ECONSTOR
Make Your Publications Visible.

A Service of
ZBW
Leibniz-Informationszentrum Wirtschaft
Leibniz Information Centre for Economics

Holtemöller, Oliver; Zeddies, Götz

Working Paper

Has the Euro Increased International Price Elasticities?

IWH Discussion Papers, No. 18/2010

Provided in Cooperation with:
Halle Institute for Economic Research (IWH) – Member of the Leibniz Association

Suggested Citation: Holtemöller, Oliver; Zeddies, Götz (2010) : Has the Euro Increased International Price Elasticities?, IWH Discussion Papers, No. 18/2010, Leibniz-Institut für Wirtschaftsforschung Halle (IWH), Halle (Saale), https://nbn-resolving.de/urn:nbn:de:101:1-201011242760

This Version is available at:
https://hdl.handle.net/10419/45916

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

WWW.ECONSTOR.EU

Mitglied der Leibniz-Gemeinschaft

Institut für Wirtschaftsforschung Halle
Halle Institute for Economic Research

Has the Euro Increased International Price Elasticities?

Oliver Holtemöller

Götz Zeddies

September 2010 No. 18

IWH-Diskussionspapiere

IWH Discussion Papers

Has the Euro Increased International Price Elasticities?

Oliver Holtemöller

Götz Zeddies

September 2010 No. 18

Authors: *Oliver Holtemöller*
Department of Macroeconomics
Phone: +49 345 7753 800
Email: oliver.holtemoeller@iwh-halle.de

Götz Zeddies
Department of Macroeconomics
Phone: +49 345 7753 854
Email: goetz.zeddies@iwh-halle.de

The responsibility for discussion papers lies solely with the individual authors. The views expressed herein do not necessarily represent those of the IWH. The papers represent preliminary work and are circulated to encourage discussion with the authors. Citation of the discussion papers should account for their provisional character; a revised version may be available directly from the authors.

Suggestions and critical comments on the papers are welcome!

IWH-Discussion Papers are indexed in RePEC-Econpapers and ECONIS.

Editor:

Halle Institute for Economic Research (IWH)
Prof Dr Dr h. c. Ulrich Blum (President), Dr Hubert Gabrisch (Head of Research)
The IWH is member of the Leibniz Association.

Address: Kleine Märkerstraße 8, 06108 Halle (Saale)
Postal Address: P.O. Box 11 03 61, 06017 Halle (Saale)
Phone: +49 345 7753 60
Fax: +49 345 7753 820
Internet: http://www.iwh-halle.de

Has the Euro Increased International Price Elasticities?*

Abstract

The introduction of the Euro has been accompanied by the hope that intra-EMU trade would increase and that prices would converge due to increased elasticities of international substitution. This paper contributes to the literature on the Euro's effects on international trade by analyzing price elasticities in international trade flows between Germany and France and between Germany and the United Kingdom before and after the introduction of the Euro. Using disaggregated Eurostat trade statistics for up to 715 product categories, we adopt a heterogeneous dynamic panel framework for the estimation of price elasticities. We suggest a Kalman-filter approach to control for unobservable quality changes which otherwise would bias estimates of price elasticities. This approach delivers reasonable estimates of price elasticities for a broad set of products. Furthermore, we divide the complete sample, which ranges from 1995 to 2008, into two sub-samples and show that the hypothesis that price elasticities in trade between EMU members did *not* change substantially after the introduction of the Euro cannot be rejected. This result is robust with respect to changes in the estimation technique.

Keywords: European Integration, introduction of the Euro, import price elasticity, panel data, Kalman-filter, structural vector autoregression

JEL classification: F14, F15, F41, C32, C33

* We thank Annika Klatt for excellent research assistance and Herbert Buscher and Toralf Pusch for helpful comments on an earlier version of this paper.

Hat der Euro die internationale Preiselastizität der Nachfrage erhöht?

Zusammenfassung

Die Euro-Einführung war mit der Hoffnung verbunden, dass der internationale Handel innerhalb der Währungsunion aufgrund einer höheren Preiselastizität der Nachfrage zunehmen und sich die Preise international angleichen würden. Der vorliegende Artikel untersucht die Preiselastizität der Nachfrage vor und nach der Euro-Einführung im Handel zwischen den EWU-Mitgliedern Deutschland und Frankreich auf der einen sowie, zum Vergleich, zwischen Deutschland und Großbritannien auf der anderen Seite. Dies geschieht auf der Basis eines heterogenen dynamischen Panelmodells, in das disaggregierte Eurostat-Außenhandelsdaten für bis zu 715 Produktgruppen einfließen. Mit Hilfe einer Kalman-Filter-Schätzung wird für unbeobachtete Qualitätsveränderungen kontrolliert, die andernfalls die Schätzergebnisse verzerren würden. Dieser Ansatz liefert valide Schätzergebnisse für die Preiselastizitäten der Nachfrage für ein breites Spektrum von Gütergruppen. Der komplette Datensatz, der von 1995 bis 2008 reicht, wird in zwei Unterperioden unterteilt. Die Hypothese, dass die Preiselastizitäten der Nachfrage im Außenhandel der EWU-Mitgliedsstaaten nach der Euro-Einführung *nicht* nennenswert gestiegen sind, kann nicht verworfen werden.

Schlagwörter: Europäische Integration, Euro-Einführung, Preiselastizität der (Import-)Nachfrage, Paneldaten, Kalman-Filter, strukturelles vektorautoregressives Modell

JEL-Klassifikation: F14, F15, F41, C32, C33

1. Introduction

Recently, the European Monetary Union (EMU) has celebrated its 10th anniversary. One reason for the introduction of a common European currency was the hope that a single currency would promote trade and competition within the currency area due to higher price transparency and thus higher price elasticity of demand (DeGrauwe 2003). Besides, the common currency was supposed to foster trade between EMU member states for some other reasons. For instance, international trade flows might be deterred by exchange rate volatility, especially if the exchange rate does not follow only fundamentals but also non-fundamental noise. Furthermore, Hoffmann and Holtemöller (2007) show that a fixed exchange rate arrangement is more attractive if price elasticities are large because in this case noisy nominal exchange rate changes induce substantial variation in labor effort and its disutility. Finally, transaction costs stemming mainly from currency conversion and hedging are reduced by adopting a single currency (Mundell 1961). This is especially the case for smaller firms, for which costs of currency exchange and risk management are comparatively higher. The focus of the present paper is put on the first effect: the Euro's impact on price elasticities of demand shall be analyzed empirically.

In its special edition of the monthly bulletin on its first ten years, the European Central Bank (ECB) reports that "Economists have now reached the consensus view that the single currency has boosted the growth of euro area countries' trade on average by 2 to 3 percentage points" (European Central Bank 2008:90). The Euro's effect on trade volumes and market shares is analyzed in a large number of studies. Many empirical analyses find a positive impact of the Euro on Intra-European trade flows (e.g. Rose 2000; Micco, Stein, and Ordoñez 2003; Barr, Breedon, and Miles 2003; Flam and Nordstrom 2003). However, these studies do not consider the causes of the observed increases in trade volumes in the course of the Euro's introduction, which could either be lowered transaction costs, reduced exchange rate volatility or higher price transparency. Moreover, estimation results of some of these studies show that the currency union did also increase EMU members' exports to and imports from non-EMU countries, indicating that the common currency did not trigger trade diversion, which would be expected in the context of higher price transparency and/or lower transaction costs. Hence, it is questionable whether the introduction of the single currency did increase international price elasticities. Instead, increases in intra-EMU trade flows after the introduction of the Euro could also result from

lagged effects of Single Market measures, which are difficult to separate from currency union effects (Baldwin 2006).

According to the law of one price, prices of similar products in EMU member states should converge. However, the results of empirical analyses of price convergence in the aftermath of European Monetary Union are ambiguous. Whereas for instance Goldberg and Verboven (2005) as well as Gil-Pareja and Sosvilla-Rivero (2008) found evidence for price convergence in the European car market, the analyses of Lutz (2004) did not confirm these results. Also for other tradable goods, no significant evidence for price convergence has been found (e.g. Deutsche Bundesbank 2009; Baye, Gatti, et al. 2006).[1] Overall, it is still an open question whether the European Monetary Union did increase economic integration by fostering international price transparency and price elasticity of demand.

An increase in price elasticities would be supportive of Frankel and Rose's (1998) hypothesis that the introduction of a single currency is followed by an increasing international integration which is itself a precondition for an optimum currency area.[2] Against this background, the present paper examines whether price elasticities of demand increased after the introduction of the Euro and can thus be considered as a vital driving force of increasing economic integration and price convergence by fostering international competition in the European Monetary Union. Price elasticities of demand are estimated for trade between Germany and France, prior as well as after the introduction of the Euro. Additionally, price elasticities between Germany and the United Kingdom are analyzed. Whereas France is Germany's most important trading partner accounting for nearly 9% in total goods exports and for around 8% in imports, the United Kingdom ranks fourth in German exports and sixth in imports. Hence, we consider an EMU member country, France, and a non-member country, the UK, in order to evaluate whether possible increases in price elasticities can be ascribed to the introduction of the Euro. This is necessary,

[1] The Euro's effect on price convergence has additionally been analyzed by Engel and Rogers (2004), Allington, Kattuman, and Waldmann (2005) and Rogers (2007). In this context, the fact that international trade especially between high-income countries is largely intra-industry in nature, i.e. consists of the exchange of differentiated goods, might be relevant. In a world of product differentiation, the hopes that higher price transparency will lead to more arbitrage transactions and will thereby increase trade flows and price convergence are probably overstated, since due to brand loyalties and goods or services designed to specific customer needs, competition is not solely limited to prices (Posen 1999).

[2] Warin, Wunnava, and Janicki (2009) show that belonging to the currency union increases FDI flows, which can also be interpreted as evidence in favor of an endogenous optimum currency area theory.

because it cannot be excluded that price elasticities have increased in general over time. In addition to Single Market measures in case of the EU member states, other factors, like for instance the emergence of new telecommunication technologies, could have increased price transparency and international trade flows all over the world regardless of whether trading partner countries use the same currency. Additionally, as an EU member state, the UK participates, other than for instance the U.S., in the Single Market Program. As a result, trade flows between Germany and the United Kingdom should be equally liberalized like those between Germany and France. Moreover, the UK and France are quite similar with respect to their levels of development. Thus, demand patterns in both countries should resemble each other.

We estimate price elasticities using a structural VAR approach and a Kalman-filter approach which accounts for unobserved quality changes in traded goods which would bias estimates if they were neglected. Overall, we find that the hypothesis that price elasticities between Germany and France did not substantially change after the introduction of the Euro cannot be rejected. This finding is robust with respect to a broad set of model variations.

The paper is organized as follows. In section 2, we describe our economic framework, and in section 3, we explain the econometric implementation and discuss some problems related to the nature of the data that we use (Eurostat external trade statistics). The empirical results are presented in section 4. Finally, section 5 concludes.

2. A Framework for Estimating International Price Elasticities

The empirical literature on price elasticities distinguishes between estimations at a micro or firm level and at the macro level.[3] Usually, the estimated elasticities are much higher for micro level data. For macro data, sometimes even elasticities below one are reported, see for example the discussions in Chari, Kehoe, and McGrattan (2002) and Corsetti, Dedola, and Leduc (2008). In this study, we use the external trade statistics of the Harmonized System (HS), compiled by EUROSTAT, on a disaggregated six-digit level (HS6). Though there are differences in the scope of the

[3] For an overview see Anderson and Wincoop (2004), for example.

HS6 categories, at this level a reasonable number of categories can be considered relatively homogenous.

2.1. Theoretical Demand for Foreign Products

The demand of agents in country i for a certain product k from a foreign country j at time t depends on variables like domestic economic conditions, import price, price of alternative products and so on. According to standard new open economy macroeconomics models, the quantity of foreign goods demanded by domestic entities is a function of the relative price and total demand, see for example Corsetti and Pesenti (2005),

$$Z_{i,j,k,t} = \left(\frac{P_{i,j,k,t}}{\overline{P}_{i,k,t}}\right)^{-\theta} \overline{Z}_{i,k,t}, \tag{1}$$

where $Z_{i,j,k,t}$ is the real quantity of product k demanded by agents in country i from country j, $\overline{Z}_{i,k,t}$ is total import demand for good k by country i, $P_{i,j,k,t}$ and $\overline{P}_{i,k,t}$ are the corresponding price and price level, and θ denotes the absolute value of the elasticity of international substitution (price elasticity). By multiplying equation (1) with the product k's price, we get the nominal import demand equation

$$\begin{aligned}\underbrace{Z_{i,j,k,t} \cdot P_{i,j,k,t}}_{Q_{i,j,k,t}} &= P_{i,j,k,t} \cdot P_{i,j,k,t}^{-\theta} \cdot \overline{P}_{i,k,t}^{\theta} \cdot \overline{Z}_{i,k,t} = P_{i,j,k,t}^{1-\theta} \cdot \overline{P}_{i,k,t}^{(\theta-1)} \cdot \overline{Z}_{i,k,t} \cdot \overline{P}_{i,k,t} \\ &= \left(\frac{P_{i,j,k,t}}{\overline{P}_{i,k,t}}\right)^{1-\theta} \underbrace{\overline{Z}_{i,k,t}\overline{P}_{i,k,t}}_{\overline{Q}_{i,k,t}}, \end{aligned} \tag{2}$$

where Q denotes nominal import demand of product k from country j.

2.2. Additional Demand Factors and Impact of the Euro

Though equations (1) and (2) are quite general, they almost surely omit other variables than relative price and total demand that have an effect on the demand for a certain product. In empirical applications, it is necessary to control for these omitted variables in order to avoid an omitted variable bias. Since HS6 product categories are relatively homogenous, many omitted variables are indirectly controlled for by the total demand for foreign products of category k, $\overline{Q}_{i,k,t}$, on the right-hand-side of the demand equation. Similarly like $Q_{i,j,k,t}$, $\overline{Q}_{i,k,t}$ varies, for example, with

macroeconomic fluctuations in the importing country and with possibly time-varying preferences for product k. However, the share of imports stemming from country j in all imports also depends on variables that characterize the overall relationship between countries i and j. Let $\gamma'\mathbf{W}_{i,j}$ denote a term which summarizes time-independent (i,j)-specific characteristics like language, distance, colonial rule and so on ($\mathbf{W}_{i,j}$ is a vector of corresponding control variables and γ is the corresponding coefficient vector).[4] By including this term into the real and nominal import demand equations, we get

$$Z_{i,j,k,t} = \left(\frac{P_{i,j,k,t}}{\overline{P}_{i,k,t}}\right)^{-\theta} \cdot \overline{Z}_{i,k,t} \cdot e^{(\gamma'\mathbf{W}_{i,j})}, \tag{3}$$

and

$$Q_{i,j,k,t} = \left(\frac{P_{i,j,k,t}}{\overline{P}_{i,k,t}}\right)^{(1-\theta)} \cdot \overline{Q}_{i,k,t} \cdot e^{(\gamma'\mathbf{W}_{i,j})}, \tag{4}$$

respectively.

The impact of institutional changes on import demand can be studied by introducing corresponding dummy variables.[5] In case of the introduction of the Euro, this dummy variable, $D_{i,j,t}$, takes on a value of zero up to 1998 (or 2001 if one focuses on the introduction of coins and banknotes) and one afterwards. While the existing literature has mostly studied this dummy's effect on the term $\gamma'\mathbf{W}_{i,j}$, this paper explores in detail the effect on the price elasticity θ. The dummy-augmented real import demand equation is

$$Z_{i,j,k,t} = \left(\frac{P_{i,j,k,t}}{\overline{P}_{i,k,t}}\right)^{-\theta} \cdot \left(\frac{P_{i,j,k,t}}{\overline{P}_{i,k,t}}\right)^{-\eta\cdot D_{i,j,t}} \cdot \overline{Z}_{i,k,t} \cdot e^{(\gamma+\delta D_{i,j,t})'\cdot\mathbf{W}_{i,j}}, \tag{5}$$

and a similar equation is obtained for nominal import demand

$$Q_{i,j,k,t} = \left(\frac{P_{i,j,k,t}}{\overline{P}_{i,k,t}}\right)^{1-\theta} \cdot \left(\frac{P_{i,j,k,t}}{\overline{P}_{i,k,t}}\right)^{(1-\eta)\cdot D_{i,j,t}} \cdot \overline{Q}_{i,k,t} \cdot e^{(\gamma+\delta D_{i,j,t})'\cdot\mathbf{W}_{i,j}}. \tag{6}$$

The price elasticity before the introduction of the Euro is given by θ, while the absolute price elasticity after the introduction of the Euro is given by $\theta^* = \theta + \eta$.

[4] The literature has explored the impact of these variables on bilateral trade using gravity models, see Frankel (1997), Evenett and Keller (2002) and the seminal contribution by Linnemann (1966).

[5] There is a large number of studies, in which dummies are used for analyzing the effect of a currency union (and other institutional arrangements) on trade, for example Bun and Klaasen (2007), Frankel (2008), Micco, Stein, and Ordoñez (2003) and Rose (2000).

3. Econometric Implementation

3.1. A VAR Model for Import Volume and Import Price

We linearize the nominal import demand equation (6) by taking natural logarithms of the left-hand side and the right-hand side. Furthermore, we can neglect the indices i, j and k in this section because separate models are estimated for different combinations of i, j and k. The linearized nominal import demand equation is

$$\ln Q_t = (1-\theta)\ln\left(\frac{P_t}{\overline{P}_t}\right) + \ln \overline{Q}_t + \gamma'\mathbf{W}_{i,j} + \delta' D_{i,j,t}\mathbf{W}_{i,j}, \tag{7}$$

where p_t denotes the logarithmic relative price, and $\ln(\gamma'\mathbf{W})$ is simply a constant term. It is a stylized fact that log nominal imports follow a long-run trend. However, subtracting $\overline{Q}_t$ from both sides of (7) yields an import demand equation in terms of the share, q_t, of imports from country j in total imports of product k

$$\underbrace{\ln Q_t - \ln \overline{Q}_t}_{q_t} = (1-\theta)\underbrace{\ln\left(\frac{P_t}{\overline{P}_t}\right)}_{p_t} + \gamma'\mathbf{W}_{i,j} + \delta' D_{i,j,t}\mathbf{W}_{i,j}. \tag{8}$$

In general, both import share and relative price are endogenous variables and the response of one variable to the other does not necessarily take place within a time unit of an empirical application. Therefore, we infer the effect of a relative price change on the import share using a bivariate vector autoregressive (VAR) model for $x_t = (p_t, q_t)'$

$$x_t = \nu + \sum_{\ell=1}^{k} A_\ell x_{t-\ell} + u_t, \qquad u_t \sim N(0, \Sigma_u), \tag{9}$$

where ν is a (2×1)-vector of constants, A_ℓ are (2×2)-coefficient matrices, and u_t is the (2×1)-residual vector, which is assumed to follow a bivariate normal distribution with mean zero and covariance matrix Σ_u. Using the estimated VAR model, we can calculate the overall effect of an exogenous relative price change on the import share, that is $(1-\theta)$. However, for this purpose it is necessary to impose one additional structural assumption (Structural VAR, SVAR), which is explained in the following subsection. We have estimated the VAR model and have calculated the implied price elasticity for two different samples, namely the period before the introduction of

the Euro and the period afterwards. The first sample gives us estimates of θ for a selection of product categories k and the second sample gives us estimates of θ^*.

3.2. Structural Analysis

The additional assumption that we impose in order to identify structural effects is that prices are sticky in the very short-run. More precisely, we assume that exogenous demand shocks that increase or decrease the import share have no *contemporaneous* effect on the relative price, that is we impose a recursive identification scheme. Technically, this is achieved by decomposing the residual vector u_t into a contemporaneous impact matrix, B, and a vector of uncorrelated structural shocks, e_t,

$$u_t = Be_t, \qquad e_t \sim N(0, I_2), \tag{10}$$

where I_2 is an identity matrix of dimension two, and B is obtained from a Cholesky decomposition of the residual covariance matrix Σ_u. The contemporaneous, or immediate, effect of an exogenous change in the relative price on the import share is the lower left element of the contemporaneous impact matrix, B_{21}. The long-run, or total, effect is the lower left element, Ψ_{21} of the total impact matrix[6]

$$\Psi = \left(I_2 - \sum_{\ell=1}^{k} A_\ell \right)^{-1} B. \tag{11}$$

3.3. Measurement Errors

Eurostat trade statistics provide data on trade values and on quantities in kilograms. Prices are not directly available and must be calculated as *unit values* from value (volume) and quantity data. Though unit values are quite commonly used in the empirical literature, it is obvious that they suffer from serious problems, especially measurement errors and changes in quality.[7] Like in case of omitted variables it can be supposed that at least some of these factors cancel out by taking import shares and relative prices instead of import volumes and absolute prices. However, there may also be country-specific measurement errors or quality changes. This may be one

[6] See, for example, Lütkepohl (2005).

[7] See also Erkel-Rousse and Mizra (2002) for a discussion of unit values in the context of import price elasticity estimation.

reason why macro estimates of price elasticities are usually much lower than estimates in micro studies which control for quality changes. If, for instance, unit values increase due to quality improvements, real demand might remain unchanged. The possibilities to directly control for quality changes in the present context are rather limited. We try to accomplish this task by estimating a second model in addition to the pure SVAR model, which allows for changes in the quality of imported products. Assume that the average quality of imported products changes by v per cent. This affects the composition of the import basket and does also *contemporaneously* affect the observed relative price – a scenario that is ruled out by the above identification scheme. Maintaining the identifying assumption that prices are sticky in the very short-run, this shift in demand to products of a different quality changes the observed price exactly to the same extent as the observed value of imports. In other words, in case of a shift to a different average quality, both import value and observed unit value (which is not adjusted for quality) change by the same v per cent. We implement this by adding an unobservable state variable v_t to both equations of the VAR

$$x_t = \nu + \sum_{\ell=1}^{k} A_\ell x_{t-\ell} + (v_t, v_t)' + Be_t. \tag{12}$$

Assuming that v_t and the error terms are uncorrelated and that quality demanded and other demand shocks share the same variance, this model can be estimated using the Kalman filter.[8] Following this approach implies that all common changes of equal sign and proportion in relative prices and import shares are attributed to the unobservable quality variable. This might bias the price elasticity estimates upwards.[9] However, this is quite a useful implication: the pure SVAR estimates are likely to be biased downwards due to omitted factors that are positively correlated with price and quantity. Therefore, the two types of estimates provide a range that is very likely to cover the true price elasticities.

[8] These assumptions are necessary for identification because the pure structural VAR is just-identified leaving no degrees of freedom. Therefore additional parameters – like an additional shock variance – cannot be estimated.

[9] Of course, nominal import shares and relative prices would also change in the same magnitude if quantity demanded would not react to changes in relative prices, i.e. if price elasticity of demand equals zero. Since in the Kalman filter estimation, such common changes in relative prices and import shares would not enter into price elasticity estimates, but into the unobservable quality variable, price elasticities could be over-estimated.

3.4. Using the Panel Structure of Eurostat External Trade Data

Besides controlling for quality, we take a second step towards a more robust estimation of price elasticities. Overall – as will be explained in the following section – we consider more than 700 HS6 product categories. These belong to different two-digit (HS2) product sections of the Harmonized System. We compute price elasticities for the HS2 product sections by adopting a heterogeneous panel VAR (PVAR) framework. We first compute SVARs for all considered HS6 product categories. Then, we compute immediate and total elasticities as described above. Finally, we average over the estimates that belong to one HS2 product section. Since it is very likely that the dynamics in different HS6 categories are heterogeneous, we do not pool the sections in any way, following the corresponding discussion in Canova (2007).

3.5. Selection of Product Categories

The Eurostat external trade database provides monthly data on import values (in Euro, Q) and quantities (weight in kg, Z). Unit values are calculated as $P = Q/Z$. We have computed the shares of the HS2 product sections in total German imports from and exports to France and the United Kingdom, respectively, and we consider all sections that individually account for at least one per cent of total imports – except for section 99 which contains all products that do not fit in other sections and is therefore very heterogeneous. These are 18 HS2 sections in case of German imports from France, 17 in French imports from Germany, 16 HS2 categories in UK imports from Germany and 15 HS2-groups in case of German imports from the UK (see tables 6 to 21 in the appendix). The following table 1 gives an overview over the HS2-groups considered in the four bilateral trade relations analyzed in this study for the year 2008. Overall, the trade data used can be considered representative for German trade with France and the UK. However, the numbers of HS6 product categories in those HS2 sections accounting for at least one percent in total trade are still so large that we further reduce the selection. We identify all four-digit (HS4) product groups in the pre-selected HS2 sections that have a share of at least 1% in their corresponding HS2 section, and then we take all HS6 product categories within these HS4 product groups that do not exhibit any missing value in our overall sample, which ranges from January 1995 to June 2008. In the next section, we report

Table 1: HS2 Product Section Considered in this Study

HS2 Code	Product Section	Share 2008 DE-FR	FR-DE	DE-UK	UK-DE
04	Dairy produce, birds' eggs, natural honey, edible products of animal origin, not elsewhere specified or included	0.0122	<0.01	<0.01	<0.01
22	Beverages, spirits and vinegar	0.0184	<0.01	<0.01	<0.01
27	Mineral fuels, mineral oils and products of their distillation, bituminous substances, mineral waxes	0.0258	0.0489	0.1957	0.0155
29	Organic chemicals	0.0186	0.0233	0.0613	0.0242
30	Pharmaceutical products	0.0271	0.0283	0.0485	0.0275
32	Tanning or Dyeing Extracts; Tannins and their Derivatives	<0.01	0.0116	<0.01	0.0101
33	Essential oils and resinoids, perfumery, cosmetic or toilet preparations	0.0212	<0.01	0.0114	<0.01
38	Miscellaneous chemical products	0.0179	0.0214	0.0275	0.0126
39	Plastics and articles thereof	0.0419	0.0542	0.0278	0.0451
40	Rubber and articles thereof	0.0201	0.0134	0.0079	0.0112
48	Paper and paperboard, articles of paper pulp, of paper or of paperboard	0.0174	0.0252	0.0085	0.0250
72	Iron and steel	0.0594	0.0400	0.0300	0.0201
73	Articles of iron or steel	0.0178	0.0253	<0.01	0.0190
76	Aluminium and articles thereof	0.0144	0.0127	0.0238	0.0140
84	Nuclear reactors, boilers, machinery and mechanical appliances, parts thereof	0.1174	0.1610	0.1288	0.1629
85	Electrical machinery and equipment and parts thereof, sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles	0.0632	0.0720	0.0858	0.0768
87	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	0.1297	0.1795	0.0739	0.2881
88	Aircraft, spacecraft, and parts thereof	0.1536	0.0432	0.0848	<0.01
90	Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus, parts and accessories thereof	0.0242	0.0312	0.0282	0.0322
94	Furniture, bedding, mattresses, mattress supportscushions and similar staffed furnishings, lamps and lighting fittings	<0.01	0.0143	<0.01	0.0137
Total		0.8002	0.8055	0.8439	0.7979

results for models including three lags of the endogenous variables. This lag length is sufficient to eliminate serial correlation from the residuals. We have also calculated estimates for lag lengths of one and of six without qualitative changes in the results.

4. Empirical Results

4.1. Composition of German Trade Flows

Before turning to the estimation results, a glance shall be thrown on the composition of trade flows considered in this study. At least three-quarters of international trade flows between Germany on the one hand and France and the United Kingdom on the other can be allotted to maximally 18 HS2-product groups. In all of the four bilateral trade relations considered here, especially groups HS84 (Nuclear Reactors, Boilers, Machinery and Mechanical Appliances), HS87 (Vehicles other than Railway or Tramway Rolling-Stock), HS88 (Aircraft, Spacecraft), and HS85 (Electrical Machinery and Equipment) are of high importance. In 2008, these four product groups accounted for about 46% in Franco-German trade values and for 54% in United Kingdom's imports from Germany. For German imports from the UK, the share of these product groups reaches only 37%, owing to the voluminous German oil imports from the UK. Although overall, international trade flows considered in this study are quite similar with respect to their composition, there are some exceptions. As already mentioned, in German imports from the United Kingdom, HS group 27 (Mineral Fuels, Mineral Oils and Products of their Distillation), accounting for 10% of total imports from the UK, ranks at the first place. On the other hand, in German imports from France, food and beverages are particularly important. Contrarily, this is not the case for German exports to France as well as to the United Kingdom. Instead, Tanning or Dyeing Extracts (HS32) and Furniture (HS94) are of higher relevance in the last named trade relations than in German imports from the respective countries. However, the last mentioned product groups do account for maximally 1.5% in total bilateral trade (as is the case for German imports of Food and Beverages from France).

4.2. Discussion of Estimated Price Elasticities

For each of the bilateral trade relations considered (German imports from France and the UK as well as imports of France and the UK from Germany), we split our complete sample into two sub-samples. The first sub-sample is 1995:7-2001:12. The sample starts in July 1995 because we need up to six pre-values for the models with six lags. The sample ends in December 2001 just before the introduction of the Euro banknotes and coins. One may argue that the sample should already end in December 1998, just before the introduction of the common monetary policy. We have also considered this case. The corresponding results are not qualitatively different from those reported below. We prefer to present the results for the longer sample because the efficiency of estimation increases in the number of observations. The sample 1995:7-2001:12 includes 78 observations, which is a sound basis for bivariate VARs including three lags. The second sample is 2002:1-2008:6 and also includes 78 observations.

Price Elasticities between Germany and the United Kingdom. In table 2 we report the results of the pure SVAR models for trade between Germany and the UK. The structure of the tables is as follows: The first column shows the product section that is considered. In the other columns we report the mean of the contemporaneous price elasticities

$$\frac{1}{K}\sum_{k=1}^{K}(1 - B_{k,21}),$$

the median of the contemporaneous price elasticities, the mean long-run price elasticity (total impact)

$$\frac{1}{K}\sum_{k=1}^{K}(1 - \Psi_{k,21})$$

and the median long-run price elasticities. K is the number of HS6 categories in the corresponding HS2 product section which is reported in the last column together with the share of the considered HS6 categories in total German imports from the United Kingdom, i.e. the upper part of the table, and in total UK imports from Germany

(the lower part of the table).[10] For reasons of clarity, the following tables do only contain estimation results for total trade as well as for the five most important HS2 sections in the respective country pair. Detailed estimation results for all product groups are depicted in tables 6 to 21 in the appendix. For each of the depicted HS product sections, the tables include three rows. The first row shows the results for the first sub-sample (Pre), the second row the results for the second sub-sample (Post), and the third row contains p-values for tests of the hypothesis that the corresponding Post-value equals the Pre-value. The estimated typical (absolute) price elasticities are mostly positive as necessary for a reasonable interpretation. Compared to micro studies, the estimates are relatively low. However, as already mentioned before, other macro studies also report relatively low price elasticities. Elasticities higher than one are reported especially for more homogeneous sections like mineral fuels (section 27) or iron and steel (section 72), for example (see tables 6 and 10 in the appendix). Elasticities smaller than one are reported for more heterogeneous sections like pharmaceuticals (section 30) or machinery and mechanical appliances (section 84).

Accounting for the unobservable changes in quality leads to substantially higher price elasticities of demand, as can be seen from table 3. Some of the price elasticities now lie in the range that is reported by micro studies. Interestingly, price elasticities for German imports from the United Kingdom are overall considerably higher than price elasticities of British import demand from Germany. This might probably be traced back to Germanys comparative advantages in higher quality varieties of products. For instance, price elasticities in product section 87 (vehicles) are considerably higher for German imports from the UK than for German car exports to the UK. It seems quite plausible that demand for higher quality or branded products is less sensitive to changes in relative prices than demand for more standardized goods. Overall, the estimated price elasticities seem to be reliable.

Price elasticities for German exports to and for German imports from the United Kingdom do not differ substantially in the periods before and after the introduction of the Euro. For U.K. imports from Germany, contemporaneous price elasticities do even decrease significantly, though only slightly, in the Kalman filter approach

[10] To be more precise, we do not report the usual mean estimate but trimmed means. We have excluded the 2.5% highest estimates and the 2.5% lowest estimates of the HS6 categories because there are some extreme outliers. (We do not trim within each HS2 section.)

Table 2: Price Elasticities between Germany and the United Kingdom before and after the Introduction of the Euro (SVAR)

Product Section	Sample	GERMAN IMPORTS FROM THE U.K. Con. Mean	Con. Med.	LR Mean	LR Med.	No. of Cat. Share (%)
	Pre	0.9576	0.9098	1.1280	1.0275	305
All	Post	0.9562	0.8949	0.9707	1.0876	46.5269
	p-value	0.9725	0.7599	0.4209	0.6232	
	Pre	-0.6603	-0.6603	2.3719	2.3719	1
27	Post	2.0093	2.0093	9.6093	9.6093	10.6495
	p-value	–	–	–	–	
	Pre	0.8510	0.8969	0.6566	0.8400	54
84	Post	0.9808	0.9017	0.7047	1.1927	8.3782
	p-value	0.1385	0.6471	0.9003	0.3151	
	Pre	0.9731	0.9969	1.9197	1.7310	14
87	Post	0.8184	0.8187	-0.0604	-1.1791	6.3841
	p-value	0.2935	0.3462	0.1576	0.0366	
	Pre	0.8237	0.8237	2.2948	2.2948	1
88	Post	0.4409	0.4409	-0.3972	-0.3972	3.8185
	p-value	–	–	–	–	
	Pre	0.9510	0.9022	1.1466	0.9859	52
85	Post	0.9237	0.9304	0.7994	0.8263	3.4318
	p-value	0.7306	0.7134	0.3770	0.2733	
Product Section	**Sample**	**U.K. IMPORTS FROM GERMANY Con. Mean**	**Con. Med.**	**LR Mean**	**LR Med.**	**No. of Cat. Share**
	Pre	0.9625	0.9780	1.0222	1.0178	669
All	Post	0.9589	0.9649	1.0269	0.9848	57.8522
	p-value	0.7844	0.5924	0.9444	0.5989	
	Pre	1.0644	1.0606	1.0837	0.8508	20
87	Post	1.0352	1.0268	1.0864	1.1445	25.8415
	p-value	0.6531	0.7150	0.9950	0.3793	
	Pre	0.9293	0.9562	0.9035	1.0067	114
84	Post	0.9237	0.9485	0.7142	0.8782	10.7288
	p-value	0.8168	0.7245	0.1382	0.0568	
	Pre	0.9548	0.9785	1.0377	0.9916	86
39	Post	0.9907	0.9914	1.1629	0.9881	4.2172
	p-value	0.3016	0.6209	0.5370	0.4394	
	Pre	0.9655	0.9683	1.0107	0.9353	84
85	Post	0.9357	0.9479	0.9416	0.9655	3.7706
	p-value	0.2755	0.1751	0.6880	0.8752	
	Pre	0.9259	0.9229	0.9372	0.8564	48
90	Post	0.9034	0.9474	0.7401	0.8653	2.2600
	p-value	0.4910	0.7168	0.2577	0.4015	

Notes: Con. Mean is the mean and Con. Med. is the median of the contemporaneous price elasticities in a HS2 product section. LR Mean and LR Med. are the corresponding statistics for the long-run (total) effects of a relative price change on the import share. p-value refers to the test of the hypothesis that the corresponding Pre- and Post-estimates are equal. The hypothesis is rejected for p-values lower than the desired significance level. No. of Cat. denotes the number of used HS6 categories in a HS2 section and Share is the total share (in percent) of these used HS6 categories in total German imports from the UK and UK imports from Germany, respectively.

Table 3: Price Elasticities between Germany and the United Kingdom before and after the Introduction of the Euro (Kalman-Filter-Approach)

Product		GERMAN IMPORTS FROM THE U.K.				No. of Cat.
Section	Sample	Con. Mean	Con. Med.	LR Mean	LR Med.	Share (%)
	Pre	1.6899	1.3999	3.0675	2.2016	305
All	Post	1.7002	1.3366	3.2834	2.1263	46.5269
	p-value	0.8869	0.2140	0.4792	0.5521	
	Pre	1.0000	1.0000	4.5095	4.5095	1
27	Post	2.0096	2.0096	9.6100	9.6100	10.6495
	p-value	–	–	–	–	
	Pre	1.4894	1.2267	2.5194	1.6389	54
84	Post	1.5813	1.2964	2.9405	1.8007	8.3782
	p-value	0.5351	0.8803	0.5399	0.2864	
	Pre	1.5724	1.7037	4.8097	3.7408	14
87	Post	1.6773	1.0276	2.5548	1.3113	6.3841
	p-value	0.8095	0.0769	0.2447	0.0695	
	Pre	1.3108	1.3108	7.7353	7.7353	1
88	Post	1.0000	1.0000	-0.1145	-0.1145	3.8185
	p-value	–	–	–	–	
	Pre	1.5878	1.3431	2.8156	2.1096	52
85	Post	1.4498	0.2913	3.0698	1.8763	3.4318
	p-value	0.3036	0.4685	0.6882	0.5739	
Product		U.K. IMPORTS FROM GERMANY				No. of Cat.
Section	Sample	Con. Mean	Con. Med.	LR Mean	LR Med.	Share (%)
	Pre	1.2610	1.1344	1.8450	1.5529	669
All	Post	1.2184	1.0765	1.7840	1.4550	57.8522
	p-value	0.0180	0.0022	0.4318	0.2252	
	Pre	1.3584	1.1695	1.8319	1.2515	20
87	Post	1.2329	1.0154	1.6084	1.3505	25.8415
	p-value	0.3378	0.1404	0.6703	0.7764	
	Pre	1.1999	1.0926	1.6305	1.2952	114
84	Post	1.1310	1.0350	1.4352	1.1918	10.7288
	p-value	0.0240	0.0406	0.2235	0.0706	
	Pre	1.2106	1.1067	1.8025	1.5711	86
39	Post	1.1915	1.0542	1.8645	1.4687	4.2172
	p-value	0.6532	0.6220	0.7799	0.9329	
	Pre	1.2050	1.0954	1.5542	1.3380	84
85	Post	1.1467	1.0382	1.7150	1.4489	3.7706
	p-value	0.1472	0.0379	0.3935	0.7984	
	Pre	1.1194	1.0557	1.5375	1.2218	48
90	Post	1.1772	1.0695	1.5086	1.1696	2.2600
	p-value	0.2294	0.4266	0.9032	0.9387	

Notes: Con. Mean is the mean and Con. Med. is the median of the contemporaneous price elasticities in a HS2 product section. LR Mean and LR Med. are the corresponding statistics for the long-run (total) effects of a relative price change on the import share. p-value refers to the test of the hypothesis that the corresponding Pre- and Post-estimates are equal. The hypothesis is rejected for p-values lower than the desired significance level. No. of Cat. denotes the number of used HS6 categories in a HS2 section and Share is the total share (in percent) of these used HS6 categories in total German imports from the UK and UK imports from Germany, respectively.

if averaged over all product groups. None of the estimations reveals a significant increase in price elasticities. This is of course what could be expected.

Price Elasticities between Germany and France. Now, the estimation results for price elasticities between Germany and France are presented. According to the estimation results of the pure VAR-Model (table 4), total price elasticities in Franco-German trade relations are, similarly like for German exports to and imports from the United Kingdom, of a similar magnitude around unity (see also tables 14, 15, 18 and 19 in the appendix). For German imports from France, price elasticities are, according to the SVAR estimations, above average in HS product groups 4 (Dairy produce, birds' eggs, natural honey, edible products of animal origin) and 22 (Beverages, spirits and vinegar).[11] As before, price elasticities are higher if trade flows are adjusted by unobservable changes in product quality (see table 5). This is especially the case for German imports from France. We now turn to the comparison of the two sub-samples and the question whether there is evidence that the introduction of the Euro has been followed by an increase in price elasticities of demand. Averaging over all 510 HS6 product categories for German imports from France, the point estimates of the contemporaneous and long-run elasticities do hardly change, and the p-values of tests for equality are above 30%. This holds for the pure SVAR as well as for the Kalman-Filter estimations. However, for French imports from Germany, the pure SVAR estimation results for the contemporaneous price elasticities before and after Euro introduction differ significantly, if averaged over all 715 product categories considered. However, this result stems mainly from one important product group, namely section 85. Moreover, despite the slightly significant p-values, the introduction of the Euro did not substantially change the estimated coefficients, and there is no evidence for a systematic increase in price elasticities caused by the introduction of the Euro. If the Kalman-Filter approach correcting for unobserved quality changes is applied, the significant p-values disappear. Hence, it cannot be rejected that the average price elasticities have stayed nearly constant after the introduction of the Euro. Using the Kalman-Filter method, only in product group 72 (iron and steel), long-term price elasticity of French import demand from Germany increased significantly. If the pure SVAR model is used, significant p-values occur in only three product sections.

[11] These HS categories are only considered in German imports from France. In the other trade relations, their share is below 1%.

Table 4: Price Elasticities between Germany and France before and after the Introduction of the Euro (SVAR)

Product Section	Sample	GERMAN IMPORTS FROM FRANCE Con. Mean	Con. Med.	LR Mean	LR Med.	No. of Cat. Share (%)
	Pre	1.0059	0.9896	1.0637	0.9797	510
All	Post	0.9722	0.9543	1.0457	1.0398	52.0949
	p-value	0.3772	0.5999	0.9060	0.6232	
	Pre	0.5995	0.3340	0.2324	0.1871	21
87	Post	0.9856	0.6043	0.3379	0.0414	11.6722
	p-value	0.0681	0.3651	0.9216	0.7059	
	Pre	0.9524	0.7694	1.3068	1.3534	3
88	Post	0.7638	0.3360	0.8951	0.5545	11.5284
	p-value	0.7389	0.6625	0.8014	0.6625	
	Pre	0.8768	0.8522	0.2497	0.5498	78
84	Post	0.8574	0.8891	0.8721	0.7833	6.594
	p-value	0.8045	0.8137	0.0548	0.2429	
	Pre	1.1101	1.1334	1.0591	0.7855	69
39	Post	1.1922	1.1406	1.4814	1.4335	3.4416
	p-value	0.4240	0.5092	0.3401	0.0343	
	Pre	0.9305	0.9490	0.6478	0.5560	65
85	Post	0.9172	0.8983	0.8428	0.6931	2.9454
	p-value	0.8879	0.7979	0.6378	0.5327	
Product Section	Sample	FRENCH IMPORTS FROM GERMANY Con. Mean	Con. Med.	LR Mean	LR Med.	No. of Cat. Share (%)
	Pre	0.9097	0.9320	1.0078	0.9802	715
All	Post	0.9488	0.9573	1.2078	1.0239	36.8444
	p-value	0.0251	0.0944	0.0418	0.3646	
	Pre	0.9557	0.9787	1.1037	1.0813	91
84	Post	0.9450	0.9966	1.1537	1.0621	7.6786
	p-value	0.7418	0.9126	0.7742	0.9731	
	Pre	0.9560	0.9900	1.4494	1.2813	85
39	Post	0.9885	0.9651	1.3086	1.1282	4.5811
	p-value	0.5130	0.7107	0.6305	0.4489	
	Pre	0.6560	0.6560	21.025	21.025	2
88	Post	0.5195	0.5195	0.3253	0.3253	3.7540
	p-value	0.7116	0.6985	0.2453	0.2453	
	Pre	0.9085	0.9302	0.3560	0.3752	14
87	Post	0.9237	0.9296	1.1565	0.5535	3.6469
	p-value	0.8387	0.8362	0.3366	0.9817	
	Pre	0.8891	0.9346	1.1303	1.0806	61
85	Post	0.9954	0.9784	0.8748	0.8594	2.7646
	p-value	0.0039	0.0436	0.2589	0.3675	

Notes: Con. Mean is the mean and Con. Med. is the median of the contemporaneous price elasticities in a HS2 product section. LR Mean and LR Med. are the corresponding statistics for the long-run (total) effects of a relative price change on the import share. p-value refers to the test of the hypothesis that the corresponding Pre- and Post-estimates are equal. The hypothesis is rejected for p-values lower than the desired significance level. No. of Cat. denotes the number of used HS6 categories in a HS2 section and Share is the total share (in percent) of these used HS6 categories in total German imports from France and French imports from Germany, respectively.

Table 5: Price Elasticities between Germany and France before and after the Introduction of the Euro (Kalman-Filter Approach)

Product Section	Sample	GERMAN IMPORTS FROM FRANCE Con. Mean	Con. Med.	LR Mean	LR Med.	No. of Cat. Share (%)
	Pre	1.9286	1.8713	3.1787	2.5921	510
All	Post	1.8563	1.8469	3.1724	2.8763	52.0949
	p-value	0.3056	0.5250	0.9782	0.6759	
	Pre	1.1956	0.6681	2.0227	1.2258	21
87	Post	1.7262	1.2091	2.7277	1.0910	11.6722
	p-value	0.1393	0.3786	0.7020	0.9398	
	Pre	1.6504	1.5389	2.9492	2.0856	3
88	Post	1.2293	0.6719	1.2787	1.1120	11.5284
	p-value	0.5834	0.6625	0.4074	0.3827	
	Pre	1.7100	1.6267	2.2049	1.9326	78
84	Post	1.5858	1.7339	2.8688	2.4661	6.594
	p-value	0.3734	0.7727	0.1654	0.1867	
	Pre	2.1724	2.1675	3.1809	2.6366	69
39	Post	2.3201	2.2478	4.3345	3.5205	3.4416
	p-value	0.4535	0.6609	0.0912	0.1549	
	Pre	1.8158	1.8446	2.6716	2.7227	65
85	Post	1.7846	1.6960	2.6439	2.5212	2.9454
	p-value	0.8625	0.7943	0.9597	0.8340	
Product Section	**Sample**	**FRENCH IMPORTS FROM GERMANY Con. Mean**	**Con. Med.**	**LR Mean**	**LR Med.**	**No. of Cat. Share (%)**
	Pre	1.2667	1.0878	2.0262	1.5254	715
All	Post	1.2547	1.0818	2.2070	1.5679	36.8444
	p-value	0.5520	0.7029	0.1311	0.8139	
	Pre	1.1878	1.0568	1.5580	1.3263	91
84	Post	1.1406	1.0263	1.5567	1.3074	7.6786
	p-value	0.1686	0.2651	0.9946	0.6164	
	Pre	1.2106	1.0359	2.2548	1.8896	85
39	Post	1.2255	1.0000	2.0738	1.5811	4.5811
	p-value	0.7730	0.2013	0.6006	0.5048	
	Pre	1.0175	1.0175	18.488	18.488	2
88	Post	1.0000	1.0000	1.3492	1.3492	3.7540
	p-value	0.6532	0.6220	0.7492	0.6985	
	Pre	1.2045	1.0066	1.1252	0.7591	14
87	Post	1.0568	1.0002	2.8487	1.8312	3.6469
	p-value	0.1849	0.6961	0.1638	0.3462	
	Pre	1.1293	1.0732	2.0506	1.7638	61
85	Post	1.1533	1.0818	1.8318	1.2957	2.7646
	p-value	0.4657	0.6896	0.5428	0.0529	

Notes: Con. Mean is the mean and Con. Med. is the median of the contemporaneous price elasticities in a HS2 product section. LR Mean and LR Med. are the corresponding statistics for the long-run (total) effects of a relative price change on the import share. p-value refers to the test of the hypothesis that the corresponding Pre- and Post-estimates are equal. The hypothesis is rejected for p-values lower than the desired significance level. No. of Cat. denotes the number of used HS6 categories in a HS2 section and Share is the total share (in percent) of these used HS6 categories in total German imports from France and French imports from Germany, respectively.

4.3. Robustness

The overall result of no change in the price elasticities even between EMU members Germany and France is very robust. It is obtained in case of the pure SVAR models, which deliver estimates for the lower bound of true price elasticities, and also in case of the quality adjusted model (Kalman filter), which delivers the corresponding upper bound. Changing the lag lengths of the models or the cutting point for the two sub-samples does also not affect the overall result. We have also tried many other specifications for sub-selections of the product categories. For example, we have estimated single equation autoregressive distributed lag models, error-correction models and models in first differences. Furthermore, we calculated recursive estimates of the price elasticities in addition to the two distinct samples. The main finding is always the same. There is no statistical support for the hypothesis that price elasticities of demand between Germany and France have significantly increased after the introduction of the Euro.

5. Conclusions

The introduction of the Euro has been accompanied by the hope that intra-EMU trade would increase and that prices of tradable goods would converge, so that the efficiency of international trade would be increased. Earlier studies on this issue have concentrated on trade volumes (gravity models) and on price and inflation convergence. Overall, the corresponding effects have been smaller than expected by some analysts in advance. We augment this line of research by analyzing the change in international price elasticities using external trade data for German exports to and imports from France and the United Kingdom, respectively. The larger these elasticities, the stronger is the shift in demand towards the relatively cheaper products in response to price differentials. In other words, the larger the price elasticity, the larger is the degree of competition and economic integration. Disaggregating international trade flows in each of the bilateral trade relations considered at a maximum of 715 HS6 product categories, which account on average for nearly 50% of German imports from and exports to France and the United Kingdom, we are not able to find statistical evidence in favor of the hypothesis that price elasticities between EMU member countries have substantially increased after the introduction of the

common currency. This finding is compatible with the statement of Lane (2006:p. 58) that the evidence that the single European currency promoted price convergence "by improving trade linkages and increasing the transparency of price differentials that could be arbitraged away" is modest.

References

Allington, N., P. Kattuman, and F. Waldmann (2005): One market, one money, one price? In: *International Journal of Central Banking* 1.3, pp. 73–116.

Anderson, J. and E. van Wincoop (2004): Trade costs. In: *Journal of Economic Literature* 42.3, pp. 691–751.

Baldwin, R. (2006): The Euro's trade effects. Working Paper 594. European Central Bank.

Barr, D., F. Breedon, and D. Miles (2003): Life on the outside: Economic conditions and prospects outside Euroland. In: *Economic Policy* 37, pp. 573–613.

Baye, M., R. Gatti, P. Kattuman, and J. Morgan (2006): Did the Euro foster online price competition? Evidence from an international price comparison site. In: *Economic Inquiry* 44.2, pp. 265–279.

Bun, M. and F. Klaasen (2007): The Euro effect on trade is not as large as commonly thought. In: *Oxford Bulletin of Economics and Statistics* 69.4, pp. 473–496.

Canova, F. (2007): Methods for applied macroeconomic research. Princeton University Press.

Chari, V., P. Kehoe, and E. McGrattan (2002): Can sticky price models generate volatile and persistent real exchange rates? In: *Review of Economic Studies* 29.3, pp. 533–563.

Corsetti, G., L. Dedola, and S. Leduc (2008): International risk sharing and the transmission of productivity shocks. In: *Review of Economic Studies* 75, pp. 443–473.

Corsetti, G. and P. Pesenti (2005): International dimensions of optimal monetary policy. In: *Journal of Monetary Economics* 52.2, pp. 281–305.

DeGrauwe, P. (2003): The economics of monetary union. 5th ed. Oxford University Press.

Deutsche Bundesbank (2009): Price convergence in the Euro area. In: *Monthly Bulletin March*, pp. 33–47.

Engel, C. and J. Rogers (2004): European product market integration after the euro. In: *Economic Policy* 19.39, pp. 347–384.

Erkel-Rousse, H. and D. Mizra (2002): Import price elasticities: reconsidering the evidence. In: *Canadian Journal of Economics* 55.2, pp. 282–306.

European Central Bank (2008): Monthly Bulletin 10th Anniversary of the ECB.

Evenett, S. and W. Keller (2002): On theories explaining the success of the gravity equation. In: *Journal of Political Economy* 110.2, pp. 281–316.

Flam, H. and H. Nordstrom (2003): Trade volume effects of the Euro: Aggregate and sector estimates. Stockholm: Institute for International Economic Studies.

Frankel, J. (1997): Regional trading blocs in the world economic system. Washington: Institute for International Economics.

Frankel, J. (2008): The estimated effects of the Euro on trade: Why are they below historical effects of monetary unions among smaller countries? Working Paper 14542. National Bureau of Economic Research.

Frankel, J. and A. Rose (1998): The endogeneity of optimum currency area criteria. In: *The Economic Journal* 108, pp. 1009–1025.

Gil-Pareja, S. and S. Sosvilla-Rivero (2008): Price convergence in the European car market. In: *Applied Economics* 40.2, pp. 241–250.

Goldberg, P. and F. Verboven (2005): Market integration and convergence to the law of one price: Evidence from the European car market. In: *Journal of International Economic* 65, pp. 49–73.

Hoffmann, M. and O. Holtemöller (2007): Transmission of nominal exchange rate changes to export prices and trade flows and implications for exchange rate policy. In: *Scandinavian Journal of Economics* 112.1, pp. 127–161.

Lane, P. (2006): The real effects of the euro. In: *Journal of Economic Perspectives* 20.4, pp. 47–66.

Linnemann, H. (1966): An econometric study of international trade flows. Amsterdam: North Holland.

Lütkepohl, H. (2005): New introduction to multiple times series analysis. Berlin: Springer.

Lutz, M. (2004): "The past, present and future of the European Union." In: ed. by A. Deardorff. Basingstoke: Palgrave McMillan. Chap. Price convergence under EMU? First estimates, pp. 48–73.

Micco, A., E. Stein, and G. Ordoñez (2003): "EMU: Assessing the impact of the Euro." In: ed. by G. B. R. Baldwin and P. Seabright. Oxford: Blackwell. Chap. The currency union effect on trade: early evidence from EMU, pp. 23–64.

Mundell, R. (1961): A theory of optimum currency areas. In: *American Economic Review* 51, pp. 657–665.

Rogers, J. (2007): Monetary union, price level convergence, and inflation: How close is Europe to the USA? In: *Journal of Monetary Economics* 54, pp. 785–796.

Rose, A. (2000): One money, one market: the effect of common currencies on trade. In: *Economic Policy* 15, pp. 9–45.

Warin, T., P. Wunnava, and H. Janicki (2009): Testing Mundells intuition of endogenous oca theory. In: *Review of International Economics* 17.1, pp. 74–86.

A. APPENDIX

Table 6: Price Elasticities before and after the Introduction of the Euro, German imports from the United Kingdom (SVAR)

Product Section	Sample	Con. Mean	Con. Med.	LR Mean	LR Med.	No. of Cat. Share
	Pre	0.9576	0.9098	1.1280	1.0275	305
All	Post	0.9562	0.8949	0.9707	1.0876	46.5269
	p-value	0.9725	0.7599	0.4209	0.3902	
	Pre	-0.6603	-0.6603	2.3719	2.3719	1
27	Post	2.0093	2.0093	9.6093	9.6093	10.6495
	p-value	–	–	–	–	
	Pre	0.9362	0.9065	1.0805	1.9423	14
29	Post	0.8957	0.8964	0.1355	0.2604	1.3953
	p-value	0.8910	0.6295	0.4051	0.3462	
	Pre	0.5632	0.5716	-1.5820	-2.7302	5
30	Post	0.5314	0.5289	0.5317	-0.3046	2.8368
	p-value	0.8447	1.0000	0.2039	0.8345	
	Pre	0.6039	0.6023	1.9290	1.7565	19
33	Post	0.6310	0.6743	2.1014	1.3612	1.3043
	p-value	0.6165	0.5398	0.6519	0.6404	
	Pre	1.1169	1.1873	1.6117	0.9460	10
38	Post	0.9582	0.8131	-0.4594	0.5618	1.2658
	p-value	0.5390	0.2123	0.1115	0.4274	
	Pre	1.0303	0.9945	0.9779	0.8659	56
39	Post	1.0775	1.0459	1.9105	1.3133	2.4449
	p-value	0.5783	0.6147	0.0318	0.1433	
	Pre	0.8225	0.8710	-0.0575	-0.1413	11
40	Post	0.7720	0.5883	-1.3513	-0.0124	0.7307
	p-value	0.8198	0.5114	0.3068	0.5114	
	Pre	1.2831	1.1704	1.5052	1.3495	19
48	Post	1.2305	1.5757	1.7298	2.0789	0.3888
	p-value	0.7880	0.5207	0.8261	0.8839	
	Pre	1.3900	1.6341	2.0328	1.7333	13
72	Post	1.3812	1.2364	1.5388	1.3964	0.4708
	p-value	0.9849	0.8777	0.7351	0.8375	
	Pre	1.2279	0.9738	1.6187	0.5864	10
76	Post	1.2640	1.3481	-0.3655	-0.7389	1.7027
	p-value	0.9172	0.6232	0.0319	0.3075	
	Pre	0.8510	0.8969	0.6566	0.8400	54
84	Post	0.9808	0.9017	0.7047	1.1927	8.3782
	p-value	0.1385	0.6471	0.9003	0.3151	
	Pre	0.9510	0.9022	1.1466	0.9859	52
85	Post	0.9237	0.9304	0.7994	0.8263	3.4318
	p-value	0.7306	0.7134	0.3770	0.2733	

Table 7: Price Elasticities before and after the Introduction of the Euro, German imports from the United Kingdom (SVAR) [continued]

Product Section	Sample	Con. Mean	Con. Med.	LR Mean	LR Med.	No. of Cat. Share
	Pre	0.9731	0.9969	1.9197	1.7310	14
87	Post	0.8184	0.8187	-0.0604	-1.1791	6.3841
	p-value	0.2935	0.3462	0.1576	0.0366	
	Pre	0.8237	0.8237	2.2948	2.2948	1
88	Post	0.4409	0.4409	-0.3972	-0.3972	3.8185
	p-value	–	–	–	–	
	Pre	0.9352	0.8870	1.3410	1.1037	26
90	Post	0.8683	0.9167	0.9650	1.1405	1.3249
	p-value	0.4466	0.5041	0.4119	0.8191	

Notes: Con. Mean is the mean and Con. Med. is the median of the contemporaneous price elasticities in a HS2 product section. LR Mean and LR Med. are the corresponding statistics for the long-run (total) effects of a relative price change on the import share. p-value refers to the test of the hypothesis that the corresponding Pre- and Post-estimates are equal. The hypothesis is rejected for p-values lower than the desired significance level. No. of Cat. denotes the number of used HS6 categories in a HS2 section and Share is the total share (in percent) of these used HS6 categories in total German imports from the UK and UK imports from Germany, respectively.

Table 8: Price Elasticities before and after the Introduction of the Euro, German imports from the United Kingdom (Kalman-Filter Approach)

Product Section	Sample	Con. Mean	Con. Med.	LR Mean	LR Med.	No. of Cat. Share
	Pre	1.6900	1.3999	3.0675	2.2016	305
All	Post	1.7000	1.3366	3.2834	2.1263	46.5269
	p-value	0.8869	0.2140	0.4792	0.3902	
	Pre	1.0000	1.0000	4.5095	4.5095	1
27	Post	2.0096	2.0096	9.6100	9.6100	10.6495
	p-value	–	–	–	–	
	Pre	2.1717	2.0467	4.5870	3.8902	14
29	Post	1.9434	1.5161	3.1054	1.8522	1.3953
	p-value	0.5683	0.4082	0.3744	0.4484	
	Pre	1.4653	1.5857	2.0424	1.9778	5
30	Post	1.0515	1.0000	2.8169	0.4324	2.8368
	p-value	0.0461	0.0367	0.7222	1.0000	
	Pre	1.1494	1.0000	3.2887	3.0082	19
33	Post	1.1485	1.0000	3.7098	2.3024	1.3043
	p-value	0.9931	0.5791	0.5687	0.3972	
	Pre	2.1629	1.5869	2.3630	2.0733	10
38	Post	1.7389	1.4763	1.9241	1.9331	1.2658
	p-value	0.3284	0.6232	0.6889	0.7913	
	Pre	1.8099	1.5682	2.6396	2.1328	56
39	Post	1.7646	1.6794	3.6227	2.8045	2.4449
	p-value	0.7462	0.6752	0.1023	0.1498	
	Pre	1.8730	1.4469	4.4760	1.8422	11
40	Post	1.3061	1.2540	4.2441	1.4701	0.7307
	p-value	0.0932	0.4307	0.9478	0.5994	
	Pre	1.9933	1.6452	3.7143	2.7874	19
48	Post	2.1093	2.0780	3.0384	2.5466	0.3888
	p-value	0.6905	0.7703	0.4724	0.5207	
	Pre	2.2519	2.1057	3.3387	3.2801	13
72	Post	2.4292	2.5895	4.0304	1.4277	0.4708
	p-value	0.7422	0.7583	0.6303	0.7196	
	Pre	1.8094	1.5834	5.3203	1.8695	10
76	Post	2.9466	2.3208	6.4009	1.0406	1.7027
	p-value	0.1492	0.5967	0.8022	0.9097	
	Pre	1.4894	1.2267	2.5194	1.6389	54
84	Post	1.5813	1.2964	2.9405	1.8007	8.3782
	p-value	0.5351	0.8803	0.5399	0.2864	
	Pre	1.5878	1.3431	2.8156	2.1096	52
85	Post	1.4498	1.2913	3.0698	1.8763	3.4318
	p-value	0.3063	0.4685	0.6882	0.5739	

Table 9: Price Elasticities before and after the Introduction of the Euro, German imports from the United Kingdom (Kalman-Filter Approach) [continued]

Product Section	Sample	Con. Mean	Con. Med.	LR Mean	LR Med.	No. of Cat. Share
	Pre	1.5724	1.7037	4.8097	3.7408	14
87	Post	1.6773	1.0276	2.5548	1.3113	6.3841
	p-value	0.8095	0.0769	0.2447	0.0695	
	Pre	1.3108	1.3108	7.7353	7.7353	1
88	Post	1.0000	1.0000	-0.1145	-0.1145	3.8185
	p-value	–	–	–	–	
	Pre	1.4098	1.2191	2.2567	1.8100	26
90	Post	1.5608	1.3032	2.9639	2.0682	1.3249
	p-value	0.4411	0.8049	0.4073	0.3948	

Notes: Con. Mean is the mean and Con. Med. is the median of the contemporaneous price elasticities in a HS2 product section. LR Mean and LR Med. are the corresponding statistics for the long-run (total) effects of a relative price change on the import share. p-value refers to the test of the hypothesis that the corresponding Pre- and Post-estimates are equal. The hypothesis is rejected for p-values lower than the desired significance level. No. of Cat. denotes the number of used HS6 categories in a HS2 section and Share is the total share (in percent) of these used HS6 categories in total German imports from the UK and UK imports from Germany, respectively.

Table 10: Price Elasticities before and after the Introduction of the Euro, UK imports from Germany (SVAR)

Product Section	Sample	Con. Mean	Con. Med.	LR Mean	LR Med.	No. of Cat. Share
	Pre	0.9625	0.9780	1.0222	1.0178	669
All	Post	0.9589	0.9649	1.0269	0.9848	57.8522
	p-value	0.7844	0.5924	0.9444	0.5989	
	Pre	0.8623	1.1279	1.5073	1.6733	4
27	Post	1.3132	1.6500	1.3599	1.3083	0.0532
	p-value	0.3639	0.6650	0.8428	0.8852	
	Pre	0.9958	1.0579	1.1437	1.3704	73
29	Post	1.0118	1.0237	1.6269	1.4863	1.1041
	p-value	0.8151	0.5757	0.0528	0.3070	
	Pre	0.7442	0.7409	0.9808	0.7071	14
30	Post	0.8512	0.8946	0.6663	0.6908	1.9754
	p-value	0.2122	0.1129	0.5649	0.8722	
	Pre	0.9426	0.9138	0.9411	0.7413	26
32	Post	0.9465	0.9471	1.1243	1.0322	0.9599
	p-value	0.9432	0.4586	0.4401	0.4925	
	Pre	0.8324	0.8574	0.7811	0.3852	12
38	Post	0.8981	0.9095	0.9986	1.1564	0.4844
	p-value	0.5802	0.9770	0.6767	0.2602	
	Pre	0.9548	0.9785	1.0377	0.9916	86
39	Post	0.9907	0.9914	1.1629	0.9881	4.2172
	p-value	0.3016	0.6209	0.5370	0.4394	
	Pre	0.9399	0.9685	1.2683	1.0892	24
40	Post	0.9721	0.8980	1.3894	1.3821	0.9305
	p-value	0.6408	0.9918	0.7462	0.5160	
	Pre	1.0219	1.0202	0.9126	1.0984	28
48	Post	0.9493	0.9539	1.3910	1.0248	1.1442
	p-value	0.1998	0.4862	0.2801	0.7493	
	Pre	1.0170	1.1187	1.4144	1.3702	29
72	Post	1.1120	1.2490	1.3334	1.3617	0.8064
	p-value	0.3782	0.5546	0.8515	0.8398	
	Pre	1.0054	0.9990	0.9929	1.1314	62
73	Post	0.9422	0.9400	0.8281	0.8949	1.3574
	p-value	0.1603	0.0547	0.4645	0.1551	
	Pre	1.0326	1.0894	1.2814	1.0726	18
76	Post	0.9966	0.9993	0.8688	0.9973	1.1357
	p-value	0.6319	0.3346	0.2891	0.4964	
	Pre	0.9293	0.9562	0.9035	1.0067	114
84	Post	0.9237	0.9485	0.7142	0.8782	10.7288
	p-value	0.8168	0.7245	0.1382	0.0568	

Table 11: Price Elasticities before and after the Introduction of the Euro, UK imports from Germany (SVAR) [continued]

Product Section	Sample	Con. Mean	Con. Med.	LR Mean	LR Med.	No. of Cat. Share
	Pre	0.9655	0.9683	1.0107	0.9353	84
85	Post	0.9357	0.9479	0.9416	0.9655	3.7706
	p-value	0.2755	0.1751	0.6880	0.8752	
	Pre	1.0644	1.0606	1.0837	0.8508	20
87	Post	1.0352	1.0268	1.0864	1.1445	25.8415
	p-value	0.6531	0.7150	0.9950	0.3793	
	Pre	0.9259	0.9229	0.9372	0.8564	48
90	Post	0.9034	0.9474	0.7401	0.8653	2.2600
	p-value	0.4910	0.7168	0.2577	0.4015	
	Pre	1.0016	1.0446	0.8105	1.1331	27
94	Post	0.9837	0.9853	0.8607	0.8778	1.0830
	p-value	0.7572	0.2129	0.8567	0.1560	

Notes: Con. Mean is the mean and Con. Med. is the median of the contemporaneous price elasticities in a HS2 product section. LR Mean and LR Med. are the corresponding statistics for the long-run (total) effects of a relative price change on the import share. p-value refers to the test of the hypothesis that the corresponding Pre- and Post-estimates are equal. The hypothesis is rejected for p-values lower than the desired significance level. No. of Cat. denotes the number of used HS6 categories in a HS2 section and Share is the total share (in percent) of these used HS6 categories in total German imports from the UK and UK imports from Germany, respectively.

Table 12: Price Elasticities before and after the Introduction of the Euro, UK imports from Germany (Kalman-Filter Approach)

Product Section	Sample	Con. Mean	Con. Med.	LR Mean	LR Med.	No. of Cat. Share
	Pre	1.2610	1.1344	1.8450	1.5529	669
All	Post	1.2184	1.0765	1.7840	1.4550	57.8522
	p-value	0.0180	0.0022	0.9444	0.5989	
	Pre	1.1285	2.1367	3.0656	2.5161	4
27	Post	1.8286	1.6538	2.0771	2.5784	0.0532
	p-value	0.2240	0.8852	0.3714	0.8852	
	Pre	1.4005	1.3083	2.2012	1.9156	73
29	Post	1.3848	1.1949	2.2171	2.0902	1.1041
	p-value	0.8281	0.3914	0.9490	0.7931	
	Pre	1.2074	1.1003	2.5442	1.9349	14
30	Post	1.1925	1.1187	2.0607	1.9416	1.9754
	p-value	0.8558	0.4907	0.4281	0.6961	
	Pre	1.1678	1.0309	1.6344	1.3939	26
32	Post	1.1537	1.0247	1.7977	1.5265	0.9599
	p-value	0.8302	0.7907	0.5684	0.7627	
	Pre	1.1967	1.0849	1.3661	1.2108	12
38	Post	1.2058	1.0000	1.9505	1.5625	0.4844
	p-value	0.9411	0.6236	0.2889	0.2855	
	Pre	1.2106	1.1067	1.8025	1.5711	86
39	Post	1.1915	1.0542	1.8645	1.4687	4.2172
	p-value	0.6532	0.6220	0.7799	0.9329	
	Pre	1.3169	1.2048	2.1766	1.5778	24
40	Post	1.2516	1.0000	2.3398	1.9927	0.9305
	p-value	0.5575	0.2160	0.7374	0.5294	
	Pre	1.2462	1.1126	1.7600	1.6353	28
48	Post	1.2692	1.1229	2.4564	1.6790	1.1442
	p-value	0.8164	0.9412	0.1886	0.6288	
	Pre	1.5876	1.5017	2.7470	2.5963	29
72	Post	1.4171	1.4065	1.9652	1.8899	0.8064
	p-value	0.1725	0.4938	0.0960	0.1811	
	Pre	1.3067	1.1552	1.8809	1.6413	62
73	Post	1.1681	1.0906	1.5612	1.3517	1.3574
	p-value	0.1603	0.1287	0.1849	0.2662	
	Pre	1.2943	1.1730	1.7456	1.5025	18
76	Post	1.2306	1.1231	1.5146	1.3193	1.1357
	p-value	0.5859	0.5583	0.5974	0.7397	
	Pre	1.1999	1.0926	1.6305	1.2952	114
84	Post	1.1310	1.0350	1.4352	1.1918	10.7288
	p-value	0.0240	0.0406	0.2235	0.0706	

Table 13: Price Elasticities before and after the Introduction of the Euro, UK imports from Germany (Kalman-Filter Approach) [continued]

Product Section	Sample	Con. Mean	Con. Med.	LR Mean	LR Med.	No. of Cat. Share
	Pre	1.2050	1.0954	1.5542	1.3380	84
85	Post	1.1467	1.0382	1.7150	1.4489	3.7706
	p-value	0.1472	0.0379	0.3935	0.7984	
	Pre	1.3584	1.1695	1.8319	1.2515	20
87	Post	1.2329	1.0154	1.6084	1.3505	25.8415
	p-value	0.3378	0.1404	0.6703	0.7764	
	Pre	1.1194	1.0557	1.5375	1.2218	48
90	Post	1.1772	1.0695	1.5086	1.1696	2.2600
	p-value	0.2294	0.4266	0.9032	0.9387	
	Pre	1.3568	1.2206	2.0345	1.5800	27
94	Post	1.3285	1.1700	1.8301	1.4997	1.0830
	p-value	0.7730	0.1323	0.6505	0.6404	

Notes: Con. Mean is the mean and Con. Med. is the median of the contemporaneous price elasticities in a HS2 product section. LR Mean and LR Med. are the corresponding statistics for the long-run (total) effects of a relative price change on the import share. p-value refers to the test of the hypothesis that the corresponding Pre- and Post-estimates are equal. The hypothesis is rejected for p-values lower than the desired significance level. No. of Cat. denotes the number of used HS6 categories in a HS2 section and Share is the total share (in percent) of these used HS6 categories in total German imports from the UK and UK imports from Germany, respectively.

Table 14: Price Elasticities before and after the Introduction of the Euro, German imports from France (SVAR)

Product Section	Sample	Con. Mean	Con. Med.	LR Mean	LR Med.	No. of Cat. Share
	Pre	1.0059	0.9896	1.0637	0.9797	510
All	Post	0.9722	0.9543	1.0457	1.0398	52.0949
	p-value	0.3772	0.5999	0.9060	0.6232	
	Pre	1.2142	1.3891	3.0754	2.1006	13
4	Post	1.3946	1.5212	1.7706	1.8505	1.3082
	p-value	0.6378	0.6444	0.2609	0.3299	
	Pre	1.3423	1.4491	1.7394	1.0340	13
22	Post	0.9916	1.0989	1.6327	1.6581	1.8429
	p-value	0.1699	0.1510	0.9065	0.7196	
	Pre	2.2502	2.2502	3.2980	3.2980	1
27	Post	2.3806	2.3806	6.2992	6.2992	0.0159
	p-value	–	–	–	–	
	Pre	0.9918	0.9272	1.3149	1.0962	34
29	Post	0.9278	0.9389	0.8501	1.3010	0.8074
	p-value	0.6992	0.6722	0.4627	0.9853	
	Pre	0.5852	0.6389	-0.1142	0.1764	5
30	Post	0.6254	0.7808	-0.0242	-0.4158	1.7376
	p-value	0.7753	0.4034	0.9075	0.6761	
	Pre	1.0425	1.2637	1.4376	1.3621	17
33	Post	1.1185	1.2714	1.3067	1.4186	1.7951
	p-value	0.6226	0.6054	0.8364	0.7305	
	Pre	1.0195	1.0274	0.2975	0.8263	16
38	Post	0.9136	0.9952	1.0945	0.7980	0.5284
	p-value	0.6595	0.8358	0.3186	0.5847	
	Pre	1.1101	1.1334	1.0591	0.7855	69
39	Post	1.1922	1.1406	1.4814	1.4335	3.4416
	p-value	0.4240	0.5092	0.3401	0.0343	
	Pre	1.2470	1.1357	1.9954	2.2932	22
40	Post	1.0248	0.8886	1.7611	1.5961	1.7016
	p-value	0.2804	0.2855	0.7554	0.5186	
	Pre	1.1001	1.0447	2.0293	1.8995	28
48	Post	0.8664	0.9702	0.8647	1.3769	0.8775
	p-value	0.1827	0.8249	0.1549	0.4659	
	Pre	0.9599	0.9125	0.8840	0.7254	36
72	Post	0.6925	0.5070	-0.0683	0.2168	1.7494
	p-value	0.2562	0.5543	0.2456	0.2304	
	Pre	1.1067	0.9971	1.4794	1.4116	50
73	Post	1.0789	1.0497	1.4761	1.4655	1.2275
	p-value	0.7746	0.9588	0.9920	0.9588	

Table 15: Price Elasticities before and after the Introduction of the Euro, German imports from France (SVAR) [continued]

Product Section	Sample	Con. Mean	Con. Med.	LR Mean	LR Med.	No. of Cat. Share
	Pre	1.0723	1.3254	1.4280	1.3543	14
76	Post	1.0227	1.0168	0.7975	1.0924	0.9602
	p-value	0.8440	0.5053	0.4011	0.4484	
	Pre	0.8768	0.8522	0.2497	0.5498	78
84	Post	0.8574	0.8891	0.8721	0.7833	6.594
	p-value	0.8045	0.8137	0.0548	0.2429	
	Pre	0.9305	0.9490	0.6478	0.5560	65
85	Post	0.9172	0.8983	0.8428	0.6931	2.9454
	p-value	0.8879	0.7979	0.6378	0.5327	
	Pre	0.5995	0.3340	0.2324	0.1871	21
87	Post	0.9856	0.6043	0.3379	0.0414	11.6722
	p-value	0.0681	0.3651	0.9216	0.7059	
	Pre	0.9524	0.7694	1.3068	1.3534	3
88	Post	0.7638	0.3360	0.8951	0.5545	11.5284
	p-value	0.7389	0.6625	0.8014	0.6625	
	Pre	0.8716	0.8638	1.2829	0.9440	25
90	Post	0.8817	0.8688	1.1355	0.8986	1.3616
	p-value	0.8760	0.9381	0.7396	0.7124	

Notes: Con. Mean is the mean and Con. Med. is the median of the contemporaneous price elasticities in a HS2 product section. LR Mean and LR Med. are the corresponding statistics for the long-run (total) effects of a relative price change on the import share. p-value refers to the test of the hypothesis that the corresponding Pre- and Post-estimates are equal. The hypothesis is rejected for p-values lower than the desired significance level. No. of Cat. denotes the number of used HS6 categories in a HS2 section and Share is the total share (in percent) of these used HS6 categories in total German imports from the UK and UK imports from Germany, respectively.

Table 16: Price Elasticities before and after the Introduction of the Euro, German imports from France (Kalman-Filter Approach)

Product Section	Sample	Con. Mean	Con. Med.	LR Mean	LR Med.	No. of Cat. Share
	Pre	1.9286	1.8713	3.1787	2.5921	510
All	Post	1.8563	1.8469	3.1724	2.8763	52.0949
	p-value	0.3056	0.5250	0.9782	0.6759	
	Pre	1.6949	2.3105	6.0946	3.6534	13
4	Post	2.4433	3.0424	4.4258	3.7750	1.3082
	p-value	0.2413	0.6816	0.3273	0.6444	
	Pre	2.6633	2.8771	4.1956	3.0115	13
22	Post	2.2104	2.2047	3.5586	3.4314	1.8429
	p-value	0.3327	0.1510	0.6517	0.7976	
	Pre	3.8908	3.8908	5.7196	5.7196	1
27	Post	3.9019	3.9019	11.3978	11.3978	0.0159
	p-value	–	–	–	–	
	Pre	1.8909	1.8545	3.5308	2.8987	34
29	Post	1.6875	1.8785	3.1712	2.8502	0.8074
	p-value	0.4828	0.6107	0.7401	0.9072	
	Pre	1.1504	1.2771	1.0703	0.9775	5
30	Post	1.2064	1.3425	2.4932	2.9145	1.7376
	p-value	0.8332	0.6761	0.2374	0.4034	
	Pre	1.8219	2.0655	3.3314	3.0101	17
33	Post	1.9401	2.1587	2.5271	2.7016	1.7951
	p-value	0.6559	0.4282	0.3531	0.2557	
	Pre	1.9285	1.6912	2.6298	2.3099	16
38	Post	1.7312	1.8316	2.8358	2.1087	0.5284
	p-value	0.6756	0.9850	0.8770	0.6647	
	Pre	2.1724	2.1675	3.1809	2.6366	69
39	Post	2.3201	2.2478	4.3345	3.5205	3.4416
	p-value	0.4535	0.6609	0.0912	0.1549	
	Pre	2.3498	2.1435	4.1363	4.2907	22
40	Post	1.9862	1.7822	4.1431	4.1089	1.7016
	p-value	0.3498	0.2549	0.9954	0.8603	
	Pre	2.1104	2.0403	3.6509	4.0127	28
48	Post	1.7382	1.9404	3.0073	3.8387	0.8775
	p-value	0.2057	0.8505	0.5308	0.5175	
	Pre	1.7938	1.8250	3.0656	2.4652	36
72	Post	1.3885	1.0155	1.1222	1.1452	1.7494
	p-value	0.3808	0.5468	0.0778	0.2392	
	Pre	2.1844	1.9691	3.9538	3.2635	50
73	Post	2.0842	2.0971	3.6116	3.0935	1.2275
	p-value	0.5881	0.7485	0.5530	0.5282	

Table 17: Price Elasticities before and after the Introduction of the Euro, German imports from France (Kalman-Filter Approach) [continued]

Product Section	Sample	Con. Mean	Con. Med.	LR Mean	LR Med.	No. of Cat. Share
	Pre	2.1067	2.4822	3.9090	3.3888	14
76	Post	2.0171	1.9441	2.6311	2.7024	0.9602
	p-value	0.8582	0.5972	0.3856	0.6961	
	Pre	1.7100	1.6267	2.2049	1.9326	78
84	Post	1.5858	1.7339	2.8688	2.4661	6.594
	p-value	0.3734	0.7727	0.1654	0.1867	
	Pre	1.8158	1.8446	2.6716	2.7227	65
85	Post	1.7846	1.6960	2.6439	2.5212	2.9454
	p-value	0.8625	0.7943	0.9597	0.8340	
	Pre	1.1956	0.6681	2.0227	1.2258	21
87	Post	1.7262	1.2091	2.7277	1.0910	11.6722
	p-value	0.1393	0.3786	0.7020	0.9398	
	Pre	1.6504	1.5389	2.9492	2.0856	3
88	Post	1.2293	0.6719	1.2787	1.1120	11.5284
	p-value	0.5834	0.6625	0.4074	0.3827	
	Pre	1.6996	1.6662	3.2178	2.3335	25
90	Post	1.6850	1.6877	3.5363	2.6152	1.3616
	p-value	0.9065	0.8920	0.6953	0.9536	

Notes: Con. Mean is the mean and Con. Med. is the median of the contemporaneous price elasticities in a HS2 product section. LR Mean and LR Med. are the corresponding statistics for the long-run (total) effects of a relative price change on the import share. p-value refers to the test of the hypothesis that the corresponding Pre- and Post-estimates are equal. The hypothesis is rejected for p-values lower than the desired significance level. No. of Cat. denotes the number of used HS6 categories in a HS2 section and Share is the total share (in percent) of these used HS6 categories in total German imports from France.

Table 18: Price Elasticities before and after the Introduction of the Euro, French imports from Germany (SVAR)

Product Section	Sample	Con. Mean	Con. Med.	LR Mean	LR Med.	No. of Cat. Share
	Pre	0.9097	0.9320	1.0078	0.9802	715
All	Post	0.9488	0.9573	1.2078	1.0239	36.8444
	p-value	0.0251	0.0944	0.0418	0.3646	
	Pre	0.9189	0.9561	1.1476	0.2483	5
27	Post	0.8330	0.8656	1.2244	1.0989	0.1148
	p-value	0.7549	1.0000	0.9631	1.0000	
	Pre	0.8922	0.9131	1.1278	0.9445	130
29	Post	0.9464	0.9868	1.6552	1.1907	1.5920
	p-value	0.3827	0.1878	0.0630	0.3604	
	Pre	0.6831	0.6725	0.0081	-0.0177	12
30	Post	0.7313	0.7374	0.3274	0.2249	1.6127
	p-value	0.4524	0.5067	0.5420	0.5067	
	Pre	0.7985	0.8677	0.4418	0.7092	27
32	Post	0.9141	0.8451	0.9361	0.6713	0.9845
	p-value	0.1602	0.9862	0.3542	0.4675	
	Pre	0.6800	0.5754	0.0029	-0.2917	16
38	Post	0.8233	0.7185	0.7295	0.7550	0.7076
	p-value	0.3230	0.2662	0.3436	0.2351	
	Pre	0.9560	0.9900	1.4494	1.2813	85
39	Post	0.9885	0.9651	1.3086	1.1282	4.5811
	p-value	0.5130	0.7107	0.6305	0.4489	
	Pre	0.8014	0.8943	0.8444	0.6645	23
40	Post	0.9153	0.9573	0.8241	0.4467	0.5645
	p-value	0.1856	0.3018	0.9663	0.7088	
	Pre	0.8941	0.9199	0.9368	1.1282	39
48	Post	0.9898	0.9642	1.1519	1.3195	1.6439
	p-value	0.2377	0.3792	0.6234	0.4476	
	Pre	0.9964	1.0082	1.3984	1.5330	63
72	Post	0.9961	1.0022	2.2104	1.9140	1.8375
	p-value	0.9958	0.5484	0.0716	0.3616	
	Pre	0.9598	0.9380	0.7637	0.9004	67
73	Post	0.9748	1.0117	1.0085	1.2607	1.8392
	p-value	0.7413	0.4003	0.3139	0.1969	
	Pre	0.9830	0.9911	0.7257	0.6668	19
76	Post	0.9606	0.9453	0.3312	0.7729	1.1604
	p-value	0.8168	0.5207	0.4582	0.8609	
	Pre	0.9557	0.9787	1.1037	1.0813	91
84	Post	0.9450	0.9966	1.1537	1.0621	7.6786
	p-value	0.7418	0.9126	0.7742	0.9731	

Table 19: Price Elasticities before and after the Introduction of the Euro, French imports from Germany (SVAR) [continued]

Product Section	Sample	Con. Mean	Con. Med.	LR Mean	LR Med.	No. of Cat. Share
	Pre	0.8891	0.9346	1.1303	1.0806	61
85	Post	0.9954	0.9784	0.8748	0.8594	2.7646
	p-value	0.0039	0.0436	0.2589	0.3675	
	Pre	0.9085	0.9302	0.3560	0.3752	14
87	Post	0.9237	0.9296	1.1565	0.5535	3.6469
	p-value	0.8387	0.8362	0.3366	0.9817	
	Pre	0.6560	0.6560	1.3317	21.0253	2
88	Post	0.5195	0.5195	0.3253	0.3253	3.7540
	p-value	0.7116	0.6985	0.1357	0.2453	
	Pre	0.8254	0.8410	0.6327	0.6827	29
90	Post	0.8125	0.8268	0.3461	0.3793	1.2295
	p-value	0.8301	0.7915	0.3824	0.1025	
	Pre	0.9394	0.9545	0.9546	0.6969	32
94	Post	0.9554	0.9994	1.0541	1.1795	1.1328
	p-value	0.8022	0.9946	0.8281	0.8879	

Notes: Con. Mean is the mean and Con. Med. is the median of the contemporaneous price elasticities in a HS2 product section. LR Mean and LR Med. are the corresponding statistics for the long-run (total) effects of a relative price change on the import share. p-value refers to the test of the hypothesis that the corresponding Pre- and Post-estimates are equal. The hypothesis is rejected for p-values lower than the desired significance level. No. of Cat. denotes the number of used HS6 categories in a HS2 section and Share is the total share (in percent) of these used HS6 categories in total German imports from the UK and UK imports from Germany, respectively.

Table 20: Price Elasticities before and after the Introduction of the Euro, French imports from Germany (Kalman-Filter Approach)

Product Section	Sample	Con. Mean	Con. Med.	LR Mean	LR Med.	No. of Cat. Share
	Pre	1.2667	1.0878	2.0262	1.5254	715
All	Post	1.2547	1.0818	2.2070	1.5679	36.8444
	p-value	0.5520	0.7029	0.1311	0.8139	
	Pre	1.2474	1.1558	1.6988	0.8527	5
27	Post	1.4512	1.3191	1.6895	1.7811	0.1148
	p-value	0.3480	0.4647	0.9949	1.0000	
	Pre	1.4772	1.2540	2.5436	1.9759	130
29	Post	1.4818	1.2946	2.6505	1.9357	1.5920
	p-value	0.9432	0.6483	0.7322	0.7735	
	Pre	1.1719	1.0115	1.7386	1.5780	12
30	Post	1.1879	1.0000	1.9849	1.5999	1.6127
	p-value	0.9269	0.3123	0.6995	0.8852	
	Pre	1.0934	1.0000	1.5800	1.2069	27
32	Post	1.0957	1.0000	2.1772	1.6658	0.9845
	p-value	0.9661	0.6220	0.3675	0.4363	
	Pre	1.1303	1.0000	1.5608	1.0849	16
38	Post	1.1031	1.0000	1.9695	1.5367	0.7076
	p-value	0.6941	0.8951	0.5846	0.2351	
	Pre	1.2106	1.0359	2.2548	1.8896	85
39	Post	1.2255	1.0000	2.0738	1.5811	4.5811
	p-value	0.7730	0.2013	0.6006	0.5048	
	Pre	1.1223	1.0001	1.9964	1.2092	23
40	Post	1.2459	1.1321	2.6490	1.5440	0.5645
	p-value	0.1132	0.1137	0.4200	0.8951	
	Pre	1.2289	1.0000	2.2078	1.8256	39
48	Post	1.2850	1.0888	2.8670	1.8964	1.6447
	p-value	0.5635	0.3501	0.3499	0.5488	
	Pre	1.5277	1.4235	2.9017	2.2768	63
72	Post	1.3973	1.2805	3.8550	3.6814	1.8392
	p-value	0.1498	0.3865	0.0570	0.0519	
	Pre	1.2515	1.1024	1.7378	1.2773	67
73	Post	1.2806	1.1759	1.8965	1.5128	1.8392
	p-value	0.6017	0.4283	0.6212	0.1597	
	Pre	1.3225	1.1671	1.6089	1.3735	19
76	Post	1.1489	1.0727	1.3376	0.9574	1.1604
	p-value	0.1451	0.8153	0.6464	0.6404	
	Pre	1.1878	1.0568	1.5580	1.3263	91
84	Post	1.1406	1.0263	1.5567	1.3074	7.6786
	p-value	0.1686	0.2651	0.9946	0.6164	

Table 21: Price Elasticities before and after the Introduction of the Euro, French imports from Germany (Kalman-Filter Approach) [continued]

Product Section	Sample	Con. Mean	Con. Med.	LR Mean	LR Med.	No. of Cat. Share
	Pre	1.1293	1.0732	2.0506	1.7638	61
85	Post	1.1533	1.0818	1.8318	1.2957	2.7646
	p-value	0.4657	0.6896	0.5428	0.0529	
	Pre	1.2045	1.0066	1.1252	0.7591	14
87	Post	1.0568	1.0002	2.8487	1.8311	3.6469
	p-value	0.1849	0.6961	0.1638	0.3462	
	Pre	1.0350	1.0175	1.8702	18.4881	2
88	Post	NA	1.0000	1.3492	1.3492	3.7540
	p-value		0.6985	0.7492	0.6985	
	Pre	1.0824	1.0000	1.1992	1.1456	29
90	Post	1.0525	1.0000	0.8873	0.6454	1.2295
	p-value	0.3491	0.8035	0.3260	0.0283	
	Pre	1.2448	1.2263	1.6479	1.4046	32
94	Post	1.1597	1.1484	1.6880	1.4413	1.1328
	p-value	0.1381	0.1379	0.9253	0.7831	

Notes: Con. Mean is the mean and Con. Med. is the median of the contemporaneous price elasticities in a HS2 product section. LR Mean and LR Med. are the corresponding statistics for the long-run (total) effects of a relative price change on the import share. p-value refers to the test of the hypothesis that the corresponding Pre- and Post-estimates are equal. The hypothesis is rejected for p-values lower than the desired significance level. No. of Cat. denotes the number of used HS6 categories in a HS2 section and Share is the total share (in percent) of these used HS6 categories in total German imports from France.