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## Price convergence in Euroland: Evidence from micro data without noise

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## SCHUMPETER DISCUSSION PAPERS

# Price Convergence in Euroland. Evidence from micro data without noise

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**Price Convergence in Euroland**

Evidence from micro data without noise

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**Abstract**

Analyzing prices of truly homogenous consumer goods sold in Euroland, we find significant price convergence after the Euro cash changeover in 2002. The deviation of national log prices from the mean log price of the same product is much narrower with the Euro than before. We observe Sigma and Beta convergence, i.e. prices do not differ systematically between countries. Our result is in contrast to some other findings stating divergence rather than convergence but which do not control perfectly for heterogeneity of products. Because of information and transportation costs arbitrage is unlikely to occur in consumer items and reasons for convergence must therefore be sought in competition and advantages on the supplier's side. If suppliers would minimize menu costs, price for the same item should be identical, which we do not observe.

**JEL classification:** D4, E31, F36**Keywords:** convergence, price setting, law of one price, Euro, homogenous products

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## Price Convergence in Euroland?

Evidence from micro data without noise

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### 1. Introduction

Aside from political considerations, the economic integration of Europe was claimed to create a market as big or even bigger than that of the US and therefore allows to raise productivity through economies of scale (eos). The common market and finally the introduction of a common currency initially among 11 countries<sup>1</sup> -the Euro- in 1998<sup>2</sup> should create a higher degree of market transparency, lower transaction costs<sup>3</sup>, more cross-border exchange, less price discrimination and more competition. Convergence of prices among the Euro-countries (Euroland in the following) was expected according to the law of one price (LOP or PPP)<sup>4</sup> because in a market without trade barriers and a common currency –i.e., no risks related to exchange rate variations- price differentials between countries for identical products should disappear or at least diminish.<sup>5</sup> Especially the Euro cash change over in January 2002 made prices more easily comparable, and may have pushed prices to converge among the EMU member states. However, transport and information costs as well as national taxes, labor and other costs may have prevented to achieve absolute PPP or the strong LOP (i.e. identical prices in Euroland) through arbitrage.<sup>6</sup> If the price-demand functions are (assumed to be) similar across the countries, pricing to the market may not be as relevant as the reduction in transaction costs achieved by setting a standard price.

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<sup>1</sup> Euroland (i.e. EU-countries using the Euro) first (January 1999) comprised: France, Spain, Italy, Austria, The Netherlands, Luxembourg, Belgium, Portugal, Germany, Ireland, and Finland. In 2001 Greece joined Euroland and later several other EU countries followed.

<sup>2</sup> Since January 1999 the Euro is the single currency in Euroland, but national coins and banknotes were used until the cash change over in January 2002.

<sup>3</sup> Some retail chains operating in several Euroland countries reduced transaction costs and started to use price-tags with unique prices for all countries, making the strong LOP obviously to hold despite different costs (labor costs, taxes). However, other price tags display country-specific Euro-prices, i.e. pricing to the market is applied although the consumer can easily identify price discrimination.

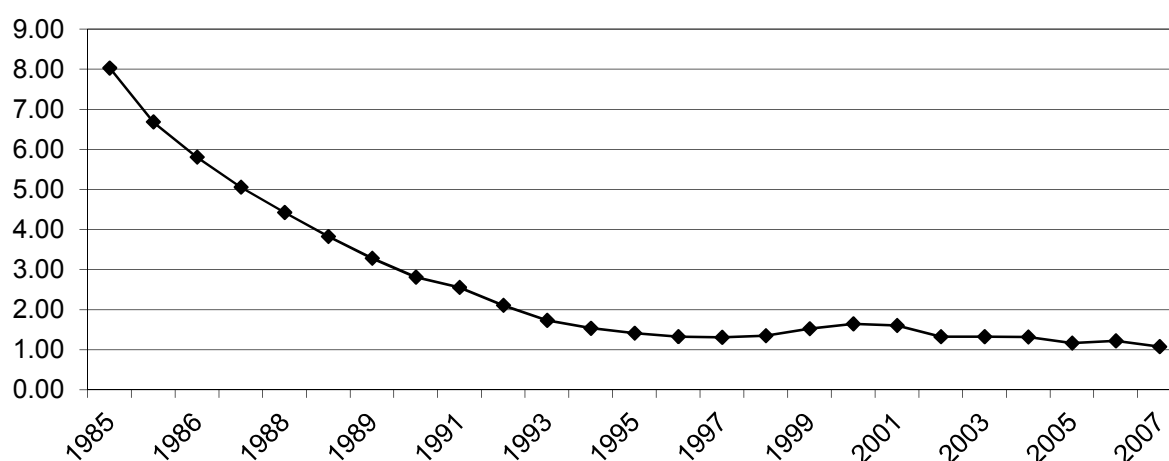
<sup>4</sup> For an overview of the LOP literature, see Dornbusch 1987, Froot/Rogoff 1995, Rogoff 1996).

<sup>5</sup> In a perfect market where absolute PPP holds, exchange variations are determined by the movement of relative prices (Dornbusch 1987). Or one may say, that exchange rates have been driven by price differentials in an integrating market.

<sup>6</sup> Reasons why real exchange rates are not constant include: Barriers to trade (tariffs, transportation costs), different consumption preferences across countries, presence of non-traded goods in CPIs, prices which are sticky in terms of currency in which the good is consumed (see e.g. Krugman/Obstfeld 1991).

The PPPs<sup>7</sup> for private consumption as published by the OECD for the initial Euroland countries reveals strong convergence (see Figure 1). The coefficient of variation declined from 1985 to 2009 by almost two thirds. Most of the convergence (about 90%), however, was achieved by 1999 with the largest contribution (6% points or 75%) occurring before 1992, i.e. before the so-called Maastricht treaty from 1991 could have affected convergence substantially. In other words, by this aggregate metric level-convergence of prices was partly achieved, but mainly in the period before the actual introduction of the Euro and before the so-called convergence criteria (treaty of Maastricht 1992) were established. After 1999 the coefficient of variation of consumer PPPs indicates roughly stability. This finding is very much in line with several studies based on macro data or some aggregation of product to groups (see e.g., Wolszczak-Derlacz 2006 Lein/ Nitsch 2008, Fritsche/ Kuzin 2011, Fritsche/Lein/Weber 2009, Cuaresma/Egert/Silgoner 2007).

**Figure 1: Coefficient of variation, PPPs private consumption**



*Note:* Countries include: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, Spain.

*Source:* computations based on OECD's Purchasing Power Parities for private consumption (PPP-PRC), Stat OECD.

Paul de Grauwe (2009) emphasized that the Euro cash change over (2002) created a window of opportunity and it seems that prices of frequently bought but low price items -such as bread, meat etc. (de Grauwe 2009: Table 2)- rose substantially although more comprehensive price indices do not show this effect. De Grauwe (2009: 10/11) argues that price convergence

<sup>7</sup> PPPs are the rates of currency conversion that equalize the purchasing power of different countries by eliminating differences in price levels between countries.

in consumer items is unlikely because high transaction costs prevent arbitrage, therefore differences in the national or regional cost structure of the retail sector can persist in a common currency area. Furthermore, regulations, customs, and cultures are still very regional (national). This reasoning is confirmed by the US-Canada comparison of Gopinath et al. (2011) who found that national borders segment markets. I.e., retail prices react to price-setting in neighboring stores within the same country but not across the national border. However, the US and Canada are different currency areas which raises transaction costs and make price comparisons difficult.<sup>8</sup> A study of prices in Scandinavian duty-free shops also argues that the reference price (i.e. the onshore price customers are used to) is most relevant for consumers (see Asplund/Friberg, 2001 and below).

The price convergence shown in Figure 1. may have been caused by changes in national prices and/or by variations of exchange rates. If national currency prices are expressed in a common currency, convergence may result from convergence of national price levels or from exchange rate adjustments.<sup>9</sup> Table 1 displays inflation rates for private consumption as well as exchange rates of the national currencies to the Deutsch-Mark (DM). For Italy, for example, the cumulated inflation differential to Germany was almost 40% in the period 1985 to 2009 but until 1998 the inflation differential was compensated or even overcompensated (1992 to 1990) by a devaluation of the Lira against the DM. After the Euro introduction in 1999 the exchange rates are equal to one and convergence could only be achieved through national price adjustments (relativ to Germany in the example used here).

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<sup>8</sup> Engel (1993) found that relative prices within a country are much less volatile than the prices of specific goods in one country to the prices of similar goods in other countries. In a later paper Engel/Rogers (1996) argue that the distance between regions affects the price differences between similar goods.

<sup>9</sup>  $P_{com} = P_{nat} * C_{ref}/C_{nat}$

where  $P_{com}$  = common price,  $P_{nat}$  = price in national currency,  $C_{ref}/C_{nat}$  = exchange rate EX

And thus for differences over time:

$\Delta \ln P_{com} = \ln P_{com,t} - \ln P_{com,t-1} = \ln P_{nat,t} - \ln P_{nat,t-1} + \ln EX_t - \ln EX_{t-1} = \Delta \ln(P_{nat}) + \Delta \ln(EX)$

**Table 1: National inflation rates (cumulated) and exchange rates (cumulated)**

Country	Inflation rate differential to Germany (cumulated logs of annual inflation rates, * 100)				Exchange rate to Germany (cumulated logs of annual differences, * 100)			
	1985- 2009	1985- 1991	1992- 1998	1999- 2009	1985- 2009	1985- 1991	1992- 1998	1999- 2009
<b>Italy</b>	<b>39.7</b>	22.9	8.6	7.8	<b>-46.9</b>	-19.1	-27.8	0
<b>Spain</b>	<b>50.8</b>	26.4	8.6	15.1	<b>-40.7</b>	-10.3	-30.4	0
<b>France</b>	<b>2.9</b>	7.5	-6.4	1.4	<b>-8.8</b>	-10.2	1.4	0
<b>Belgium</b>	<b>5.1</b>	2.9	-4.5	5.7	<b>-1.6</b>	-1.3	-0.2	0
<b>Portugal</b>	<b>79.8</b>	53.0	14.9	11.6	<b>-68.8</b>	-52.6	-16.2	0
<b>Netherlands</b>	<b>1.4</b>	-4.0	-1.6	6.8	<b>0.0</b>	0.1	-0.1	0
<b>Austria</b>	<b>6.5</b>	3.3	-1.3	3.9	<b>-0.6</b>	-0.1	0.0	0
<b>Finland</b>	<b>11.5</b>	17.7	-7.9	1.7	<b>-36.33</b>	-14.3	-22.0	0
<b>Germany</b>	<b>0</b>	0.0	0.0	0.0	<b>0</b>	0.0	0.0	0

Source: computations based on IMF data (exchange rates), OECD (inflation rates).

Summarizing the empirical results above and that of other studies using macro or aggregated data one may conclude, that convergence within Euroland was strong, but that it was already achieved before the introduction of the Euro in 1999. Even before the so-called Maastricht criteria was effective substantial price convergence occurred but it was achieved mainly by exchange rate adjustments. Aggregated price level data is based on a basket of goods, which may be not comparable across the countries and heterogeneity may disturb hide similarities but also differences between countries. To overcome heterogeneity problems some studies restrict the analysis to single items (The Economist, BigMac, for example, see below).

In the following we first summarize studies investigating price convergence using micro data. In the third section we present our analysis based on a unique data set using identical products in a unique service environment in 8 initial Euroland countries. We make use of data collected from IKEA catalogues before (1998) and twice after the introduction of the EURO (2001 when national banknotes were still used and after the Euro cash over, 2009). Thus, we analyze price convergence of perfectly homogenous products within Euroland. We find significant price convergence between 1998, 2001 and 2009.

**Table 2: Measures to achieve European economic integration**

2002, January 1<sup>st</sup>: Euro notes and coins introduced

1999, January 1<sup>st</sup>: Euro (EMU) established, exchange rates fixed, national currencies were becoming denominations of the Euro (virtual Euro).

1998, May 2<sup>nd</sup>: Special European Council agreed that 11 member states (France, Belgium, Luxembourg, the Netherlands, Germany, Austria, Italy, Spain, Portugal, Finland, Ireland) joined Euroland (Britain, Denmark, Sweden and Greece (joined in 2002) did not join).

ECB board appointed

1997, June: Stability and Growth Pact (SGP, Amsterdam)

1994, January 1<sup>st</sup>: European monetary integrations (EMI) set to work to prepare EMU

1993, July/ August: European Exchange rate mechanism (ERM) in critical stage, fluctuation band increased from 2.25% to 15%

1992, November: Treaty on the European Union came into effect

1991, September: British Pound and Italian Lira left the ERM after speculative attacks.

1991, December: Treaty of Maastricht, convergence to start stage 3 (the EMU) was defined in terms of monetary and fiscal stability:

- stable inflation rate (within 1,5% of the three best performing states)
- low government deficit (no more than 3% of GDP) and government debt (below 60% of GDP)
- no devaluation of the currency within the previous 2 years
- stable interest rates (within 2% of the three best performing states)

1989, November: Collapse of the Berlin wall, prospective German unification gave stimulus to EMU negotiations.

1989, April: Delors Report, a blueprint to implement EMU in 3 stages.

June 1988: European Council (Hannover) moving ahead with EMU

1979: European Monetary System (EMS) launched

(for details see: Dyson/Featherstone, 1999)



## 2. Micro data studies of price differentials

The most famous individual item PPP is the McDonald's Big-Mac regularly published in the Economist, but also the Economist itself has been used in several studies (Knetter 1997, Gosh/Wolf 1994). Gosh/Wolf (1994) found that cover prices of 'The Economist' in local currency do not react to exchange rate variation, i.e. that the magazine is 'priced to the market' to long-term considerations (10 European countries and the US using the UK as reference). Knetter (1997) used monthly cover prices of the Economist in 7 European countries and the US in the period between 1966 and 1990. He found price rigidity in local prices, i.e. relative prices expressed in a common currency price rise if the exchange rate appreciates. Engel and Rogers (1999) analyzed price dispersion for similar goods across US cities but concluded that sticky prices cannot explain price divergence within the US because nominal exchange rate shocks cannot occur.

Parsley and Wei (1996) use quarterly prices of 51 final goods and services from 48 cities in the US over the period 1975:1 through 1992:4 to investigate convergence to LOP. They find that tradable goods converge fast to parity (the half-life of the price gap is about 4 to 5 quarters) but that services converge less fast (15 quarters half-life). The higher the price differential the stronger the convergence in the Parsley/Wei data for the US. However, given that the US was an integrated market already before 1975, one may wonder why convergence did not occur before.

Wolf (2000) uses prices for 42 goods and services within 211 US cities and investigates possible hypotheses for the deviation from LOP. He found that the difference in traded and non-traded goods is only marginal (slightly in favor of tradables) and that differences in prices between city-pairs are consistently changing signs for various goods. Wolf concludes that differences in (roughly constant) city-specific characteristics (such as taxes, median household income, population, city government expenditures etc.) and distance between the locations do not explain divergence from LOP.<sup>10</sup> Differences in mark-ups also seem to be a problematic explanation since price differences are not significantly influenced by proxies for local competition. Average prices of the entire basket also seem to be unrelated to per capita

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<sup>10</sup> Measurement error may affect non-branded tradables more than branded tradables but Wolf (2000) actually found on average a higher coefficient of variation for branded (0.127) than for non-branded (0.117) tradables.

income and median household income variables which may serve as proxies for productivity differentials.<sup>11</sup>

Among European countries Goldberg and Verboven (1998) found substantial and persisting differences in quality-adjusted prices for cars in the period 1980 to 1993. Year-to-year volatility in price differentials is strongly (although not completely) related to exchange rate fluctuations (see also section 1 of this paper), i.e. local prices remain relatively stable despite exchange rate variations. They conclude that exchange rates seem to be the main variable driving any price conversion. In a later study Goldberg and Verboven (2001) also analyze the European (5 countries) auto market applying hedonic price regressions to account for the variations of models across countries (physical characteristics, market segments, brands). The data covers the period 1970 to 2000 - a period when the European common market has been developed – and this allows the authors to analyze the impact of dissolving trade barriers on price convergence. They claim that the strength of their data (prices of individual car models and their characteristics) allow them to compare prices of identical products across countries and thus to investigate convergence not only to the relative LOP but also to the absolute LOP. However, even controlling for characteristics, cars remain complex products and the service environment may have a substantial impact on prices. Using similar data on car prices provided by the European Commission for the period 1995 to 2005 Gil-Pareja and Sosvilla-Rivero (2008) interpret their analysis as clear evidence of price convergence after 1999.

Some studies explicitly investigate price convergence on the basis of micro data in Europe and especially in Euroland. Wolszczak-Derlacz (2006)<sup>12</sup> uses data from the Economist Intelligence Unit which includes prices for 173 narrowly defined products (goods and services) for 15 capital cities in the EU (Wolszczak-Derlacz 2006: 23) for the period 1990 to 2005.<sup>13</sup> Market exchange rates have been used to express prices in a common currency. Excluding items for which the comparability has been assumed problematic, the final dataset comprises 107 traded and 41 non-traded items (Wolszczak-Derlacz 2006:23). Tradable goods have been grouped into 8 categories and price dispersion (coefficient of variation) has been

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<sup>11</sup> The Harrod-Balassa-Samuelson effect assumes that relative productivity differs between locations in tradables but not in non-tradables (services) and that prices of tradables are equal. Within a location wages equalize and therefore non-tradable production in high-productive (high wage) locations is more costly than in low-productive (low wage) locations. Thus, LOP or PPP holds only for tradables but not for non-tradables which are permanently higher priced in high-productive locations. The price level will be higher in high-productive locations because the CPI is a basket of equally priced tradables and differently priced non-tradables (which are higher priced in the high-productive locations).

<sup>12</sup> Aside from using micro data she also investigates macro indicators (see section 1 of this paper)

<sup>13</sup> Imputations for missing values have been made using the CPI (Wolszczak-Derlacz 2006:23).

measured within these groups. The highest price difference has been observed for non-tradables (hourly rate of domestic cleaning help) and the lowest for traded goods. Standard deviations (sigma convergence) show a decline from 1990 to 1996 (19%) but some variations after.

Most products (110 of 148) in the Wolszczak-Derlacz data set experienced price convergence between 1990 and 2005. Calculating log price differences for all pairs of cities shows the decline in dispersion between 1990 and 1995 and roughly stability after. Thus, the results based on the less aggregated micro data from the Economist Intelligence Unit over 15 years confirm the findings made with more aggregated indicators: a decline in price dispersion mainly in the period from 1990 to the mid 1990s and roughly stability after. One has to keep in mind that the Wolszczak-Derlacz study includes not only Euroland countries but also countries keeping their own national currencies. In addition, the convergence in prices before the shift to the Euro in 1999 may be mainly caused by exchange rate adjustments rather than by the movements of prices itself. Also based on data of the Economist Intelligence Unit, Engel and Rogers (2004) find similar results as Wolszczak-Derlacz with a wider dispersion among non-tradables than tradables and clearly lower price dispersion in the period 1998-2003 than in earlier periods. However, in the latter period only prices of one product category (alcoholic beverages) showed a further decline in price dispersion. In other categories it rose slightly although insignificantly in most categories.

Probably the largest dataset (327,583 observations) was used in a Bundesbank analysis (Fischer 2009) of prices of washing machines in 17 European countries for the period 1995 to 2005.<sup>14</sup> Applying a hedonic price regression<sup>15</sup> ‘controlling’ for specific features of the machines and including firm and country dummies 88% of the net price variation of washing machines is explained. All country and firm dummies are significant (Deutsche Bundesbank 2009: 43). Comparing net prices from September to December 1998 (just before the introduction of the Euro) with prices from September to December 2005, the deviation from the average of the Euroland countries (including Greece, but excluding Ireland and Luxemburg) was higher in 2005 than before the introduction of the Euro. The Bundesbank

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<sup>14</sup> The Analysis include also non Euroland countries.

<sup>15</sup> The equation estimated was:

$$\ln P_{ikt} = \pi_0 + \pi'_{\omega} \omega_k + \pi_f + \pi_{it} + \varepsilon_{ikt}$$

where  $P_{ikt}$  = price of model  $k$  in country  $i$  at time  $t$ ,  $\pi_0$  = constant,  $\pi'_{\omega}$  = coefficient of model-specific features,  $\omega_k$  = quality features of model  $k$ ,  $\pi_f$  = coefficient of a firm dummy,  $\pi_{it}$  = coefficient of an interaction term of country and time,  $\varepsilon_{ikt}$  = error term.

analysis, if generalized, is clearly in contrast to the Wolszczak-Derlacz finding that after the introduction of the Euro price divergence did not occur. However, washing machines are clearly tradable products and are often produced in one or only a few locations and then distributed across Europe, but the comparison is based on a quality adjusted single item. An alternative test could make use of identical products and, of course, more than one product would be preferable.

**Table 3: Deviations of net prices for washing machines within Euroland (% , %-Pts. respectively)**

Country	Sept. to Dec. 1998	Sept. to Dec. 2005	Difference (2-1)*	Convergence (con) Divergence (dev)
	1	2	3	4
<b>Italy</b>	1.5	12	10.5	Div
<b>Spain</b>	-2.0	9.5	11.5	Div
<b>France</b>	4	8	4.0	Div
<b>Belgium</b>	4	2	-2.0	Con
<b>Portugal</b>	3	-3.5	-6.5	Div
<b>Netherlands</b>	-11	-6	5.0	Con
<b>Austria</b>	-11	-2	9.0	Con
<b>Finland</b>	0	-11.5	-11.5	Div
<b>Germany</b>	1	-14	-15.0	Div

\* the signs do not indicate whether the country converged to the mean or not. Convergence (lower absolute distance from mean) from 1998 to 2005 can only be observed in Belgium, The Netherlands, and Austria (see column 4).

Source: numbers are extracted from Figure on page 44, Deutsche Bundesbank 2009.

To our knowledge two studies used IKEA data before (Haskel/ Wolf 2001, Hassink/Schettkat 2001, 2003). Haskel and Wolf analyzed mainly low-price items in 25 European, American and Asian countries.<sup>16</sup> Hassink/Schettkat analyze prices of identical items sold by IKEA in 1998 (before the introduction of the EURO) and in 2001 in 8 EU countries. The log price difference of identical products in 1998 has a strong but not perfect (coefficient of 0.53) effect on the log price difference in 2001. They found evidence for pricing to national markets but argue that this pricing strategy is strongly limited by incomplete information of the seller. Effective price discrimination requires knowledge of the price-demand function, but sellers

<sup>16</sup> Haskel and Wolf analyzed prices of 119 IKEA products in the period 1995 to 1998 in 25 countries (in Europe, America, Asia and Australia) using mid-year exchange rates to calculate common currency prices. The product basket Haskel and Wolf used consists of identical but mainly low-price products typically selling at about 2 US\$ (Haskel/Wolf 2001: 548). They conclude that LOP is violated with typical deviation of 20 to 50% and only a weak convergence to LOP. However, their study does not cover the introduction of the Euro.

know at best a few points of the function. If prices cannot be easily adjusted down and up – because buyers resist price rises, e.g. –, the price-demand function is basically unknown to the seller. Most of the inter-country price variation for identical products remains unexplained in the Hassink/Schettkat study.

Absolutely identical products sold in the same place were analyzed by Marcus Asplund and Richard Friberg (2001) in a study of Scandinavian duty-free shops with price tags in two currencies. They offer two hypotheses why the seller uses two currencies on the price tags although prices may deviate for the same product at the same location when expressed in a common currency. First two rigid nominal prices may be convenient for the consumer because this offers her the possibility to compare easily to prices at home and second the seller may discriminate prices according to the onshore price level. However, difference in cost components (labor costs, taxes etc.) cannot be the reason for deviation from the LOP and transportation costs hindering arbitrage are nil. The only costs related to arbitrage for consumers are related to the exchange of currencies. These, however, could be relatively high especially if small amounts are changed as it will typically be the case for low price items sold in Scandinavian duty-free shops (such as alcoholics, cosmetics etc.). Thus, even for identical products sold at the same place prices may deviate in a certain range.

### 3. Price convergence in Euroland: evidence from homogenous products

Why may prices converge? Price convergence may occur for several reasons: (1) arbitrage, (2) convergence of the cost structure (VAT harmonization, labor costs, interest rates), (3) declining transaction costs, (4) competition, (5) convergence of price demand functions. Arbitrage by customers shopping in different countries, is unlikely to occur because information and transportation costs will be high for individuals.<sup>17</sup> Therefore, with imperfect competition, sellers may discriminate between national markets. But pricing to the market, i.e. regional price differentiation, requires sufficient knowledge about the national demand functions.<sup>18</sup> The cost structure is influenced by the product itself, which can be assumed to be roughly identical everywhere (transportation costs per item are low) but the domestic cost components may differ most obvious with VAT-rates and other taxes, but also rents, and labor costs.

We analyse price convergence in Euroland based on a three-dimensional dataset of identical products, countries and time covering the period before (1998) and after the introduction of the Euro (2001 and 2009). Therefore, we are able to investigate prices in the currency area when prices were still expressed in national currencies (although fixed to the Euro) countries as well as after the cash change over to actual Euro-banknotes in 2002. The analysis is based on national IKEA catalogues including 112 products<sup>19</sup> priced at a minimum of 5.00 Euros. The sample includes eight of the initially 11 EMU member states: Germany, Austria, Netherland, France, Belgium, Italy, Spain and Finland (i.e., not including Luxemburg, Portugal and Ireland).<sup>20</sup> IKEA sets prices at the national level published in an annual catalogue, the firm famously minimizes distribution costs, involves the customer who has to collect the products in the store, arrange the transport and assemble the products. The stores and catalogues are almost identical everywhere<sup>21</sup>, products are labelled identically with Scandinavian names, i.e. IKEA products are thus truly homogeneous not only with respect to the products themselves but also regarding the shopping and service environment. Therefore, our cross-national analysis compares actually homogenous products.

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<sup>17</sup> In border regions it may well be the case that arbitrage is used especially in common currency areas, which does not necessarily contradict the Gopinath et al. (2011) finding for the US and Canada (see also above). IKEA stores make in border regions announcements in two languages (Wikipedia).

<sup>18</sup> Helga Einecke (2010) reports that IKEA invested 130 Mill. Euro in lowering product prices (about 5% of the 2,670 Mill Euro turnover), that turnover increased by 11%, which implies a price elasticity of about 2 (assuming that lower prices caused the increase in turnover) in Germany.

<sup>19</sup> With a few exceptions the products are available in all countries.

<sup>20</sup> The first IKEA store in Ireland opened in 2009 (Wikipedia)

<sup>21</sup> All catalogues are centrally designed in Sweden and apply the same production labels. Only prices may differ.

If Euroland were a perfect market, competition and arbitrage would enforce the LOP, prices would be identical independent of national cost components. Actually, arbitrage is unlikely to occur because for consumers information (they simply would not know about price differences) and transportation costs are high for consumers. Competition could enforce unique prices but although IKEA products are in the low price segment they have a distinguished design and quality which may be an advantage over competitors. The IKEA-world is highly standardized allowing IKEA to gain from economies of scale. Catalogues are centrally designed and identical, suggesting that consumers are assumed to be similar with respect to features like culture and tastes. Although catalogues are centrally designed, ‘pricing to the market’ may still be attractive if price-demand functions and/or cost components differ sufficiently. If IKEA applies a strict full cost principle and mark-up pricing, domestic cost components will affect national prices, i.e. a higher VAT will translate into higher consumer prices if costs are otherwise identical. This should be reflected in country-specific effects. If, on the other hand, price-demand functions are sufficiently different between countries (and IKEA knows about it) profit maximization may lead to price differentiation (pricing to the market)<sup>22</sup> IKEA clearly differentiates prices between countries but –at least for the outside observer- in an unsystematic way (Hassink/Schettkat 2001, 2003).

**Table 4: Two-sample Kolmogorov-Smirnov test for equality of distribution functions (log price deviations)**

	Test-Statistic D	P-Value
1998 against 2001	0.0322	0.733
1998 against 2009	0.1417	0.000
2001 against 2009	0.1275	0.000

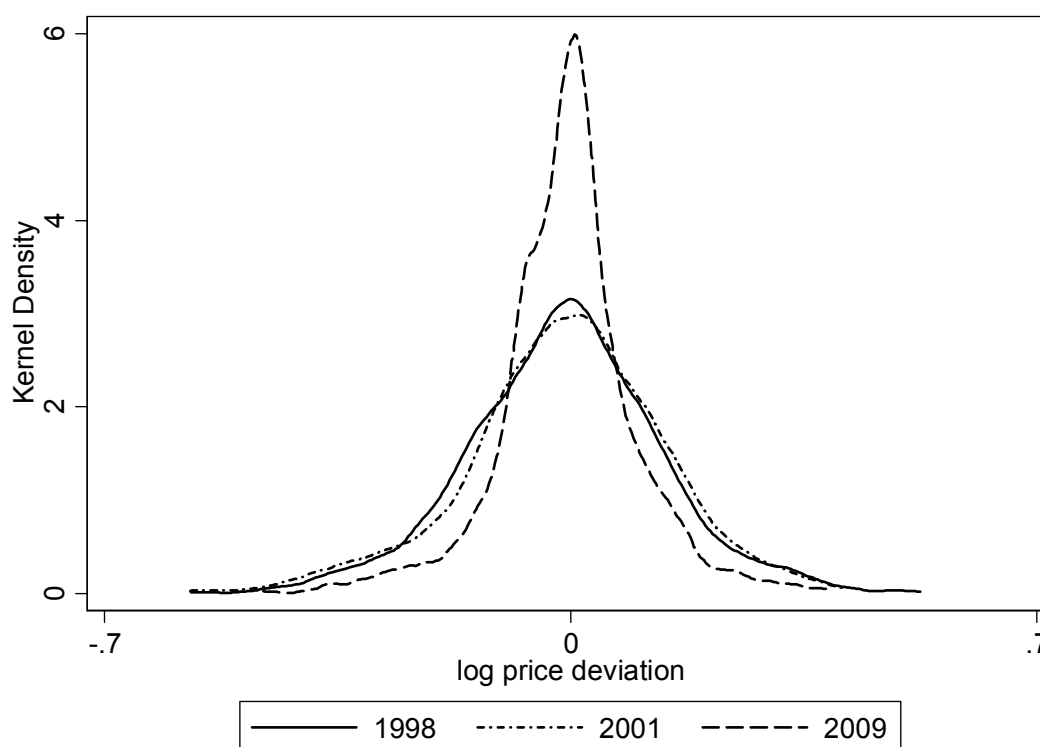
Source: IKEA-Prices collected by Hassink/Schettkat (cf. Hassink/Schettkat 2001), the authors.

We use beta and sigma convergence to investigate whether prices of homogenous products differ and whether they converged after the introduction of the EURO. As Figure 3.1 clearly shows, The distribution of the log-price deviations (difference of country specific prices in logs of each product  $[\ln(p_{i,c})]$  from the mean price of the product in logs  $[\ln(p_{i,\cdot})]$ ,  $[\ln(p_{i,c})-$

<sup>22</sup> For price discrimination see Varian (1989).

$\ln(p_{i,t})$ ) are much smaller and much more concentrated in 2009 than in the earlier 1998 or 2001 samples. Actually we cannot detect a difference between the 1998 and 2001 distributions but both are significantly different from the 2009 distribution as indicated by a Kolmogorov-Smirnov two-sample test on the similarity of the distributions (see table 4). Sigma convergence clearly occurred after the cash change over to the Euro. However, sigma convergence is not the same as identical country-specific prices which may still differ systematically between countries.

**Figure 2: Distribution of prices differences (logs), 1998, 2001 and 2009.**



Source: IKEA-Prices collected by Hassink/Schettkat (cf. Hassink/Schettkat 2001), the authors.

To investigate country-specific effects, we apply 3 models: first we assume absolute PPP, identical prices in all countries, i.e. we apply an unrestricted model but include a vector of country-dummies. The country-coefficients should be insignificant if the absolute PPP holds. Absolute PPP is based on strong assumptions and we investigate therefore the weak PPP version, allowing for national cost components such as VAT rates and labor costs. For labor costs we use hourly wages instead of unit labor costs. The latter is strongly influenced by



aggregate productivity, but here we compare IKEA prices and since IKEA is organized similarly everywhere it will have similar productivity but hourly labor costs may differ.

Model 1: country dummies

$$(1) \quad \ln(p_{i,c}) - \ln(p_{i,\cdot}) = \beta_0 + \beta_{1,c} C + \varepsilon_{i,c}$$

where  $i$  = product,  $c$  = country,  $\beta_0$  = constant,  $\beta_1$  = coefficient for country,  $\varepsilon$  = error term.

Model 2: country dummies plus VAT

$$(2) \quad \ln(p_{i,c}) - \ln(p_{i,\cdot}) = \beta_0 + \beta_{1,c} C + \beta_2 VAT + \varepsilon_{i,c}$$

where  $\beta_2$  = coefficient for Value Added Tax (VAT)

Model 3: country dummies plus VAT, plus hourly labor costs

$$(3) \quad \ln(p_{i,c}) - \ln(p_{i,\cdot}) = \beta_0 + \beta_{1,c} C + \beta_2 VAT + \beta_3 HLC + \varepsilon_{i,c}$$

where  $\beta_3$  = coefficient for hourly labor costs (HLC)

If the price deviations between EMU countries could be ascribed to different labor costs or VAT alone, the coefficients for all country-dummies in model (2) or (3) should become zero whereas the coefficients of the cost variables should differ significantly from zero. If price deviations between countries still exist after controlling for these country-specific cost components, other unobserved variables may determine prices. If price-demand functions are sufficiently different between the countries (and IKEA knows about it) pricing to the market may be applied.<sup>23</sup>

All models are significant although the  $R^2$  are very low indicating a minor role or no role for systematic country-specific effects on prices (Table 5). Actually, the coefficients for labor costs and VAT<sup>24</sup> have a significantly negative sign in 1998 but are both insignificant in 2009 (in 2001 the coefficient of the labor cost variable is significantly negative, but VAT is positive). Thus, we cannot detect systematic effects of the variables proxying cost component. In 2009 all country-coefficients (except for The Netherlands) are insignificant, i.e. price levels differ insignificantly from the reference country (Germany). In comparison to early years we see clearly beta-convergence.

<sup>23</sup> Most demand functions have varying elasticities (Appelbaum/Schettkat 1999) where price elasticities greater than 1 classify unsaturated markets and elasticities smaller than one saturated markets.

<sup>24</sup> VAT rates have converged (see Appendix Table A.1).

Why is the coefficient for NL significantly negative in 2009 even in the models with country-specific cost components (models 2 and 3)? Actually the mean price across all products in the 2009 sample is not the lowest in The Netherlands<sup>25</sup> but the country's mean of the relative deviation from the product-means  $[\ln(p_{iNL}) - \ln(p_i)]$  is substantially lower (about 5% whereas most other countries are in the range of less than 1% up to 2%). In the Netherlands 81 products in the 2009 sample are priced below the mean and for 46 products the Dutch price is the lowest. At the same time, the Dutch VAT rate in 2009 is lower than in many other countries but not substantially (see Appendix Table A1). Assuming that the VAT translates one-to-one into prices, the VAT rate in The Netherlands is 1%-pt. (5%) below the mean VAT (20%) in the sample, but the same is true for Germany and Spain (see Appendix Table A.1) and hourly wages in The Netherlands are not the lowest. Even if some unobserved cost component is lower in The Netherlands, why would IKEA pass this advantage on to consumers? Probably the Dutch price elasticity is higher but since not all products are lowest priced in The Netherlands, IKEA must know product-specific price-demand functions. Determining price-demand functions requires knowledge of prices and quantities, information not available to outside observers and it is questionable whether IKEA has such information. Determining price-demand functions requires at least two price-quantity combinations. In principle IKEA could create this information but if the store lowers the price, it will be difficult to raise it again. Therefore, IKEA may guess the price-demand function but the company will hardly know it.

IKEA uses blue and yellow to be identified as Swedish and actually the design center is located in Sweden, but the parent company of the IKEA operations is INGKA Holding, which in turn belongs to Stichting Ingka Foundation, a tax –exempt, non-profit entity under Dutch law (Economist 2011). The IKEA conglomerate is obviously setup to minimize taxes but it remains –for the outside observer- a conundrum why Dutch prices are on average lower than in other countries.

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<sup>25</sup>

	Germany	Belgium	Spain	Italy	France	Austria	Netherlands	Finland
Mean price (Euro) 2009	117.95	116.35	115.46	108.88	119.18	110.52	112.46	123.82

**Table 5: Regression analysis of price dispersion, relative to Germany.**

Dependent Variable	1998			2001			2009		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	$\ln(p_{i,c})-\ln(p_{i,.})$	$\ln(p_{i,c})-\ln(p_{i,.})$	$\ln(p_{i,c})-\ln(p_{i,.})$	$\ln(p_{i,c})-\ln(p_{i,.})$	$\ln(p_{i,c})-\ln(p_{i,.})$	$\ln(p_{i,c})-\ln(p_{i,.})$	$\ln(p_{i,c})-\ln(p_{i,.})$	$\ln(p_{i,c})-\ln(p_{i,.})$	$\ln(p_{i,c})-\ln(p_{i,.})$
<b>Belgium</b>	0.000216 (0.01)	0.0385 (1.35)	0.0799* (2.49)	0.0188 (0.89)	-0.0461* (-2.31)	0.0188 (0.75)	-0.0130 (-1.09)	-0.0414 (-1.86)	-0.0414 (-1.81)
<b>Spain</b>	0.0578** (3.10)	0.0578** (3.10)		0.0941*** (4.84)	0.0941*** (4.84)		-0.0427 (-1.82)		
<b>Italy</b>	0.0934*** (4.93)	0.124*** (6.75)	0.121*** (6.65)	0.0506 (1.26)	-0.00138 (-0.04)	-0.0167 (-0.43)	0.00194 (0.15)	-0.0123 (-0.73)	-0.0119 (-0.71)
<b>France</b>	0.0685*** (3.78)	0.104*** (5.61)	0.122*** (6.08)	0.0616** (3.22)	0.0148 (0.90)	0.0459* (2.40)	0.00155 (0.11)	-0.00699 (-0.43)	-0.00708 (-0.36)
<b>Austria</b>	-0.000103 (-0.01)	0.0305 (1.58)	0.0343 (1.75)	0.0645*** (3.33)	0.0126 (0.74)	0.0132 (0.77)	0.00188 (0.15)	-0.0123 (-0.74)	-0.0121 (-0.88)
<b>Netherlands</b>	-0.0464** (-2.59)	-0.0350* (-2.16)	-0.0281 (-1.62)	0.0146 (0.75)	-0.0243 (-1.44)	0.00121 (0.06)	-0.0512*** (-3.94)	-0.0512*** (-3.94)	-0.0513** (-2.99)
<b>Finland</b>	-0.0459* (-2.08)			0.0779*** (3.84)			0.0421 (1.84)	-0.000576 (-0.02)	
<b>VAT</b>		-0.00765* (-2.08)	-0.0114*** (-3.42)		0.0130*** (3.84)	0.00881** (2.90)		0.0142 (1.82)	0.0140 (1.94)
<b>HLC</b>			-0.00628** (-3.10)			-0.0100*** (-4.84)			0.0000678 (0.02)
<b>Constant</b>	-0.0281* (-2.10)	0.0943 (1.39)	0.311*** (4.59)	-0.0633*** (-4.47)	-0.271*** (-4.18)	0.0620 (1.02)	-0.000475 (-0.05)	-0.271 (-1.87)	-0.269** (-2.77)
<b>F</b>	14.80***	14.80***	14.80***	5.703***	5.703***	5.703***	4.812***	4.812***	4.812***
<b>adj. R-squared</b>	0.075	0.075	0.075	0.017	0.017	0.017	0.029	0.029	0.029
<b>Observations</b>	873	873	873	885	885	885	884	884	884

Note: t-statistics in parentheses; \* p<0.05 \*\* p<0.01 \*\*\* p<0.001; Germany is reference country.

Source: IKEA-Prices collected by Hassink/Schettkat (cf. Hassink/Schettkat 2001), the authors.

#### 4. Conclusion

Calculating the distributions of the deviations of national log prices from their mean in 8 Euroland countries (Germany, Belgium, Spain, Italy, Austria, France, Netherlands and Finland) for 112 products in the year before the introduction of the Euro (1998), the year before the change over to Euro banknotes and coins (2001), and a year when the Euro was established for some time (2009), we find clear sigma convergence of prices for truly homogeneous products sold by a globally acting furniture company (IKEA). I.e. in 2009 is the distribution significantly more concentrated than in the earlier years. We observe Sigma convergence, which does not necessarily mean that prices converge to a perfect market price. In 2009 only one country has a significantly lower coefficient whereas in 1998 and 2001 the country deviations are more common and more pronounced. I.e. we also observe beta convergence. However, insignificant country coefficients simply mean that systematic country-effects cannot be detected but prices do nevertheless differ.

Why does convergence occur? If Euroland were a perfect market, competition and arbitrage would enforce the LOP, prices would be identical independent of country-specific cost components. The use of a common currency potentially makes prices more transparent but it is unlikely that consumers discover price differences between countries (or one may say that information costs for consumers are too high) and furthermore transportation costs may prevent consumers to engage in arbitrage. Competition could enforce unique prices but although IKEA products are in the low price segment, they have a distinguished design. Insofar they are ideosyncratic and have sufficient quality that they create their own market niche. But keep the image of low prices the competitors need to be matched. Furthermore, IKEA operates with declining marginal costs, which in addition give room for discretion in price setting.<sup>26</sup>

Price convergence would have advantages for suppliers because it may reduce menu costs (printing price tags or catalogues) but then one would expect products to be sold at exactly the same price everywhere. This pattern does only occur for 1 product in our 2009 sample which is sold at exactly the same price in all 8 countries. Two products are priced equally in 7 countries and eight products in 6 countries. These are roughly 10% of the products in the

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<sup>26</sup> See Blinder et al. for price setting practices.

sample.<sup>27</sup> Why do we then see many small deviations in prices but hardly any systematic, significant effects? One answer may be that IKEA assumes the price-demand functions to be similar in all countries but that small product-specific differences in price-demand functions exist between countries. Whether such a pricing strategy is maximizing profits in praxis remains unobservable. However, this would require substantial knowledge about the country and product-specific demand functions unlikely to be present in the IKEA organization. The answer may only be found if we “ask about prices” (Blinder 1998).

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<sup>27</sup> This analysis applies to our 2009 dataset only, because in former years prices were expressed in national currencies (see above) and one cannot expect exactly the same price when expressed in a common currency.

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## Appendix

**Table A.1: VAT-rates in Euroland-countries**

	<b>1998</b>	<b>2001</b>	<b>2009</b>
<b>Deutschland</b>	16.0	16.0	19.0
<b>Belgien</b>	21.0	21.0	21.0
<b>Spanien</b>	16.0	16.0	16.0
<b>Italien</b>	20.0	20.0	20.0
<b>Frankreich</b>	20.6	19.6	19.6
<b>Österreich</b>	20.0	20.0	20.0
<b>Niederlande</b>	17.5	19.0	19.0
<b>Finnland</b>	22.0	22.0	22.0
<b>Portugal</b>	17.0	17.0	20.0
<b>Coeff. of variation (incl. Portugal)</b>	0.121	0.114	0.084

Source: European Commission (2013).



**Table A.2: Products in the 1998 data, mean price and standard deviations**

<b>item</b>	<b>product group</b>	<b>mean price</b>	<b>standard deviation</b>	<b>coefficient of variation</b>
TIMRA	audio furniture	137.43	29.24	0.21
KUBIST	audio furniture	107.37	20.41	0.19
KOMPAS	audio furniture	10.96	1.90	0.17
ABO	audio furniture	128.36	7.33	0.06
FRACK	bathroom	11.11	2.90	0.26
VISDALEN	bedroom	313.76	35.43	0.11
VISDALEN	bedroom	99.66	7.22	0.07
TROMSNES	bedroom	265.90	31.47	0.12
HADELAND	bedroom	99.88	6.14	0.06
NARVIK	bedroom	342.28	39.25	0.11
NARVIK	bedroom	88.70	9.00	0.10
VRADAL	bedroom	215.72	34.46	0.16
EGBY	carpets and basement	148.13	10.24	0.07
TUNDRA	carpets and basement	19.77	3.39	0.17
ABO	chairs and tables	69.09	9.06	0.13
ABO	chairs and tables	312.70	45.61	0.15
IGGESUND	chairs and tables	151.81	11.65	0.08
PELTO	chairs and tables	326.27	44.87	0.14
HENDRIKSAL	chairs and tables	110.82	18.64	0.17
KRONVIK	chairs and tables	376.37	49.40	0.13
KRONVIK	chairs and tables	105.54	15.48	0.15
JUSSI	chairs and tables	35.27	3.45	0.10
INGO	chairs and tables	46.53	4.08	0.09
ADAM	chairs and tables	49.57	6.74	0.14
RONALD	chairs and tables	48.33	6.34	0.13
DENNIS	chairs and tables	28.22	2.60	0.09
RINGO	chairs and tables	31.03	4.19	0.14
TERJE	chairs and tables	15.71	2.26	0.14
OGLA	chairs and tables	37.18	6.21	0.17
BABORD	corridor	12.74	1.80	0.14
LOGGA	corridor	43.89	13.49	0.31
BONETT	corridor	25.72	11.35	0.44
BRA	corridor	92.42	8.61	0.09
BABORD	corridor	12.02	2.37	0.20
RIGG	corridor	20.16	3.08	0.15
PILOT	corridor	60.72	12.21	0.20
TOMELIA	couch	760.59	72.48	0.10
EKTORP	couch	692.21	74.31	0.11
KLIPPAN	couch	336.79	45.38	0.13
TULSTA	couch	144.85	14.77	0.10
STEN	cupboards	21.98	5.52	0.25
FJORD	cupboards	134.19	24.55	0.18
HARPUN	cupboards	96.39	10.44	0.11

IVAR	cupboards	63.05	13.28	0.21
IVAR	cupboards	12.93	2.31	0.18
BILLY	cupboards	60.04	6.69	0.11
BENNO	cupboards	56.18	3.70	0.07
LIO	cupboards	48.10	4.52	0.09
BONDE	cupboards	226.70	25.25	0.11
KUBUS	cupboards	199.55	23.74	0.12
AKROBAT	cupboards	88.26	9.85	0.11
NARTORP	cupboards	150.56	20.03	0.13
KRONVIK	cupboards	453.59	38.75	0.09
KRYSS	cupboards	85.00	8.86	0.10
SKANDOR	cupboards	147.14	5.86	0.04
ABO	cupboards	340.63	45.49	0.13
NARVIK	cupboards	195.14	8.57	0.04
BIALITT	cupboards	104.93	18.21	0.17
FJORD	cupboards	107.82	13.58	0.13
KURS	cupboards	93.29	4.27	0.05
RAST	cupboards	40.82	5.91	0.14
PRAGEL	kitchen	70.69	17.81	0.25
EDSVIK	kitchen	53.43	8.18	0.15
HAGGVINK	kitchen	60.30	9.73	0.16
FACTUM	kitchen	98.22	16.94	0.17
PERFECT	kitchen	82.26	9.92	0.12
ANTOFINO	lamp	51.13	12.24	0.24
KVINTOL	lamp	29.59	5.58	0.19
TERTIAL	lamp	14.42	2.62	0.18
ERBIUM	lamp	39.36	6.17	0.16
NORSSKEN	lamp	52.96	9.36	0.18
NORSSKEN	lamp	12.37	3.58	0.29
ANTILOP	nursery	14.78	2.38	0.16
GOK	nursery	63.10	18.81	0.30
TROFAST	nursery	103.28	10.53	0.10
TROFAST	nursery	75.88	6.16	0.08
GLIS	nursery	12.13	1.50	0.12
VIKARE	nursery	134.50	15.27	0.11
DUKTIG	nursery	8.25	2.79	0.34
DUKTIG	nursery	15.41	1.92	0.12
MAMMUT	nursery	12.55	1.67	0.13
PANTER	nursery	18.23	2.71	0.15
MAMMUT	nursery	228.98	28.33	0.12
GLIS	nursery	7.71	1.07	0.14
HELMER	office	65.06	11.24	0.17
EFFECTIV	office	191.27	22.88	0.12
OPERATIV	office	271.13	20.48	0.08
EFFECTIV	office	194.86	40.29	0.21
MAXIMAL	office	163.62	12.94	0.08
MAXIMAL	office	165.09	14.36	0.09

TORE	office	119.55	11.91	0.10
BRA	office	37.09	6.04	0.16
BERTIL	office	37.89	3.85	0.10
FRASSE	office	23.29	2.91	0.13
ANTONIUS	organizing	47.35	17.29	0.37
MOPPE	organizing	15.34	2.09	0.14
LACK	storage	19.72	1.17	0.06
JUSSI	tables	60.94	13.20	0.22
KROKSHULT	tables	149.24	10.21	0.07
TIMBRA	tables	91.34	7.09	0.08
LACK	tables	37.80	6.12	0.16
DRAGON	textile and accessory	33.19	5.37	0.16
AGEN	textile and accessory	26.15	2.17	0.08
INDEX	textile and accessory	9.78	2.75	0.28
RESLIG	wall decoration	21.66	1.59	0.07
NYTTJA	wall decoration	6.12	1.18	0.19
HAPPEN	wardrobe	44.92	10.84	0.24
KOMPLEMENT	wardrobe	9.19	2.75	0.30
ASKEDAL	wardrobe	211.86	29.84	0.14
VISDALEN	wardrobe	356.29	35.07	0.10
BIALITT	wardrobe	178.55	16.77	0.09
TROGEN	wardrobe	137.73	17.94	0.13

**Table A.3: Products in the 2001 data, mean price and standard deviations**

<b>item</b>	<b>product group</b>	<b>mean price</b>	<b>standard deviation</b>	<b>coefficient of variation</b>
TIMRA	audio furniture	65.31	62.46	0.96
KUBIST	audio furniture	49.18	50.40	1.02
KOMPAS	audio furniture	4.90	5.25	1.07
ABO	audio furniture	47.53	70.01	1.47
FRACK	bathroom	5.63	4.75	0.84
VISDALEN	bedroom	127.35	161.44	1.27
VISDALEN	bedroom	37.25	54.05	1.45
TROMSNES	bedroom	109.07	135.82	1.25
HADELAND	bedroom	37.37	54.14	1.45
NARVIK	bedroom	137.40	177.49	1.29
NARVIK	bedroom	35.06	46.46	1.33
VRADAL	bedroom	94.29	105.16	1.12
EGEBY	carpets and basement	56.14	79.66	1.42
TUNDRA	carpets and basement	8.64	9.65	1.12
ABO	chairs and tables	27.99	35.63	1.27
ABO	chairs and tables	134.62	154.22	1.15
IGGESUND	chairs and tables	58.37	80.92	1.39
PELTO	chairs and tables	135.26	165.49	1.22
HENDRIKSAL	chairs and tables	49.25	53.33	1.08
KRONVIK	chairs and tables	158.19	188.95	1.19
KRONVIK	chairs and tables	44.82	52.59	1.17
JUSSI	chairs and tables	14.06	18.37	1.31
INGO	chairs and tables	17.96	24.75	1.38
ADAM	chairs and tables	20.89	24.84	1.19
RONALD	chairs and tables	19.76	24.75	1.25
DENNIS	chairs and tables	11.03	14.89	1.35
RINGO	chairs and tables	13.02	15.60	1.20
TERJE	chairs and tables	6.73	7.77	1.15
OGLA	chairs and tables	16.52	17.89	1.08
BABORD	corridor	5.44	6.32	1.16
LOGGA	corridor	22.88	18.22	0.80
BONETT	corridor	15.87	8.54	0.54
BRA	corridor	36.55	48.39	1.32
BABORD	corridor	5.49	5.65	1.03
RIGG	corridor	8.77	9.86	1.12
PILOT	corridor	28.10	28.24	1.00
TOMELIA	couch	301.84	397.29	1.32
EKTORP	couch	279.20	357.68	1.28
KLIPPAN	couch	142.26	168.46	1.18
TULSTA	couch	57.54	75.62	1.31
STEN	cupboards	10.99	9.52	0.87
FJORD	cupboards	60.94	63.44	1.04
HARPUN	cupboards	38.82	49.85	1.28

IVAR	cupboards	29.76	28.83	0.97
IVAR	cupboards	5.81	6.17	1.06
BILLY	cupboards	24.47	30.80	1.26
BENNO	cupboards	21.19	30.30	1.43
LIO	cupboards	19.00	25.20	1.33
BONDE	cupboards	92.34	116.35	1.26
KUBUS	cupboards	82.21	101.62	1.24
AKROBAT	cupboards	35.71	45.51	1.27
NARTORP	cupboards	63.31	75.56	1.19
KRONVIK	cupboards	177.01	239.53	1.35
KRYSS	cupboards	34.24	43.96	1.28
SKANDOR	cupboards	52.82	81.68	1.55
ABO	cupboards	143.70	170.55	1.19
NARVIK	cupboards	70.76	107.72	1.52
BIALITT	cupboards	46.84	50.30	1.07
FJORD	cupboards	43.98	55.31	1.26
KURS	cupboards	33.87	51.46	1.52
RAST	cupboards	17.45	20.24	1.16
PRAGEL	kitchen	35.44	30.53	0.86
EDSVIK	kitchen	23.04	26.32	1.14
HAGGVINK	kitchen	26.26	29.48	1.12
FACTUM	kitchen	43.21	47.65	1.10
PERFECT	kitchen	33.80	41.97	1.24
ANTOFINO	lamp	25.20	22.46	0.89
KVINTOL	lamp	13.54	13.91	1.03
TERTIAL	lamp	6.35	7.00	1.10
ERBIUM	lamp	17.23	19.17	1.11
NORSSKEN	lamp	23.45	25.56	1.09
NORSSKEN	lamp	6.46	5.12	0.79
ANTILOP	nursery	6.52	7.16	1.10
GOK	nursery	33.56	25.59	0.76
TROFAST	nursery	41.44	53.55	1.29
TROFAST	nursery	29.40	40.26	1.37
GLIS	nursery	5.05	6.14	1.22
VIKARE	nursery	55.01	68.84	1.25
DUKTIG	nursery	4.61	3.15	0.68
DUKTIG	nursery	6.41	7.79	1.21
MAMMUT	nursery	5.21	6.36	1.22
PANTER	nursery	7.76	9.07	1.17
MAMMUT	nursery	94.61	116.37	1.23
GLIS	nursery	3.26	3.85	1.18
HELMER	office	28.12	32.03	1.14
EFFECTIV	office	78.34	97.80	1.25
OPERATIV	office	103.12	145.51	1.41
EFFECTIV	office	91.76	89.29	0.97
MAXIMAL	office	62.87	87.25	1.39
MAXIMAL	office	64.26	87.33	1.36

TORE	office	47.00	62.84	1.34
BRA	office	16.33	17.98	1.10
BERTIL	office	15.15	19.69	1.30
FRASSE	office	9.67	11.79	1.22
ANTONIUS	organizing	27.17	17.48	0.64
MOPPE	organizing	6.50	7.66	1.18
LACK	storage	7.35	10.72	1.46
JUSSI	tables	28.44	28.16	0.99
KROKSHULT	tables	56.55	80.28	1.42
TIMBRA	tables	34.76	49.00	1.41
LACK	tables	16.65	18.32	1.10
DRAGON	textile and accessory	14.60	16.10	1.10
AGEN	textile and accessory	10.15	13.86	1.37
INDEX	textile and accessory	4.92	4.22	0.86
RESLIG	wall decoration	8.23	11.63	1.41
NYTTJA	wall decoration	2.80	2.87	1.02
HAPPEN	wardrobe	21.51	20.30	0.94
KOMPLEMENT	wardrobe	4.87	3.74	0.77
ASKEDAL	wardrobe	87.41	107.88	1.23
VISDALEN	wardrobe	139.83	187.49	1.34
BIALITT	wardrobe	69.52	94.44	1.36
TROGEN	wardrobe	57.20	69.75	1.22

**Table A.4: Products in the 2009 data, mean price and standard deviations**

item	product group	mean price	standard deviation	coefficient of variation
LACK	audio furniture	50.73	3.38	0.07
BENNO	audio furniture	127.75	3.54	0.03
LIATORP	audio furniture	1006.00	64.62	0.06
LILLHOLMEN	bathroom	15.08	0.33	0.02
GODMORGON	bathroom	21.09	3.20	0.15
VÄNNA	bedroom	34.84	3.60	0.10
EIDE	bedroom	49.59	0.49	0.01
PAX BALLSTAD	bedroom	80.38	6.44	0.08
ENGAN	bedroom	88.21	31.64	0.36
ODDA	bedroom	98.09	3.32	0.03
ASPELUND	bedroom	156.50	19.09	0.12
HEMNES	bedroom	235.25	14.08	0.06
PAX HEMNES	bedroom	358.38	19.29	0.05
EDLAND	bedroom	399.00	0.00	0.00
ERSLEV	carpets and basement	27.09	3.66	0.14
HEMMET	carpets and basement	171.50	13.89	0.08
VITTEN	carpets and basement	97.71	5.15	0.05
ALVINE RUTA	carpets and basement	140.25	9.91	0.07
ANTILOP	chairs and tables	13.22	1.48	0.11
HERMAN	chairs and tables	13.29	2.16	0.16
GILBERT	chairs and tables	24.96	2.67	0.11
MALTE	chairs and tables	31.21	2.31	0.07
NILS	chairs and tables	35.45	3.63	0.10
INGO	chairs and tables	42.34	7.42	0.18
MELLTORP	chairs and tables	43.96	5.72	0.13
MELLTORP	chairs and tables	48.59	3.91	0.08
HENRIKSDAL	chairs and tables	56.96	6.55	0.11
BERNHARD	chairs and tables	136.50	7.07	0.05
STORNÄS	chairs and tables	336.50	23.15	0.07
EKBY JÄRPEN	corridor	12.64	2.51	0.20
EKBY BJÄRNUM	corridor	12.83	2.23	0.17
SKÄR	corridor	69.57	0.47	0.01
KLOBO	couch	94.96	12.73	0.13
POÄNG	couch	99.45	0.48	0.00
KLIPPAN	couch	257.75	32.27	0.13
KARLSTAD	couch	395.25	19.96	0.05
EKTORP	couch	469.00	35.05	0.07
KRAMFORS	couch	534.00	29.76	0.06
IKEA STOCKHOLM	couch	1371.13	50.09	0.04
LACK	cupboards	5.36	0.51	0.10
HYLLIS	cupboards	8.85	1.12	0.13
PAX	cupboards	11.75	2.31	0.20
ÄTRAN	cupboards	15.96	1.93	0.12
EXPEDIT	cupboards	16.75	2.19	0.13

LERBERG	cupboards	17.39	2.35	0.13
LACK	cupboards	20.20	2.19	0.11
BILLY	cupboards	20.56	2.84	0.14
UDDEN	cupboards	22.48	4.57	0.20
EXPEDIT	cupboards	26.63	2.26	0.09
BILLY	cupboards	27.24	2.18	0.08
BILLY BYOM	cupboards	28.38	2.13	0.08
BILLY	cupboards	36.87	2.04	0.06
EXPEDIT	cupboards	58.95	5.60	0.09
LACK	cupboards	99.45	11.85	0.12
EXPEDIT	cupboards	139.75	16.35	0.12
MARKÖR	cupboards	271.50	13.89	0.05
RINGSKÄR	kitchen	90.84	7.96	0.09
UDDEN	kitchen	98.36	10.77	0.11
RATIONELL	kitchen	111.25	22.00	0.20
OXSKÄR	kitchen	221.00	17.34	0.08
STORNÄS	kitchen	315.25	23.26	0.07
DATID OV10	kitchen	423.50	58.57	0.14
NUTID HF560	kitchen	631.00	38.59	0.06
KVART	lamp	16.34	1.30	0.08
ARSTID	lamp	19.21	1.99	0.10
GRUNDTAL	lamp	19.34	1.77	0.09
FORSA	lamp	19.71	0.71	0.04
JANSJÖ	lamp	46.71	4.50	0.10
IKEA 365+ BRASA	lamp	49.71	0.44	0.01
DIODER	lamp	57.08	4.42	0.08
MAMMUT	nursery	19.96	0.02	0.00
JULES	nursery	41.69	3.79	0.09
HENSVIK	nursery	64.07	4.94	0.08
HENSVIK	nursery	80.94	3.64	0.05
HENSVIK	nursery	93.21	14.85	0.16
MAMMUT	nursery	99.46	0.49	0.00
HENSVIK	nursery	109.23	8.99	0.08
MAMMUT	nursery	111.11	41.56	0.37
LEKSVIK	nursery	112.98	20.37	0.18
LEKSVIK	nursery	116.23	21.00	0.18
LEKSVIK	nursery	141.50	7.07	0.05
MAMMUT	nursery	146.50	12.82	0.09
LEKSVIK	nursery	202.25	10.90	0.05
ANDY	office	19.60	0.50	0.03
DAVE	office	20.83	3.76	0.18
SNILLE	office	21.13	1.97	0.09
KOLON	office	23.71	5.18	0.22
MIKAEL	office	37.09	6.94	0.19
JULES	office	59.57	5.60	0.09
SMADAL	office	64.57	5.48	0.08
ASPVIK	office	79.57	0.47	0.01



VIKA AMON	office	83.86	11.36	0.14
FREDERIK	office	94.46	5.12	0.05
ALEX	office	99.46	0.49	0.00
GALANT	office	137.25	8.38	0.06
KOMPLEMENT	organizing	7.68	1.44	0.19
KASSETT	organizing	7.74	1.31	0.17
BENNO	organizing	36.33	3.50	0.10
KOMPLEMENT	storage	20.37	1.92	0.09
LACK	tables	6.73	1.98	0.29
RÖRBERG	tables	57.18	4.59	0.08
KLUBBO	tables	76.95	7.27	0.09
VEJMON	tables	151.50	7.07	0.05
MARKÖR	tables	157.75	6.41	0.04
LUPIN	textile and accessory	10.79	1.26	0.12
RATIONELL	textile and accessory	21.09	2.80	0.13
IKEA STOCKHOLM	textile and accessory	26.71	2.44	0.09
BIGARRA	textile and accessory	28.70	2.31	0.08
RIBBA	wall decoration	10.24	1.16	0.11
SLÄTTHULT	wall decoration	10.86	1.79	0.17
IKEA PS	wall decoration	31.84	3.72	0.12
SKÄR	wardrobe	98.21	3.37	0.03