3 in the Annex.

countries in the sample had the same changes in import protection rate the results indicate an important heterogeneity between countries. These differences can be explained by big variations in market structures and differences in services sector costs between countries. Most countries experienced a significant reduction in market power in some segments of the market either in footwear or in clothing products. However, in some countries only limited change occurred. In Spain, for example, there was no significant change in the market power in either of the product categories. In Italy and Austria there was no change in market power in footwear products. (JOE: CAN WE SAY ANYTHING HERE ABOUT WHY- LIKE THE TIERINGE OF THE ABOLISHMENTS?)

The important external liberalization taking place in these sectors during the period is expected to lead to a large increase in supply and thus a shift in the supply curve. In essence, implying that, as stated in Observation 8, that the liberalization would lead to more elastic import supply and therefore lower markdowns. This in turn should lead to reductions in the market power in consumer markets in clothing and footwear due to external liberalization. Indeed, our results indicate that reductions in market power, possibly coupled with a decrease in trade and distribution services costs seem to dominate the results. The majority of countries experienced significant decreases in market power in the consumer markets over the period.

4. Conclusions

Our goal in this paper has been to explore empirically the interaction between consumer prices, producer prices and trade openness in Europe. We depart from the recent literature on pass-through at the sector level by focusing on producer prices in addition to consumer prices. For this reason, the approach taken has been macroeconomic, focusing on evidence at the level of industry aggregates rather than at the firm level.

In this paper we developed a simple theoretical framework in which the trade and distribution sector exercises market power (oligopoly) vis-à-vis consumers and also vis-à-vis domestic and foreign suppliers of goods (oligopsony). According to our this framework, there is a double margin mechanism which links border prices to consumer prices and competing producer prices. This mechanism is a function of varying degrees of oligopoly and oligopsony power and allows us to gain insights about how changes in import protection will change market power and thus pass-through to prices.

Using the framework developed in the first part of the paper we estimated pass-through rates and changes in market power for euro-zone countries over the period 1996-2006. We quantified the transmission of border price changes from both tariff changes and exchange rate movements into both European producer prices and consumer prices. Results indicate a higher pass-through from import prices to producer prices compared to pass-through rates from import prices to consumer prices. More precisely, the correspondence between changes in import prices and consumer prices was 12% while the correspondence between import prices and producer prices was 52% over the period. We found important heterogeneities in pass-through rates between countries at aggregate product categories and also between different product categories. The highest pass-through rates were found for Germany (with 12% pass-through for consumer prices and 86% for producer prices) while the lowest rates were found for Greece (no significant pass-through for consumer prices and 19% for producer prices). These differences in pass-through rates reflect significant differences in market structures.

The aggregate effects we have identified imply a complex mix of factors linking price changes at the border to changes in internal market conditions. For sectors where EU retailers are able to exercise market power, a greater share of these price changes is likely to be absorbed in changes in retailer margins, in times of both rising and falling prices. Thus market structure in the trade and distribution sectors appears to be important to consumer welfare and the consumption-related gains to trade liberalization.

References

Alfaro, L. (2005), Inflation, openness, and exchange-rate regimes: The quest for short-term commitment, *Journal of International Economics* 77: 229-249.

Berman,N., P. Martin and T. Mayer (2009), How do Different Exporters React to Exchange Rate Changes? Theory, Empirics and Aggregate Implications. *CEPR working pape*r No 7493.

Betts, C. M. And T.J. Kehoe (2006) U.S: real exchange rate fluctuations and relative price flucuations, *Journal of Monetary Economics* 53, 1297-1326.

Bloningen, B. A. and S. E. Haynes (2002), Antidumping Investigations of the Pass-Through of Antidumping Duties and Exchange Rates, *AER*, Vol. 92, No 4, 1044-1061

Boylaud, O. and G. Nicoletti (2001), Regulatory reform in retail distribution, OECD Economic Studies No. 32.

Burstein, A.T., J.C. Neves and S. Rebelo (2003) Distribution costs and real exchange rate dynamics during exchange-rate-based stabilizations, *Journal of Monetary Economics*, Vol. 50, pp.1189-1214.

Campa, J. M. and L. S. Goldberg (2005) Exchange Rate Pass-Through into Import Prices, The Review of Economics and Statistics 87, 679-690.(also NBER working paper No. 8934, 2002)

Campa, J. M., L. S. Goldberg and J. M. Gonzalez-Minguez (2005) Exchange Rate Pass-Through to Import Prices in the Euro Area. Federal Reserve Bank of New York Staff Report No. 219 (September).

Campa, J. M. and L. S. Goldberg (2006) Distribution Margins, Imported Inputs and the insensitivity of the CPI to Exchange Rates, mimeo Federal Reserve Bank of New York.

Conway, P. and G. Nicoletti (2006), Product Market Regulation in the Non-Manufacturing Sectors of OECD Countries: Measurement and Highlights, *OECD Economics Department Working Paper*, No 530.

Corsetti, G. And L. Dedola (2005) A macroeconomic model of international price discrimination, *Journal of International Economics* Vol 67, 129-155.

DeStefano, M. (2003) Exchange Rate Pass-Through in the Italian Car Market 1990-1996, Mimeo Boston University.

Devereux, M. B. C. Engel and C. Tille (2002), Exchange Rate Pass-through and the Welfare Effects of the Euro, International Economic Review, Vol. 44 pp. 223-242.

Dornbusch, R. (1987) Exchange Rates and Prices, *The American Economic Review* 97: 93-106.

Feenstra R. C. (1987) Symmetric Pass-Through of Tariffs and Exchange Rates under Imperfect Competition: An Empirical Test, *NBER Working Paper No.* 2453.

Feenstra, R.E. (1992) How Costly is Protectionism, the *Journal of Economic Perspectives*, Vol.6. pp. 159-178.

Feenstra, R.C., J. E. Gagnon and M.M. Knetter (1996), Market share and exchange rate pass -through in world automobile trade*, Journal of International Economics* 40, pp. 187-207.

Feenstra R. C. and J. D. Kendall (1997) Pass-through of exchange rates and purchasing power parity, *Journal of International Economics* 43, 237-261.

Feinberg, R. (1986) The Interaction of Foreign Exchange and Market Power Effects on German Domestic Prices, *The Journal of Industrial Economics*, vol. 35, p. 61-70.

Feinberg, R. M. (1989) The Effects of Foreign Exchange Movements on U.S. Domestic Prices, *The Review of Economics and Statistics*, Vol. 71, pp. 505-511.

Feinberg, R. M. (1991) The Choice of Exchange-rate Index and Domestic Price Pass-Through, *The Journal of Industrial Economics*, Vol. 39, pp. 409-420.

Feinberg R. M. and S. Kaplan (1992), The Response of Domestic Prices to Expected Exchange Rates, The Journal of Business, Vol. 65 (2), pp. 267-280.

Feinberg, R. M. (1996) A Simultaneous Analysis of Exchange-Rate Passthrough into Prices of Imperfectly Substitutable Domestic and Import Goods, International Review of Economics and Finance 5 (4), pp. 407-416.

Feinberg, R. (2008) Import price effects on retail prices in the US and abroad: two cases, *Economics Bulletin,* Vol. 13, pp.1-7.

Fitzgerald, D. (2008), Can trade costs explain why exchange rate volatility does not feed into consumer prices? *Journal of Monetary Economics* Vol. 55, pp. 606- 628.

Francois, J.F. and B. Hoekman (2009), Trade and Policy in Services, forthcoming *Journal of Economic Literature.*

Francois, J.F., M. Manchin, H. Norberg, and D. Spinanger (2007), Impacts Of Textiles And Clothing Sectors Liberalisation On Prices, Final Report 2007-04-18, Commission of the European Union – Directorate-General for Trade.

Francois, J and I. Wooton (2001), Trade in International Transport Services: The Role of Competition, *Review of International Economics 9(2), 249- 261.*

Francois, J.F. and I. Wooton (2010), Market Structure and Market Access, *World Economy*, forthcoming.

Gaulier G., A. Lahréche-Révil and I. Méjan (2008) Exchange-rate pass through at the product level, *Canadian Journal of Economics*, Vol. 41, No. 2, pp. 425- 449.

Goldberg, P. K. and Knetter, M. M. (1997) Goods Prices and Exchange Rates: What Have We Learned? *Journal of Economic Literature*, 35, 1243-1272.

Gopinath, G and O. Itskhoki (2008), Frequency of Price Adjustment and Pass-Through, *NBER working paper* No. 14200.

Gruben, W.C. and McLeod, D. (2004), The Openness- Inflation Puzzle Revisited, *Applied Economics Letters* 11, pp.465-468.

Gust, C and N. Sheets (2007) International Finance Discussion Papers, Board of Governors of the Federal Reserve System, No. 850.

Hellerstein, R. (2006) A Decomposition of the Sources of Incomplete Cross-Border Transmission, *Federal Reserve Bank of New York Staff Reports*, No. 250.

Henderson, D. W. (2002), Comment on: Openness, imperfect exchange rate pass-through and monetary policy, *Journal of Monetary Economics* 49, 983-988.

Ihrig, J.E., M. Marazzi and A.D. Rothenberg, (2006) Exchange-Rate Pass-Through in the G-7 Countries, International Finance Discussion Papers, Board of Governors of the Federal Reserve System, No. 851.

Mishkin, F.S. (2008) Exchange Rate Pass-through and Monetary Policy, *NBER Working Paper No.13889*.

Nakamura, E. (2008), Pass-through in Retail and Wholesale, *NBER Working Paper No.* 13965.

Parsley D. and Wei, S.J. (2003) A Prism Into the PPP-Puzzle: The Micro-Foundations of the Big Mac Real Exchange Rates ; NBER working paper No. 10074.

Richardson, M. (2004) Trade Policy and Access to Retail Distribution, Review of International Economics 12, 676-688**.**

Raff, H and N. Schmitt (2008a) Buyer Power in International Markets, Kiel Working Paper No.1431, June.

Raff, H and N. Schmitt (2008b) International Trade with Heterogeneous Retailers, Mimeo-presented at the 2008 ETSG Conference in Warsaw.

Romer, D. (1993) Openness and Inflation: Theory and Evidence, the *Quarterly Journal of Economics* 108: 869-903.

Romer, D. (1998) A New Assessment of Openness and Inflation: Reply, the *Quarterly Journal of Economics* 113, pp. 641-648.

Taylor, J. B. (2000) Low inflation, pass-through, and the pricing power of firms. *European Economic Review* 44, 1389-1408.

Yang, J. (1997) Exchange Rate Pass-Through in U.S. Manufacturing Industries, The Review of Economics and Statistics, Vol. X, pp. 95-104.

Table 1. Pass-through by country

	Consumer pass-through	Producer pass-through
Euro countries aggregate	0.123	0.518
	(0.021)***	(0.051)***
Belgium-Luxembourg	0.054	0.498
	(0.015)***	(0.051)***
Denmark	-0.015	0.53
	-0.015	(0.053)***
Germany	0.114	0.86
	(0.019)***	(0.066)***
Ireland	0.153	0.463
	(0.014)***	(0.047)***
Greece	0.023	0.191
	-0.02	(0.068)***
Spain	0.1	0.487
	(0.019)***	(0.064)***
France	0.037	0.419
	(0.022)*	(0.074)***
Italy	0.025	0.628
	(0.014)*	(0.048)***
Netherlands	0.042	0.593
	(0.016)***	(0.055)***
Austria	0.071	0.286
	(0.017)***	(0.059)***
Portugal	0.026	0.214
	(0.011)**	(0.037)***
Finland	0.06	0.312
	(0.021)***	(0.071)***

Detailed regression results are presented in Table 1 in the Annex.

Table 2. Changes in market power in producer and consumer markets by country

	market power changes in consumer markets	market power changes in producer markets
Belgium-Luxembourg	-0.045	0.069
	(0.015)***	(0.035)*
Denmark	-0.081	-0.011
	(0.015)***	-0.035
Germany	-0.052	0.072
	(0.014)***	(0.034)**
Ireland	-0.103	0.191
	(0.015)***	(0.036)***
Greece	-0.067	0.088
	(0.014)***	(0.037)**
Spain	-0.042	0.034
	(0.014)***	-0.036
France	-0.041	0.004
	(0.014)***	-0.034
Italy	-0.046	0.123
	(0.015)***	(0.035)***
Netherlands	-0.068	-0.086
	(0.015)***	(0.035)**
Austria	-0.07	-0.008
	(0.014)***	-0.034
Portugal	-0.064	-0.083
	(0.015)***	(0.036)**
Finland	-0.065	0.044
	(0.013)***	-0.034

Detailed regression results are presented in Table 1 in the Annex.

Table 3. Aggregate product pass-through (PT) rates

	Consumer PT	Producer PT
food	**-0.011**	**0.074**
	-0.008	**(0.042)***
other food products	0.006	0.086
	-0.034	-0.13
non alcoholic beverages	0.11	0.539
	(0.016)***	(0.059)***
tobacco	0.044	0.239
	(0.017)***	(0.064)***
industrial goods	**0.033**	**0.761**
	(0.005)*	**(0.054)***
industrial goods excluding energy	**0.084**	**0.419**
	(0.008)*	**(0.043)***
durable industrial goods excluding energy	**0.169**	**0.724**
	(0.017)*	**(0.078)***
Medical equipment	0.103	0.895
	-0.064	(0.243)***
vehicles	0.04	0.526
	-0.029	(0.110)***
Transportation parts	0.14	0.334
	(0.028)***	(0.109)***
IT	0.331	0.587
	(0.018)***	(0.069)***
non-durable industrial goods excluding energy	**0.016**	**0.256**
	(0.004)*	**(0.052)***
semi-durable industrial goods excluding energy	**0.212**	**0.464**
	(0.016)*	**(0.055)***
clothing	0.263	1.15
	(0.026)***	(0.097)***
footwear	0.152	0.868
	(0.023)***	(0.088)***

Detailed regression results are presented in Table 2 and 3 in the Annex.

Table 4. Changes in market power in footwear and clothing products

	Footwear market power changes		Clothing market power changes	
	Consumer prices	Producer prices	Consumer prices	Producer prices
Belgium-Luxembourg	-0.037	-0.384	-0.052	-0.289
	(0.020)*	(0.075)***	(0.020)***	(0.075)***
Denmark	-0.149	-0.035	-0.16	0.052
	(0.021)***	-0.081	(0.020)***	-0.076
Germany	-0.023	-0.315	0.034	-0.166
	-0.02	(0.075)***	-0.022	(0.083)**
Ireland	-0.276	-0.287	-0.378	-0.038
	(0.021)***	(0.079)***	(0.020)***	-0.077
Greece	0.052	-0.396	0.08	-0.294
	(0.021)**	(0.079)***	(0.022)***	(0.082)***
Spain	0.013	0.085	-0.007	-0.05
	-0.021	-0.078	-0.021	-0.079
France	-0.061	-0.099	-0.06	-0.062
	(0.021)***	-0.079	(0.021)***	-0.078
Italy	0.028	0.083	0.043	0.105
	-0.02	-0.075	(0.020)**	-0.077
Netherlands	0.026	-0.906	0.054	-0.245
	-0.021	(0.080)***	(0.025)**	(0.096)**
Austria	-0.013	0.042	-0.067	-0.11
	-0.02	-0.077	(0.020)***	-0.075
Portugal	-0.134	-0.51	-0.072	0.093
	(0.023)***	(0.087)***	(0.022)***	-0.084
Finland	-0.074	0.074	-0.089	-0.136
	(0.020)***	-0.075	(0.020)***	(0.075)*

Detailed regression results are presented in Table 3 in the Annex.

Annex

Table 1 Country-level pass-through regressions

	lnPc	lnPh
cpass_bx	0.054	0.498
	(0.015)***	(0.051)***
cpass_dk	-0.015	0.53
	-0.015	(0.053)***
cpass_de	0.114	0.86
	(0.019)***	(0.066)***
cpass_ie	0.153	0.463
	(0.014)***	(0.047)***
cpass_gr	0.023	0.191
	-0.02	(0.068)***
cpass_es	0.1	0.487
	(0.019)***	(0.064)***
cpass_fr	0.037	0.419
	(0.022)*	(0.074)***
cpass_it	0.025	0.628
	(0.014)*	(0.048)***
cpass_nl	0.042	0.593
	(0.016)***	(0.055)***
cpass_at	0.071	0.286
	(0.017)***	(0.059)***
cpass_pt	0.026	0.214
	(0.011)**	(0.037)***
cpass_fi	0.06	0.312
	(0.021)***	(0.071)***
c_bx	-0.045	0.069
	(0.015)***	(0.035)*
c_dk	-0.081	-0.011
	(0.015)***	-0.035
c_de	-0.052	0.072
	(0.014)***	(0.034)**
c_ie	-0.103	0.191
	(0.015)***	(0.036)***
c_gr	-0.067	0.088

	(0.014)***	(0.037)**
c_es	-0.042	0.034
	(0.014)***	-0.036
c_fr	-0.041	0.004
	(0.014)***	-0.034
c_it	-0.046	0.123
	(0.015)***	(0.035)***
c_nl	-0.068	-0.086
	(0.015)***	(0.035)**
c_at	-0.07	-0.008
	(0.014)***	-0.034
c_pt	-0.064	-0.083
	(0.015)***	(0.036)**
c_fi	-0.065	0.044
	(0.013)***	-0.034
Observations	2336	2336
"R-sq"	0.56	0.41
Breusch-Pagan test of independence:chi2=	36.41	Pr = 0.000

Standard errors in parentheses, Product dummies are included in the regression.

* significant at 10%; ** significant at 5%; *** significant at 1%

The table presents seemingly unrelated regression with changes in consumer prices (lnPc) and changes in producer prices (lnPh) being the dependent variables. The variables cpass_* measures pass-through rates and are interactions of import prices and country dummies. The variables c_* are country dummies measuring changes at country-level market power. Table 6 in the Annex lists the corresponding country names of the country codes used for the variables.

Table 2 Aggregate product pass-through rates

	Food		Industrial goods		Industrial goods excluding energy		Durable industrial goods excluding energy		non-durable industrial goods excluding energy		semi-durable industrial goods excluding energy	
	lnPc	lnPh	lnPc	lnPh	lnPc	lnPh	lnPc	lnPh	lnPc	lnPh	lnPc	lnPh
lnPm	-0.011	0.074	0.033	0.761	0.084	0.419	0.169	0.724	0.016	0.256	0.212	0.464
	-0.008	(0.042)*	(0.005)***	(0.054)***	(0.008)***	(0.043)***	(0.017)***	(0.078)***	(0.004)***	(0.052)***	(0.016)***	(0.055)***
c_bx	0.034	0.07	-0.015	-0.124	-0.007	0.293	-0.024	0.024	0.001	0.363	0.013	0.159
	(0.006)***	(0.029)**	(0.007)**	-0.083	-0.011	(0.058)***	-0.015	-0.067	-0.004	(0.063)***	-0.015	(0.052)***
c_dk	-0.019	0.013	0.02	0.277	-0.019	-0.073	-0.045	-0.202	0.022	-0.148	-0.059	-0.015
	(0.006)***	-0.029	(0.010)**	(0.118)**	-0.012	-0.063	(0.015)***	(0.069)***	(0.005)***	(0.069)**	(0.015)***	-0.052
c_de	0.002	-0.083	0.013	-0.192	-0.022	-0.076	-0.07	-0.226	0.011	0.046	0.007	0.097
	-0.006	(0.028)***	(0.008)*	(0.090)**	(0.011)**	-0.057	(0.015)***	(0.065)***	(0.004)**	-0.061	-0.015	(0.052)*
c_ie	0.023	0.119	-0.1	-0.25	-0.121	0.153	-0.057	0.239	0.005	0.193	-0.239	0.016
	(0.006)***	(0.029)***	(0.007)***	(0.084)***	(0.011)***	(0.058)***	(0.016)***	(0.070)***	-0.004	(0.062)***	(0.015)***	-0.054
c_gr	0.012	-0.046	-0.048	0.271	-0.014	0.294	-0.099	0.257	-0.019	0.36	0.043	0.126
	(0.007)*	-0.033	(0.007)***	(0.088)***	-0.011	(0.059)***	(0.015)***	(0.070)***	(0.005)***	(0.064)***	(0.015)***	(0.054)**
c_es	-0.004	-0.147	-0.03	-0.268	-0.026	-0.04	-0.013	0.163	-0.027	-0.064	0.025	0.047
	-0.006	(0.030)**	(0.007)**	(0.088)**	(0.011)**	-0.058	-0.016	(0.073)**	(0.004)**	-0.063	-0.015	-0.054

	Food		Industrial goods		Industrial goods excluding energy		Durable industrial goods excluding energy		non-durable industrial goods excluding energy		semi-durable industrial goods excluding energy	
	lnPc	lnPh	lnPc	lnPh	lnPc	lnPh	lnPc	lnPh	lnPc	lnPh	lnPc	lnPh
		*	*	*					*			
c_fr	0.048	-0.073	-0.027	-0.116	-0.034	-0.022	-0.072	0.04	0.02	0	-0.032	-0.041
	(0.006)***	(0.030)***	(0.007)***	-0.088	(0.011)***	-0.058	(0.015)***	-0.069	(0.004)***	-0.063	(0.015)**	-0.052
c_it	-0.019	-0.032	-0.038	0.197	-0.059	0.057	0.013	0.157	-0.014	0.339	0.068	0.108
	(0.006)***	-0.031	(0.008)***	(0.090)**	(0.011)***	-0.058	-0.016	(0.072)**	(0.005)***	(0.067)***	(0.015)***	(0.053)**
c_nl	-0.001	-0.009	-0.007	-0.183	-0.041	-0.073	-0.082	-0.053	-0.006	0.023	0.003	0.053
	-0.006	-0.031	-0.007	(0.088)**	(0.011)***	-0.058	(0.015)***	-0.068	-0.004	-0.063	-0.016	-0.055
c_at	0.005	-0.008	-0.033	-0.156	-0.053	-0.087	-0.069	-0.021	-0.01	-0.063	-0.048	0.037
	-0.006	-0.028	(0.007)***	(0.084)*	(0.010)***	-0.055	(0.014)***	-0.065	(0.004)**	-0.06	(0.014)***	-0.05
c_pt	-0.007	-0.049	-0.049	-0.322	-0.056	-0.253	0.017	-0.03	-0.028	-0.117	-0.046	-0.257
	-0.006	-0.03	(0.007)***	(0.088)***	(0.011)***	(0.058)***	-0.016	-0.07	(0.004)***	(0.063)*	(0.016)***	(0.055)***
c_fi	-0.014	0.031	-0.02	0.333	-0.02	0.168	-0.128	-0.165	0.014	0.145	-0.031	0.07
	(0.006)**	-0.028	(0.007)***	(0.086)***	(0.011)*	(0.059)***	(0.014)***	(0.065)**	(0.005)***	(0.066)**	(0.015)**	-0.051
Observations	127	127	127	127	127	127	127	127	127	127	127	127

	Food		Industrial goods		Industrial goods excluding energy		Durable industrial goods excluding energy		non-durable industrial goods excluding energy		semi-durable industrial goods excluding energy	
	lnPc	lnPh	lnPc	lnPh	lnPc	lnPh	lnPc	lnPh	lnPc	lnPh	lnPc	lnPh
R-sq	0.54	0.39	0.8	0.81	0.83	0.64	0.82	0.6	0.56	0.58	0.88	0.55
Breusch-Pagan test of independence: chi2(	2.82	Pr = 0.092	22.31	Pr = 0.000	13.58	Pr = 0.000	13.18	Pr = 0.000	2.42	Pr = 0.119	0.46	Pr = 0.498

Standard errors in parentheses, Product dummies are included in the regression

* significant at 10%; ** significant at 5%; *** significant at 1%

The table presents seemingly unrelated regression with changes in consumer prices (lnPc) and changes in producer prices (lnPh) being the dependent variables for various product aggregates. The variable lnPm is the log of import prices and the coefficient represent pass-through rates. The variables c_* are country dummies measuring changes at country-level market power. Table 6 in the Annex lists the corresponding country names of the country codes used for the variables.

Table 3 Product-level pass-through regressions

	lnPc	lnPh
ppass_food	0.006	0.086
	-0.034	-0.13
ppass_nabeverages	0.11	0.539
	(0.016)***	(0.059)***
ppass_tobacco	0.044	0.239
	(0.017)***	(0.064)***
ppass_cloths	0.263	1.15
	(0.026)***	(0.097)***
ppass_footwear	0.152	0.868
	(0.023)***	(0.088)***
ppass_dwellingmat	-0.001	0.079
	-0.014	-0.054
ppass_furniture	0.074	0.459
	(0.027)***	(0.103)***
ppass_householdtextiles	0.238	0.361
	(0.037)***	(0.140)***
ppass_appliances	0.209	0.031
	(0.021)***	-0.08
ppass_tableware	0.189	0.393
	(0.042)***	(0.158)**
ppass_house_eq	0.076	0.381
	(0.016)***	(0.061)***
ppass_housemaintenance	-0.001	0.641
	-0.009	(0.033)***
ppass_medical	0.103	0.895
	-0.064	(0.243)***
ppass_vehicles	0.04	0.526
	-0.029	(0.110)***
ppass_transportparts	0.14	0.334
	(0.028)***	(0.109)***
ppass_IT	0.331	0.587
	(0.018)***	(0.069)***
ppass_recreation	0.061	0.244

	(0.036)*	(0.137)*
ppass_electrics	0.073	0.473
	(0.030)**	(0.113)***
ppass_other	0.149	0.239
	(0.015)***	(0.056)***
mc_bx_food	0.019	0.061
	-0.02	-0.077
mc_bx_nabeverages	0.024	-0.09
	-0.02	-0.078
mc_bx_tobacco	0.122	0.365
	(0.020)***	(0.075)***
mc_bx_cloths	-0.052	-0.289
	(0.020)***	(0.075)***
mc_bx_footwear	-0.037	-0.384
	(0.020)*	(0.075)***
mc_bx_dwellingmat	-0.011	-0.043
	-0.02	-0.075
mc_bx_furniture	-0.012	0.016
	-0.02	-0.078
mc_bx_householdtextiles	-0.017	0.216
	-0.02	(0.075)***
mc_bx_appliances	-0.031	0.041
	-0.02	-0.077
mc_bx_tableware	0.03	0.059
	-0.022	-0.083
mc_bx_house_eq	-0.047	0.008
	(0.020)**	-0.077
mc_bx_housemaintenance	0.032	0.156
	-0.021	(0.080)*
mc_bx_vehicles	-0.03	0.191
	-0.02	(0.075)**
mc_bx_transportparts	-0.052	0.011
	(0.020)**	-0.078
mc_bx_IT	-0.155	0.028
	(0.021)***	-0.08

mc_bx_recreation	-0.043	0.614
	(0.020)**	(0.076)***
mc_bx_electrics	0.005	-0.053
	-0.02	-0.077
mc_bx_other	0.072	0.106
	(0.021)***	-0.081
mc_dk_food	-0.015	0.028
	-0.02	-0.077
mc_dk_nabeverages	0.055	-0.187
	(0.020)***	(0.075)**
mc_dk_tobacco	-0.031	0.245
	-0.02	(0.075)***
mc_dk_cloths	-0.16	0.052
	(0.020)***	-0.076
mc_dk_footwear	-0.149	-0.035
	(0.021)***	-0.081
mc_dk_dwellingmat	-0.03	-0.016
	-0.02	-0.076
mc_dk_furniture	-0.023	-0.046
	-0.02	-0.076
mc_dk_householdtextiles	-0.045	0.127
	(0.020)**	(0.076)*
mc_dk_appliances	-0.063	-0.145
	(0.021)***	(0.080)*
mc_dk_tableware	0.037	-0.079
	(0.020)*	-0.078
mc_dk_house_eq	-0.009	-0.026
	-0.02	-0.078
mc_dk_housemaintenance	0.082	0.078
	(0.022)***	-0.085
mc_dk_vehicles	-0.022	-0.013
	-0.02	-0.075
mc_dk_transportparts	-0.014	0.015
	-0.021	-0.079
mc_dk_recreation	-0.033	-0.124

	-0.02	-0.076
mc_dk_electrics	0.015	-0.012
	-0.02	-0.076
mc_dk_other	0.031	-0.032
	-0.021	-0.079
mc_de_food	-0.022	-0.097
	-0.02	-0.076
mc_de_nabeverages	-0.014	-0.299
	-0.02	(0.077)***
mc_de_tobacco	0.15	0.491
	(0.020)***	(0.075)***
mc_de_footwear	-0.023	-0.315
	-0.02	(0.075)***
mc_de_dwellingmat	-0.009	0.496
	-0.02	(0.076)***
mc_de_furniture	-0.034	-0.038
	(0.020)*	-0.076
mc_de_householdtextiles	-0.071	0.1
	(0.020)***	-0.075
mc_de_appliances	-0.103	-0.002
	(0.020)***	-0.075
mc_de_tableware	0.009	0.311
	-0.02	(0.075)***
mc_de_house_eq	-0.038	0
	(0.020)*	-0.075
mc_de_housemaintenance	-0.053	-0.187
	(0.021)**	(0.080)**
mc_de_medical	0.039	0.294
	(0.020)**	(0.075)***
mc_de_vehicles	-0.028	0.372
	-0.02	(0.075)***
mc_de_transportparts	-0.028	0.05
	-0.02	-0.075
mc_de_IT	-0.283	0
	(0.020)***	-0.077

mc_de_recreation	-0.04	0.224
	(0.020)**	(0.075)***
mc_de_other	0.015	0.109
	-0.02	-0.077
mc_ie_food	-0.007	0.097
	-0.021	-0.079
mc_ie_nabeverages	0.004	0.602
	-0.02	(0.075)***
mc_ie_tobacco	0.147	-0.017
	(0.020)***	-0.075
mc_ie_cloths	-0.378	-0.038
	(0.020)***	-0.077
mc_ie_footwear	-0.276	-0.287
	(0.021)***	(0.079)***
mc_ie_dwellingmat	-0.075	0.157
	(0.021)***	(0.080)**
mc_ie_furniture	-0.007	0.215
	-0.022	(0.082)***
mc_ie_householdtextiles	-0.228	0.091
	(0.021)***	-0.078
mc_ie_appliances	-0.093	0.038
	(0.022)***	-0.083
mc_ie_tableware	-0.159	0.399
	(0.020)***	(0.075)***
mc_ie_house_eq	-0.072	0.343
	(0.020)***	(0.077)***
mc_ie_housemaintenance	0.067	0.316
	(0.021)***	(0.081)***
mc_ie_vehicles	-0.094	0.199
	(0.020)***	(0.077)***
mc_ie_transportparts	-0.048	0.094
	(0.020)**	-0.076
mc_ie_IT	-0.186	0.062
	(0.020)***	-0.077
mc_ie_electrics	-0.002	0.303

	-0.02	(0.077)***
mc_ie_other	-0.2	0.339
	(0.022)***	(0.085)***
mc_gr_nabeverages	0.039	-0.316
	(0.022)*	(0.083)***
mc_gr_tobacco	0.131	0.68
	(0.021)***	(0.079)***
mc_gr_cloths	0.08	-0.294
	(0.022)***	(0.082)***
mc_gr_footwear	0.052	-0.396
	(0.021)**	(0.079)***
mc_gr_dwellingmat	0.02	0.225
	-0.021	(0.079)***
mc_gr_furniture	0.008	0.391
	-0.023	(0.087)***
mc_gr_appliances	-0.055	0.062
	(0.021)***	-0.081
mc_gr_tableware	-0.04	0.246
	(0.021)*	(0.079)***
mc_gr_house_eq	-0.009	0.029
	-0.021	-0.081
mc_gr_housemaintenance	0.031	0.488
	-0.021	(0.079)***
mc_gr_medical	-0.306	-0.11
	(0.021)***	-0.082
mc_gr_vehicles	-0.204	0.155
	(0.021)***	(0.079)**
mc_gr_transportparts	-0.063	0.252
	(0.021)***	(0.081)***
mc_gr_IT	-0.198	0.41
	(0.021)***	(0.080)***
mc_gr_recreation	-0.034	0.339
	(0.021)*	(0.078)***
mc_gr_electrics	0.016	-0.118
	-0.022	-0.082

mc_gr_other	-0.009	0.491
	-0.021	(0.081)***
mc_es_food	-0.016	-0.155
	-0.021	(0.079)**
mc_es_nabeverages	-0.053	-0.152
	(0.021)**	(0.081)*
mc_es_cloths	-0.007	-0.05
	-0.021	-0.079
mc_es_footwear	0.013	0.085
	-0.021	-0.078
mc_es_dwellingmat	0.009	0.125
	-0.022	-0.083
mc_es_furniture	0.029	-0.006
	-0.022	-0.085
mc_es_householdtextiles	-0.03	-0.081
	-0.021	-0.08
mc_es_appliances	-0.056	-0.007
	(0.021)***	-0.081
mc_es_house_eq	0.007	0.022
	-0.022	-0.083
mc_es_housemaintenance	-0.006	-0.228
	-0.021	(0.080)***
mc_es_medical	-0.03	0.194
	-0.022	(0.085)**
mc_es_vehicles	-0.043	0.138
	(0.021)**	(0.081)*
mc_es_transportparts	-0.098	-0.016
	(0.022)***	-0.082
mc_es_IT	-0.185	0.064
	(0.021)***	-0.08
mc_es_recreation	-0.056	0.063
	(0.021)***	-0.079
mc_es_electrics	-0.018	0.017
	-0.021	-0.081
mc_es_other	-0.005	-0.048

	-0.021	-0.081
mc_fr_food	0.03	-0.084
	-0.021	-0.08
mc_fr_nabeverages	0	-0.162
	-0.021	(0.079)**
mc_fr_tobacco	0.24	0.429
	(0.021)***	(0.080)***
mc_fr_cloths	-0.06	-0.062
	(0.021)***	-0.078
mc_fr_dwellingmat	-0.007	-0.024
	-0.021	-0.079
mc_fr_furniture	-0.016	-0.09
	-0.021	-0.079
mc_fr_householdtextiles	-0.08	0.079
	(0.022)***	-0.085
mc_fr_appliances	-0.087	-0.024
	(0.021)***	-0.079
mc_fr_tableware	0.016	0.03
	-0.021	-0.08
mc_fr_house_eq	-0.018	-0.037
	-0.021	-0.079
mc_fr_medical	-0.004	0.081
	-0.023	-0.088
mc_fr_vehicles	-0.067	0.042
	(0.021)***	-0.078
mc_fr_transportparts	-0.066	-0.078
	(0.021)***	-0.08
mc_fr_IT	-0.231	0.1
	(0.021)***	-0.079
mc_fr_recreation	-0.042	0.011
	(0.022)*	-0.084
mc_fr_electrics	0.044	-0.058
	(0.021)**	-0.079
mc_fr_other	-0.003	-0.04
	-0.021	-0.079

mc_it_food	-0.024	-0.038
	-0.022	-0.083
mc_it_nabeverages	-0.009	-0.28
	-0.02	(0.078)***
mc_it_tobacco	0.088	0.558
	(0.020)***	(0.075)***
mc_it_cloths	0.043	0.105
	(0.020)**	-0.077
mc_it_footwear	0.028	0.083
	-0.02	-0.075
mc_it_dwellingmat	0.018	0.117
	-0.02	-0.078
mc_it_householdtextiles	0.023	-0.096
	-0.02	-0.076
mc_it_appliances	-0.009	-0.124
	-0.021	-0.079
mc_it_tableware	0.025	-0.145
	-0.021	(0.080)*
mc_it_house_eq	0.031	-0.017
	-0.022	-0.082
mc_it_housemaintenance	-0.01	0.255
	-0.021	(0.080)***
mc_it_vehicles	-0.037	0.137
	(0.020)*	(0.075)*
mc_it_recreation	-0.03	0.284
	-0.021	(0.079)***
mc_it_electrics	0.007	-0.089
	-0.021	-0.081
mc_it_other	0.015	0.009
	-0.02	-0.078
mc_nl_food	-0.019	-0.004
	-0.022	-0.084
mc_nl_nabeverages	-0.038	-0.063
	(0.021)*	-0.08
mc_nl_tobacco	0.128	-0.089

	(0.021)***	-0.078
mc_nl_footwear	0.026	-0.906
	-0.021	(0.080)***
mc_nl_dwellingmat	0.001	0.042
	-0.021	-0.079
mc_nl_furniture	0.009	0.242
	-0.022	(0.083)***
mc_nl_householdtextiles	0.007	0.013
	-0.021	-0.079
mc_nl_tableware	0.007	0.459
	-0.023	(0.087)***
mc_nl_house_eq	-0.047	-0.052
	(0.021)**	-0.079
mc_nl_vehicles	-0.037	-0.131
	-0.027	-0.104
mc_nl_transportparts	-0.062	0.027
	(0.021)***	-0.079
mc_nl_recreation	-0.036	0.169
	-0.023	(0.086)**
mc_nl_electrics	-0.018	-0.27
	-0.021	(0.080)***
mc_at_food	0.006	-0.011
	-0.02	-0.075
mc_at_nabeverages	-0.01	-0.008
	-0.021	-0.08
mc_at_cloths	-0.067	-0.11
	(0.020)***	-0.075
mc_at_footwear	-0.013	0.042
	-0.02	-0.077
mc_at_dwellingmat	-0.024	0.137
	-0.02	(0.076)*
mc_at_householdtextiles	0.022	0.058
	-0.02	-0.078
mc_at_appliances	-0.04	0.048
	(0.020)**	-0.075

mc_at_tableware	-0.061	0.023
	(0.020)***	-0.076
mc_at_house_eq	-0.069	0.024
	(0.020)***	-0.075
mc_at_housemaintenance	-0.038	-0.218
	(0.020)*	(0.075)***
mc_at_vehicles	-0.037	-0.044
	(0.020)*	-0.075
mc_at_transportparts	-0.072	0.137
	(0.020)***	(0.075)*
mc_at_recreation	-0.074	0.058
	(0.020)***	-0.077
mc_at_electrics	0.003	-0.016
	-0.02	-0.076
mc_pt_nabeverages	-0.087	0.143
	(0.021)***	(0.081)*
mc_pt_footwear	-0.134	-0.51
	(0.023)***	(0.087)***
mc_pt_dwellingmat	-0.007	-0.164
	-0.031	-0.119
mc_pt_furniture	-0.02	-0.21
	-0.021	(0.080)***
mc_pt_householdtextiles	-0.022	-0.02
	-0.021	-0.079
mc_pt_appliances	-0.002	-0.087
	-0.021	-0.082
mc_pt_housemaintenance	0.033	-0.357
	-0.021	(0.080)***
mc_pt_vehicles	0.024	0.027
	-0.022	-0.083
mc_pt_IT	-0.162	0.022
	(0.021)***	-0.079
mc_pt_recreation	-0.078	-0.253
	(0.021)***	(0.081)***
mc_pt_other	0.002	-0.069

	-0.022	-0.082
mc_fi_food	-0.011	0.02
	-0.02	-0.076
mc_fi_nabeverages	0.038	-0.176
	(0.020)*	(0.075)**
mc_fi_tobacco	0.034	0.692
	(0.020)*	(0.077)***
mc_fi_cloths	-0.089	-0.136
	(0.020)***	(0.075)*
mc_fi_footwear	-0.074	0.074
	(0.020)***	-0.075
mc_fi_appliances	-0.039	-0.112
	(0.020)*	-0.075
mc_fi_house_eq	-0.053	-0.02
	(0.020)***	-0.075
mc_fi_medical	-0.014	-0.063
	-0.03	-0.113
mc_fi_vehicles	-0.102	0.012
	(0.020)***	-0.077
mc_fi_transportparts	-0.03	0.11
	-0.021	-0.079
mc_fi_recreation	-0.034	0.254
	-0.022	(0.083)***
mc_fi_electrics	-0.057	-0.072
	(0.020)***	-0.075
Observations	2336	2336
"R-sq"	0.76	0.6
Breusch-Pagan test of independence:chi2=	59.11	Pr = 0.000

Standard errors in parentheses. Product dummies are included in the regression.

* significant at 10%; ** significant at 5%; *** significant at 1%

The table presents seemingly unrelated regression with changes in consumer prices (lnPc) and changes in producer prices (lnPh) being the dependent variables. The variables ppass_* measure pass-through rates and are interactions of import prices and industry dummies. The variables mc_* are country-product dummies measuring changes at country-

product-level market power. Table 6 in the Annex lists the corresponding country names of the country codes used for the variables.

Table 4 Special aggregates

Industrial goods
03.1.1 Clothing materials, 03.1.2 Garments, 03.1.3 Other articles of clothing and clothing accessories, 03.2.1/2 Shoes and other footwear including repair and hire of footwear, 04.3.1 Materials for the maintenance and repair of the dwelling, 04.4.1 Water supply, 04.5.1 Electricity, 04.5.2 Gas, 04.5.3 Liquid fuels, 04.5.4 Solid fuels, 04.5.5 Heat energy, 05.1.1 Furniture and furnishings, 05.1.2 Carpets and other floor coverings, 05.2.0 Household textiles, 05.3.1/2 Major household appliances whether electric or not and small electric household appliances, 05.4.0 Glassware, tableware and household utensils, 05.5.1/2 Major tools and equipment and small tools and miscellaneous accessories, 05.6.1 Non-durable household goods, 06.1.1 Pharmaceutical products, 06.1.2/3 Other medical products, therapeutic appliances and equipment, 07.1.1 Motor cars, 07.1.2/3/4 Motor cycles, bicycles and animal drawn vehicles, 07.2.1 Spare parts and accessories for personal transport equipment, 07.2.2 Fuels and lubricants for personal transport equipment, 09.1.1 Equipment for the reception, recording and reproduction of sound and pictures, 09.1.2 Photographic and cinematographic equipment and optical instruments, 09.1.3 Information processing equipment, 09.1.4 Recording media, 09.2.1/2 Major durables for indoor and outdoor recreation including musical instruments, 09.3.1 Games, toys and hobbies, 09.3.2 Equipment for sport, camping and open-air recreation, 09.3.3 Gardens, plants and flowers, 09.3.4/5 Pets and related products including veterinary and other services for pets, 09.5.1 Books, 09.5.2 Newspapers and periodicals, 09.5.3/4 Miscellaneous printed matter and stationery and drawing materials, 12.1.2/3 Electric appliances for personal care and other appliances, articles and products for personal care, 12.3.1 Jewellery, clocks and watches, 12.3.2 Other personal effects
Non-energy industrial goods
Excluding the following from industrial goods: 04.5.1 Electricity , 04.5.2 Gas , 04.5.3 Liquid fuels , 04.5.4 Solid fuels , 04.5.5 Heat energy , 07.2.2 Fuels and lubricants for personal transport equipment
Non-energy industrial goods, durables
05.1.1 Furniture and furnishings , 05.1.2 Carpets and other floor coverings , 05.3.1/2 Major household appliances whether electric or not and small electric household appliances , 07.1.1 Motor cars , 07.1.2/3/4 Motor cycles, bicycles and animal drawn vehicles , 09.1.1 Equipment for the reception, recording and reproduction of sound and pictures , 09.1.2 Photographic and cinematographic equipment and optical instruments , 09.1.3 Information processing equipment , 09.2.1/2 Major durables for indoor and outdoor recreation including musical instruments , 12.3.1 Jewellery, clocks and watches
Non-energy industrial goods, semi-durables
03.1.1 Clothing materials, 03.1.2 Garments, 03.1.3 Other articles of clothing and clothing accessories, 03.2.1/2 Shoes and other footwear including repair and hire of footwear, 05.2.0 Household textiles, 05.4.0 Glassware, tableware and household utensils, 05.5.1/2 Major tools and equipment and small tools and miscellaneous accessories, 07.2.1 Spare parts and accessories for personal transport equipment, 09.1.4 Recording media, 09.3.1 Games, toys and hobbies, 09.3.2 Equipment for sport, camping and open-air recreation, 09.5.1 Books, 12.3.2 Other personal effects
Non-energy industrial goods, non-durables:
04.3.1 Materials for the maintenance and repair of the dwelling, 04.4.1 Water supply, 05.6.1 Non-durable household goods, 06.1.1 Pharmaceutical products, 06.1.2/3 Other medical products, therapeutic appliances and equipment, 09.3.3 Gardens, plants and flowers, 09.3.4/5 Pets and related products including veterinary and other services for pets, 09.5.2 Newspapers and periodicals, 09.5.3/4 Miscellaneous printed matter and stationery and drawing materials, 12.1.2/3 Electric appliances for personal care and other appliances, articles and products for personal care

Table 5 Description of Disaggregated HICP Product Categories.

Description	HICP Number
Food	11
Non-alcoholic beverages	12
Tobacco	22
Clothing	31
Footwear including repair	32
Materials for the maintenance and repair of the dwelling	431
Furniture and furnishings, carpets and other floor coverings	51
Household textiles	52
Household appliances	53
Glassware, tableware and household utensils	54
Tools and equipment for house and garden	55
Goods and services for routine household maintenance	56
Medical products, appliances and equipment	61
Purchase of vehicles	71
Spares parts and accessories for personal transport equipment	721
Audio-visual, photographic and information processing equipment	91
Other recreational items and equipment, gardens and pets	93
Electrical appliances for personal care; other appliances, articles and products for personal care	1212, 1213
Other personal effects	1232

Table 6 Country codes and corresponding country names

Country code	Country name
bx	Belgium-Luxembourg
dk	Denmark
de	Germany
ie	Ireland
gr	Greece
es	Spain
fr	France
it	Italy
nl	Netherlands
at	Austria
pt	Portugal
fi	Finland