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Report

Prices of Pharmaceuticals: A Comparison of Prescription Drug Prices in Sweden with Nine European Countries

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PRICES OF PHARMACEUTICALS:

A COMPARISON OF PRESCRIPTION DRUG PRICES IN SWEDEN WITH NINE EUROPEAN COUNTRIES

Kurt R. Brekke and Tor Helge Holmås

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Preface

This report has been conducted on behalf of LIF – the research-based pharmaceutical industry in Sweden. The purpose of the project has been to study the price level of pharmaceuticals in Sweden relative to a set of European reference countries. The project was initiated in December 2011 and finalized in February 2012. During the project period we had a meeting with LIF in January 2012.

The project builds on four previous reports we have written on cross-country price comparisons in Europe using Norway as the base country. The first report (SNF report 05/08) written for the Norwegian Ministry of Health, whereas the three subsequent reports (SNF report 06/09, 08/10, and 11/11) was written for the Norwegian Pharmacy Association. The current report differs from the previous ones along two important dimensions: (i) we use Sweden as the base country for price comparisons; (ii) we select a sample of substances that has no generic sales in Sweden.

The project has been undertaken by Professor Kurt R. Brekke at the Norwegian School of Economics (NHH) and Senior Researcher Tor Helge Holmås at the Uni Rokkan Centre. The authors are affiliated to the Institute of Research of Economics and Business Administration (SNF) and the Centre for Health Economics in Bergen (HEB).

We are grateful to IMS Health for allowing us to use the data used in SNF report 11/11 in this project. We are also grateful for comments and suggestions by Karolina Antonov from LIF, although this does not make her responsible for content and the conclusions in the report. Possible errors and mistakes are of course the responsibility of the authors.

Bergen, February 2012

Kurt R. Brekke

Tor Helge Holmås

Summary

We study the price level of pharmaceuticals in Sweden relative to the following nine European countries; Austria, Belgium, Denmark, Finland, Germany, Ireland, the Netherlands, Norway, and United Kingdom (UK). Our sample consists of prescription drugs that do not have generic sale in Sweden. Using IMS Health data on prices and sales volumes for the first half of 2010, we compute several price indices to describe the price differences and potential cost savings in the non-generic market segment. Our results show that the Swedish price level is slightly below average relative to the other European countries. UK, Norway and the Netherlands tend to have lower prices than Sweden, whereas Germany, Ireland and Denmark tend to have higher prices. Finland has lower prices than Sweden on wholesale level, but slightly higher prices at retail level. Austria and Belgium have about the same price level as Sweden.

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Chapter 1 Introduction

The purpose of this study is to analyze the price level of pharmaceuticals in Sweden relative to other European countries in the non-generic market segment. We have obtained data from IMS Health on prices and sales volumes for the first half of 2010. The sample contains top selling prescription-bound substances with no generic sale on the Swedish market. We compare the prices of this set of (brand-name) products with the following nine European countries: Austria, Belgium, Denmark, Finland, Germany, Ireland, the Netherlands, Norway, and United Kingdom (UK).

We use price index analysis to study the price differences across countries. This usually entails a trade-off between precision and representativity, which is particularly present considering heterogeneous products such as pharmaceuticals. We therefore take two different approaches that in various degrees satisfy these criteria. First, we compare prices of identical packs in Sweden and the reference countries. This approach yields a high degree of precision, but is not likely to produce representative samples of products, implying that price differences are possibly incorrect. Second, we compare average substance (dose) prices across countries. This approach generates more representative samples in each country, and is therefore likely to produce more reliable measures of price differences and potential cost savings across countries.

We compute a wide set of price indices using Sweden as the base country. First, we compute bilateral price indices for all matching products. These indices show that the Swedish price level is slightly below average at both wholesale and retail level. Second, we compute separate price indices for protected and non-protected substances. In the protected segment, the Swedish price level is fairly low, whereas in the non-protected segment the Swedish price level is more at the higher end. The latter might be due to generic sales in the reference countries, so we compute price indices where we exclude substances with generic sale in the reference countries. As expected, the Swedish price level becomes more favorable, but the effect is rather small and does not change the ranking of countries.

Third, we compute price indices for the substances with parallel imports in Sweden. For this sample of products, the Swedish price level is fairly high. However, this is most likely due to the fact that parallel import is more profitable for products with relatively high prices. Finally, we compare the price indices derived in this study with the ones obtained in Brekke, Holmås and Straume (2011) (BHS-study) that used Norway as the base country. As expected, we find that Sweden becomes

relatively cheaper when being the base country. However, the effect is not very strong and does not change the ranking of countries qualitatively.

The rest of the report is organized as follows. In Chapter 2 we provide an overview over the data and our sample of products. In Chapter 3 we present the methods that are used to construct the price indices. In Chapter 4 we present and discuss the results we derive from the analysis, and, finally, in Chapter 5 we draw some conclusions and offer some remarks.

Chapter 2 Data and Sample

Data are provided by IMS Health and contain detailed information on prescription-bound sales the first six months of 2010 for the following ten European countries: Austria, Belgium, Denmark, Finland, Germany, Ireland, the Netherlands, Norway, Sweden, and the UK. The data set is the same as used in BHS (2011) and comprises the 300 most selling substances in Norway. In the current study we limit the sample to the set of substances that do not have generic sale in Sweden. Below we first describe our sample of substances and products, and then the data we make use of in our analysis.

2.1 The sample of substances

In our data there are 169 substances without generic sales in Sweden. We exclude 16 of these substances, because they lack information on patent status, which makes it difficult to compute separate price indices for the protected and non-protected market segment.[1] This leaves us with a sample of 153 substances. Table A.1 in the Appendix provides a full list of these substances with information about patent status, generic sale, and parallel import. In the table below we report the number of substances in each country in our sample.

Table 2.1. Number of substances in Sweden and reference countries, 2010.

	All substances	Substances with patent status "Protected"	Substances with patent status "Not-Protected"	Substances with generic sales	Substances with parallel import
Sweden	153	106	47	0	59
Norway	153	96	57	12	37
Denmark	148	109	39	14	89
Finland	142	85	57	15	17
UK	137	95	42	18	97
Germany	143	104	39	20	122
Netherlands	144	101	43	21	112
Belgium	130	91	39	12	6
Austria	139	101	38	11	2
Ireland	136	96	40	12	0
Global substances	104	54	23	-	-

[1] The 16 substances without information about patent status are the following: ALFACALCIDOL, CALCIUM;COLECALCIFEROL, CINACALCET, CLOSTRIDIUM BOTULINUM TOXIN TYPE A, CYANOCOBALAMIN, CYANOCOBALAMIN;FOLIC ACID;PYRIDOXINE, EPINEPHRINE, FOLLICLE-STIMULATING HORMONE;LUTEINISIN, GLUCOSAMINE, HYDROXOCOBALAMIN, IMMUNOGLOBULIN BASE, LANTHANUM, LITHIUM, PALIVIZUMAB, POLLEN, URSODEOXYCHOLIC ACID.

The table shows that 106 of the 153 substances without generic sales in Sweden are protected by patent regulation. However, the residual 47 substances are non-protected, but generic producers have abstained from entering the market. The table also shows that 59 of the 153 substances have sales of parallel imported products in Sweden.

The matching of substances across countries is fairly high. In fact, all of the 153 substances in Sweden are present on the Norwegian market. In Denmark only 5 of the 153 substances are not on the market. Belgium has the lowest number with 130 matching substances. The number of global substances – i.e., substances that are on the market in all countries – is 104. This reflects that it not the same substances that are missing in the different countries.

The second column in the table shows the number of substances that are protected by patent regulation. In Sweden 106 of the 153 substances are protected. Interestingly, this number varies across the countries in our sample. For instance, in Norway only 96 substances are protected, whereas in Denmark 109 substances are protected. If we consider the 104 global substances, only 54 substances are protected in all of the countries in our sample. These figures demonstrate the variation in the national enforcement of patent protection, despite the harmonization across European countries through EU legislation.

Protected substances do not have generic competition by definition. However, this is not the case for the non-protected substances. In this segment absence of generic competition is due to the generic producers not finding it profitable to launch their generic versions on national markets. While none of the 153 substances have generic sales in Sweden, this is not the case in our reference countries. The highest number of substances with generic sales in our sample is in the Netherlands, where 21 (of 43 non-protected) substances have generic sales. The lowest number is in Austria with 11 (of 38 non-protected) substances have generic sales. In table 2.2 below present the full list of substances that have generic competition in the reference countries. This demonstrates the variation across countries in the extent of generic competition in the non-protected segment.

Parallel import is another source of competition mainly for protected substances, but potentially also for non-protected substances, especially in the absence of generic competition. We see from the table that parallel import plays a large role in Germany and the Netherlands. In Germany 122 of 143 (matching) substances have parallel import. However, in Ireland, Austria and Belgium parallel import seems to play a very minor role. In fact, in Ireland we do not observe parallel import of any of the products in our sample.

Table 2.2. Substances with generic sales in the reference countries, 2010.

	Norway	Den-mark	Finland	UK	Ger-many	Nether-lands	Belgium	Austria	Ireland
AMITRIPTYLINE		X		X	X	X			X
ATORVASTATIN			X						
BETAMETHASONE,SALICYLIC ACID					X				
BUDESONIDE,FORMOTEROL		X							
BUMETANIDE		X		X	X	X			
C1 INHIBITOR (HUMAN)	X				X				
CALCIPOTRIOL				X	X	X	X		
CLOBETASOL				X	X	X	X	X	X
DESOGESTREL,ETHINYLESTRADIOL		X	X			X	X		
DIPYRIDAMOLE			X	X		X			X
DONEPEZIL	X		X						X
DORZOLAMIDE,TIMOLOL				X	X	X			
EBASTINE					X				
EPINEPHRINE,LIDOCAINE			X	X	X	X		X	
ESCITALOPRAM	X	X				X			
ESOMEPRAZOLE		X				X		X	X
FLECAINIDE		X		X	X	X	X	X	X
FLUVASTATIN		X	X	X	X	X		X	X
FUSIDIC ACID				X	X				
HYDROXYZINE				X		X			X
LATANOPROST	X								
LERCANIDIPINE		X	X	X	X	X	X	X	X
LEVONORGESTREL					X				
METHENAMINE			X			X			
METHYLPREDNISOLONE			X		X			X	
METOCLOPRAMIDE	X	X		X	X	X	X	X	
MONTELUKAST			X				X		
NIFEDIPINE		X	X	X	X	X	X	X	X
NYSTATIN				X			X	X	
OLANZAPINE	X		X						
PERPHENAZINE					X	X			
PIVMECILLINAM	X	X	X						
PRAMIPEXOLE	X								
PROGESTERONE		X		X	X	X	X		X
QUETIAPINE	X		X					X	
SALMETEROL						X			
SIBUTRAMINE	X								
SILDENAFIL			X						
TERBUTALINE		X		X	X	X			
THALIDOMIDE	X								
TIBOLONE							X		
VALSARTAN	X								
WARFARIN				X			X		X

Let us take a closer look at the number of products in our sample. The table below provides the number of (unique) packs on the market for each country. We see that there are 791 unique packs of the 153 different substances on the market in Sweden. This implies an average of slightly above 5 different packs per substance. Since there are no generic sales in Sweden for this sample of substances, the 791 packs are all brand-name or parallel imported (brand-name) products.

Table 2.3. Number of packs in each country depending on patent status and parallel imports, 2010.

	All substances	Patent status "Protected"	Patent status "Not-Protected"	Parallel import
Sweden	791	566	225	170
Norway	630	377	253	53
Denmark	732	503	229	292
Finland	664	363	301	33
UK	661	436	225	354
Germany	1200	750	450	759
Netherlands	807	529	278	450
Belgium	516	340	176	9
Austria	606	383	223	4
Ireland	461	311	150	0

The first column shows that there is quite some variation across the countries in the number of packs on the market in our sample of substances. Germany has the highest number with 1200 unique packs of the 143 substances. Ireland has the lowest number of packs, with only 461 packs of the 136 substances in the sample. The number of packs is likely to be higher for substances with parallel imports and/or generic sales, where the brand-name producers face competition from parallel traders or generic producers.

Let us finally take a look at the number of doses per pack in each country. We see from the table below that there is some variation across countries in the average pack size. Indeed, Sweden has the highest average number of doses (45.1) per pack, whereas UK and the Netherlands have the lowest pack sizes with 29.9 and 27.3 doses on average.

Table 2.4. Average number of doses per pack, 2010.

	All substances	Substances with patent status "Protected"
Sweden	45.1	39.6
Norway	44.5	38.0
Denmark	41.1	36.7
Finland	40.5	35.2
UK	29.9	26.7
Germany	40.4	39.1
Netherlands	36.7	27.2
Belgium	37.9	35.7
Austria	27.3	25.6
Ireland	32.5	27.9

We also see that the pack sizes are on average lower for the substances that are protected by patent regulation. This pattern is consistent across countries, and implies that the non-protected segment has a higher average number of doses per pack, which drives up the average for all substances. This can be due to generic producers entering the non-protected market with large packs and/or parallel importers entering the protected market with small packs. Alternatively, the higher average pack size in the non-protected segment is due to sample selection, where some of the substances in the non-protected (protected) segment are characterized by relatively large (small) pack sizes.

More importantly, the relatively large variation in the number of packs and the average pack size across raises a concern regarding the representativity of price comparisons based on matching of identical packs. The issue is related to how many of the 791 unique packs on the Swedish market we are able to find in the reference countries. Indeed, if a large number of packs are not possible to match, then the resulting price differences might be biased and potentially incorrect. We will return to this issue in the next chapters.

Chapter 3 Method and Analysis

We will use standard price index method to compare prices across countries.[2] Price indices are often sensitive to how they are calculated. The results might vary according to the sample, the matching procedure, and the use of weights. We therefore compute several price indices using different procedures. In this chapter we first describe some general aspects of price index analysis and then afterwards the various matching procedures that we use.

3.1 Basic price index analysis

A price index is a weighted average of prices for different products, usually calculated over time, such as the consumer price index. If we have two time periods, period 0 and *t*, and two products, product 1 and 2, we can express a price index as follows:

$$I_P = \frac{p_1^t w_1 + p_2^t w_2}{p_1^0 w_1 + p_2^0 w_2} \times 100,$$

where w_1 and w_2 are weights applied to the respective prices $p_1^0, p_1^t, p_2^0 \text{ and } p_2^t$. When calculating price indices it is common to use sold quantities of the products as weights to take account of the relative importance of the prices of the various products. We can obtain two different price indices depending on the choice of weights. If we choose sold quantities in the comparison period (period *t*) as weights, we obtain the so-called *Paasche price index*:

$$P_P = \frac{p_1^t q_1^t + p_2^t q_2^t}{p_1^0 q_1^t + p_2^0 q_2^t} \times 100,$$

where $q_1^t \text{ and } q_2^t$ are the quantities of product 1 and 2 sold in period *t*. If we use quantities sold in the base period (period 0) as weights, we obtain the so-called *Laspeyres price index*:

$$L_P = \frac{p_1^t q_1^0 + p_2^t q_2^0}{p_1^0 q_1^0 + p_2^0 q_2^0} \times 100,$$

where q_1^0 and q_2^0 are the quantities of product 1 and 2 sold in period 0. Both these price indices will express changes in average prices over time. If prices are less (more) than 100, this means that there has been a reduction (increase) in average prices over the period.

[2] See Danzon (1999) and Danzon and Chao (2000) for a discussion and analysis of cross-country price comparisons of pharmaceuticals.

In this study we calculate differences in average prices across countries (not over time) to study whether the prices in Sweden are higher or lower than in the reference countries. To explain how the price indices are constructed, we assume two countries, Sweden and Abroad, where products 1 and 2 are sold (but in potentially different quantities). The general price index can then be expressed as

$$I_P = \frac{p_1^A w_1 + p_2^A w_2}{p_1^S w_1 + p_2^S w_2} \times 100,$$

where p_1^A and p_2^A are the prices of product 1 and 2 abroad, p_1^S and p_2^S are the prices of products 1 and 2 in Sweden, and w_1 and w_2 are the weights to be applied to these different prices. If we use quantities sold abroad as weights, we calculate the Paasche price index. However, for cross-country price studies, it is more common to compute the Laspeyres price index, where the quantity sold in the base country (Sweden) is used as weights. The Laspeyres price index for cross-country comparisons can be expressed as follows:

$$L_P = \frac{p_1^A q_1^S + p_2^A q_2^S}{p_1^S q_1^S + p_2^S q_2^S} \times 100,$$

where q_1^S and q_2^S are quantities sold of product 1 and 2 in Sweden. If the price index is more (less) than 100, this means that average prices abroad are higher (lower) than in Sweden. However, it does not mean that all prices are higher abroad than in Sweden. We can imagine that product 1 has a higher price abroad than in Sweden ($p_1^A > p_1^S$), while the converse is true for product 2 ($p_2^A < p_2^S$). Whether the price index will be higher or lower than 100 depends on the magnitude of price differences and the quantity weights.

Using Swedish quantity weights, the price indices provide a measure of what the consumption of pharmaceuticals in Sweden would cost with the foreign price level. A price index below 100 would show the cost savings that can be obtained if Sweden imported the foreign prices given that the Swedish consumption remained unchanged. This is a strong assumption that is only reasonable if the demand is perfectly price inelastic. If this is not the case, then demand responses would either counteract or reinforce the cost savings reported by the price indices. We can also imagine supply side responses due to competition when prices of rival products are changed. In addition, the implementation of lower prices is of course a hard task. Thus, the cost savings measured by the price indices should be treated with some caution.

3.2 Matching of products

Having decided on the type of price index to compute, the next question is how to match the products in the base country (Sweden) with the products in the reference countries. As mentioned before, there is an inevitable trade-off between precision and representativity when it comes to comparing prices of heterogeneous products such as pharmaceuticals.

Precision is attained when comparing prices of exactly the same product across countries. A common approach is to select the most sold pack with a given substance in the base country and compare the price of this pack with the price of an identical pack in the reference country. The problem with this procedure is two-fold. First, this pack is representative in the base country due to being the most sold one, but rarely representative in the reference country, where other packs with the same substance might have higher sales. Second, this pack might not be sold at all in the reference country. If this is the case for several packs, then the sample of products that forms the basis for price comparisons would be biased and not representative for both the base and the reference country. The price indices would also be very sensitive to the sample of products.

In order to mitigate this problem somewhat, we do not match only the most selling packs, but instead match the whole population of packs on the market in the base country. This gives a much broader sample and increases the representativity at the same time as the precision in the price comparisons is preserved. In computing the price indices, we use the number of doses sold of a given pack in the base country (Sweden) as weights. However, the matching numbers show that even this procedure results in a significant loss of products in both the base and the reference countries, which means that there is still a concern that the price differences are not representative across countries.

To ensure representativity we compute the (volume-weighted) average dose price for each substance in each country. To illustrate how this price is computed, we may consider the following example. Assume that for active substance A (for example in Sweden) we have three different packs with the following prices and sales volumes:

- Pack 1A: the price is SEK 10 per dose and the sales volume is 5 doses
- Pack 2A: the price is SEK 20 per dose and the sales volume is 10 doses
- Pack 3A: the price is SEK 30 per dose and the sales volume is 15 doses

The volume-weighted average dose price is then computed as follows:

$$\text{SEK}\,10\times\frac{5}{30}+\text{SEK}\,20\times\frac{10}{30}+\text{SEK}\,30\times\frac{15}{30}=\text{SEK}\,23.33$$

The arithmetic (un-weighted) average dose price in the example is SEK 20. The volume-weighted average dose price is higher because the more expensive packs also have higher sales than the cheaper pack. If the cheaper pack had a higher sales volume than the more expensive packs, then the volume-weighted average price would become lower than the arithmetic average price. Finally, if we selected only the top-selling pack, we would in this example report a price level of SEK 30 per dose, and consider this to be representative price for this substance in the base country (Sweden).

Thus, the advantage of using the volume-weighted average dose price is that it makes use of all sales information in each country and produces a representative price level of each country. Moreover, using this measure implies that we match substances and not packs across countries. The set of matching substances is much larger than the set of matching packs, which means that sample is not biased and the price indices are likely to be more precise measures of price difference across countries.

Chapter 4 Results

In this chapter we present the results from the price index analysis. We have computed a wide range of price indices for various market segments using different matching procedures. The complete set of price indices can be found in Table A.2 to A.5 in the Appendix. Below we present the ones we find more interesting and relevant.

4.1 Price indices based on identical packs

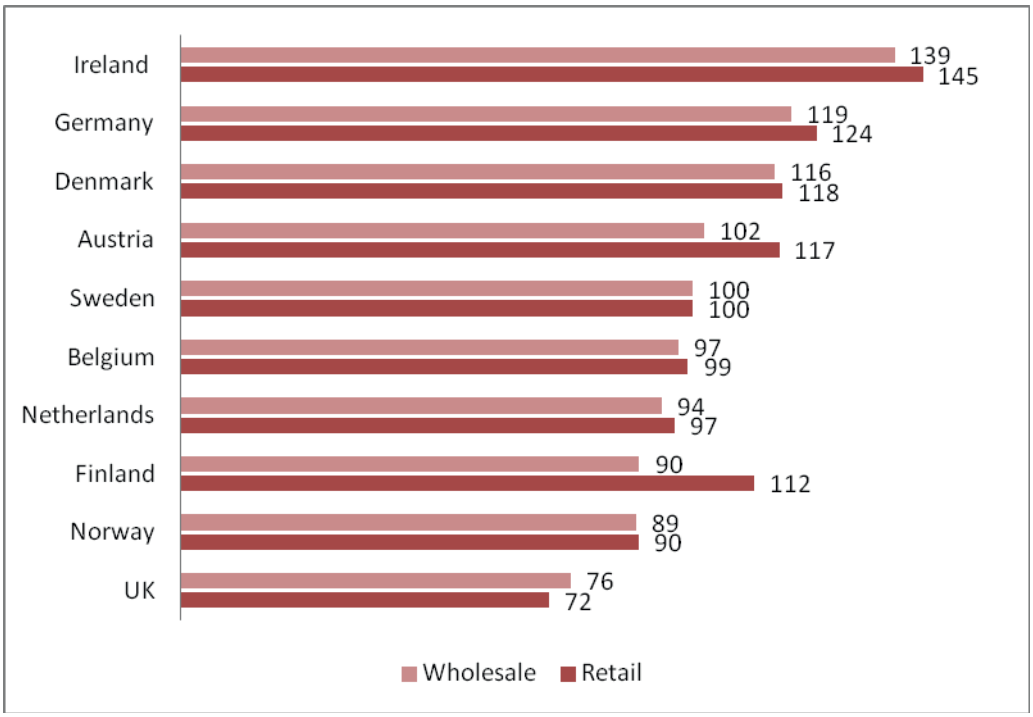
We first compare prices of identical packs (same size, strength and formulation). A standard approach is to select the top selling pack within a given substance in the base country (Sweden) and compare the price of this pack with prices of identical packs in the reference countries. The problem with this procedure is that the sample becomes very small and potentially biased, so the resulting price indices will be incorrect measures of cross-country price differences.

We therefore take the same approach as in BHS (2010) and match all (not just the top selling) identical packs between Sweden and each reference country. This gives us a much larger and more representative sample of products. Quantity weights are computed by dividing the number of doses sold of a given pack with the total number of doses sold of all the matching packs. We use the Swedish sales volumes to compute the quantity weights and use these to compute the bilateral price indices. Since the sample of matching packs varies across countries, there will be a unique set of quantity weights for the different price indices.

A challenge with matching identical packs is that there might be several identical packs within a given country. The same pack (size, strength and formulation) may be offered by different firms, such as brand-name producers and parallel importers. In some countries there are also generic producers. We handle this issue by computing the volume-weighted average price for identical packs when there are several identical packs in a given country. This (representative) pack price is then the basis for computing the price indices.

The full set of bilateral price indices based on identical packs can be found in Table A.2 in the Appendix. Below we present some of the price indices. We first consider the price indices based on all substances (the full sample) in Sweden. The figure below shows these price indices at both retail and wholesale level. The countries are ranked from lowest to highest prices according to the whole price levels.

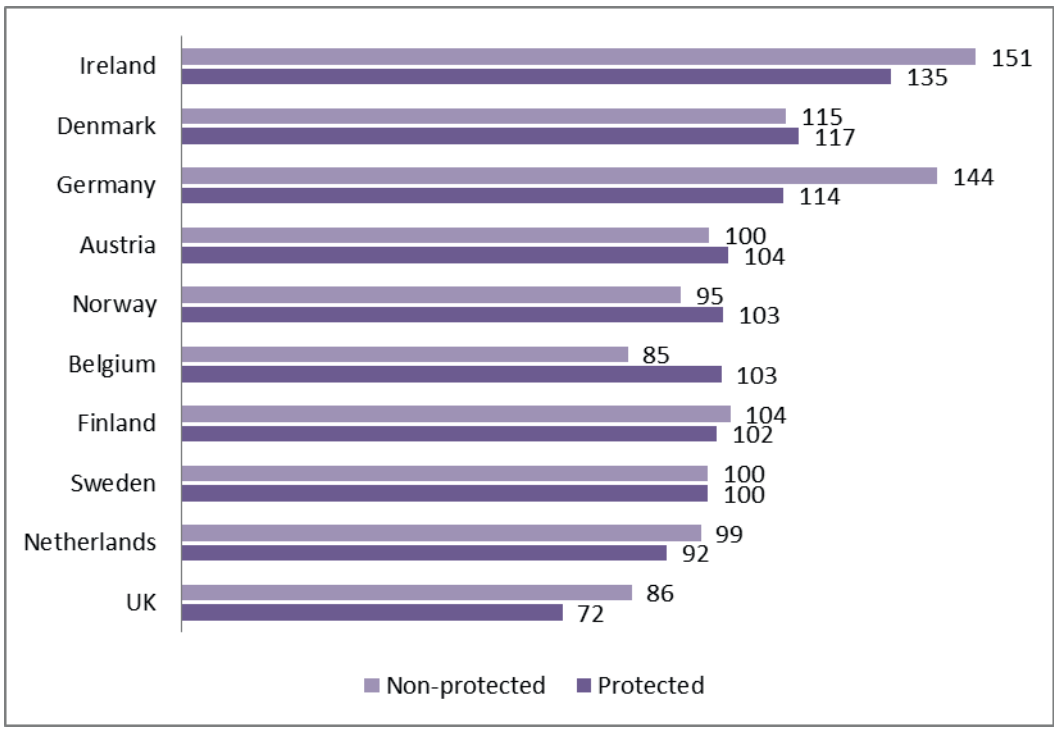
Figure 4.1. Bilateral price indices based on identical packs, all substances, 2010.



The figure shows that the Sweden is in the middle of the price ranking. Ireland is the most expensive country with 39 percent higher wholesale prices than Sweden. Also Germany and Denmark are also more expensive than Sweden with, respectively, 19 and 16 percent higher wholesale prices. Austria, Belgium and the Netherlands have about the same price level as Sweden. The residual countries have significantly lower prices. UK is the cheapest country with 24 percent lower wholesale prices than Sweden. Norway and Finland have about 10 percent lower prices at wholesale level. The price ranking at retail level is more favorable for Sweden. This is due to lower pharmacy margins than the rest of the countries except for UK.

The next figure shows the separate price indices packs with protected and non-protected substances. We match only packs that have the same patent status in Sweden and the reference countries, and compute bilateral price indices. We report the price indices based on prices at wholesale level. The price indices for retail level can be found in table A.2 in the Appendix. The countries are ranked from lowest to highest prices in the protected market segment.

Figure 4.2. Bilateral price indices for identical packs, protected and non-protected substances, wholesale prices, 2010.



The figure shows that the Swedish price level is more favorable for the protected market segment. In this market segment only UK and the Netherlands have lower wholesale prices. The UK price level is 28 percent lower than in Sweden, whereas the Netherlands has 8 percent lower prices. In the other end, we find Ireland with 35 percent higher prices. Also Denmark and Germany have significantly higher prices than Sweden in the protected market segment. The residual countries have only marginally higher wholesale prices.

In the non-protected market segment the picture is different. In this segment, the Swedish price level is more at the average. UK, Belgium, Norway and the Netherlands have lower prices. However, the cost savings from importing the UK price level is smaller than in the protected segment. Ireland and Germany are particularly expensive in the non-protected segment. Importing the Irish price level would result in a 51 per cent increase in the pharmaceutical expenditures in Sweden assuming that the consumption pattern is unchanged.

The problem with comparing prices of identical packs is, as mentioned before, that the sample becomes small, potentially biased and thus non-representative for Sweden and the reference countries. The table below reports the population of packs in each country and the number of identical packs that can be matched with Sweden.

Table 4.1. Number of packs in each country and number of identical packs with Sweden.

	All substances		Protected		Non-protected	
	Population	Matched	Population	Matched	Population	Matched
Sweden	791	-	566	-	225	-
Norway	630	438	377	263	253	97
Denmark	732	493	503	364	229	116
Finland	664	448	363	274	301	85
UK	661	313	436	248	225	63
Germany	1200	434	750	337	450	82
Netherlands	807	337	529	262	278	64
Belgium	516	282	340	225	176	50
Austria	606	288	383	229	223	51
Ireland	461	272	311	213	150	48

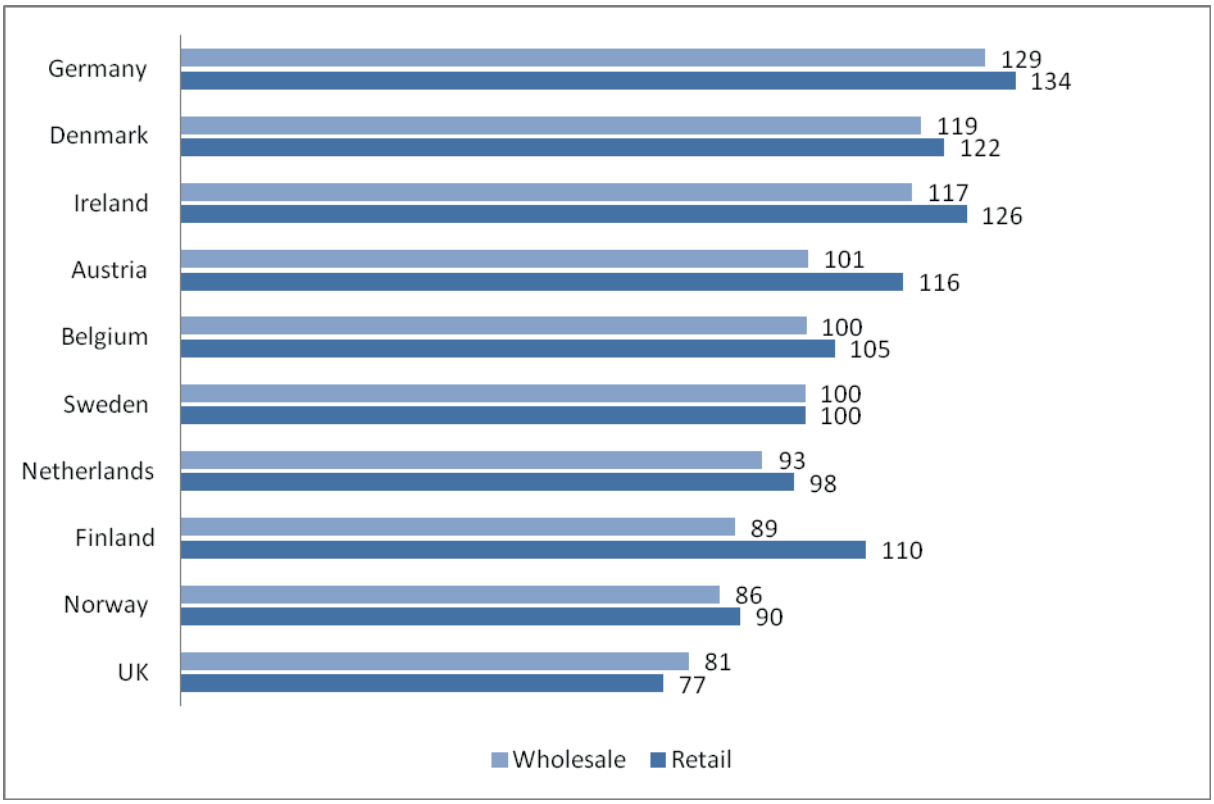
The table shows that the sample of matching packs is significantly lower than the total number (population) of packs in Sweden and the reference countries. The biggest reduction in the sample occurs when we match packs with Germany. The number of matching packs between these two countries is 434, whereas Germany and Sweden have a population of packs equal to 1200 and 791, respectively. Notice, however, that the loss of observations is not as large as it appears, since there might be several suppliers (brand-name producers, parallel traders, generic producers) of the same pack in each country. Our procedure of computing the volume-weighted average pack price when there are several identical packs in a given country implies that the actual loss of information is somewhat lower. However, the problem is still significant as shown in the table. In the following sections, we therefore focus the price indices based on the (volume-weighted) average dose prices at substance level.

4.2 Price indices based on substance (dose) prices

The average dose prices per substance are computed using all sales information in each country. Since we have information about the dose price and the number of doses sold of each pack, we can compute the volume-weighted average dose price for each substance in each country. We then compare these substance (dose) prices across countries for the set of matching substances and construct price indices using the Swedish quantity weights. The quantity weights are simply the number of doses sold of a given substance relative to the total number of doses sold of all matching substances. Since the sample of matching substances varies across countries when we compute bilateral price indices, there will be a unique set of quantity weights for each comparison.

The full set of bilateral price indices based on volume-weighted average substance (dose) prices is reported in Table A.3 in the Appendix. Here, we will focus on the ones we find most relevant. Let us first consider the bilateral price indices for all matching substances irrespective of whether they are protected or not. In the figure below we report these price indices at wholesale and retail level.

Figure 4.3. Bilateral price indices based on average substance prices at retail and wholesale level for all substances.

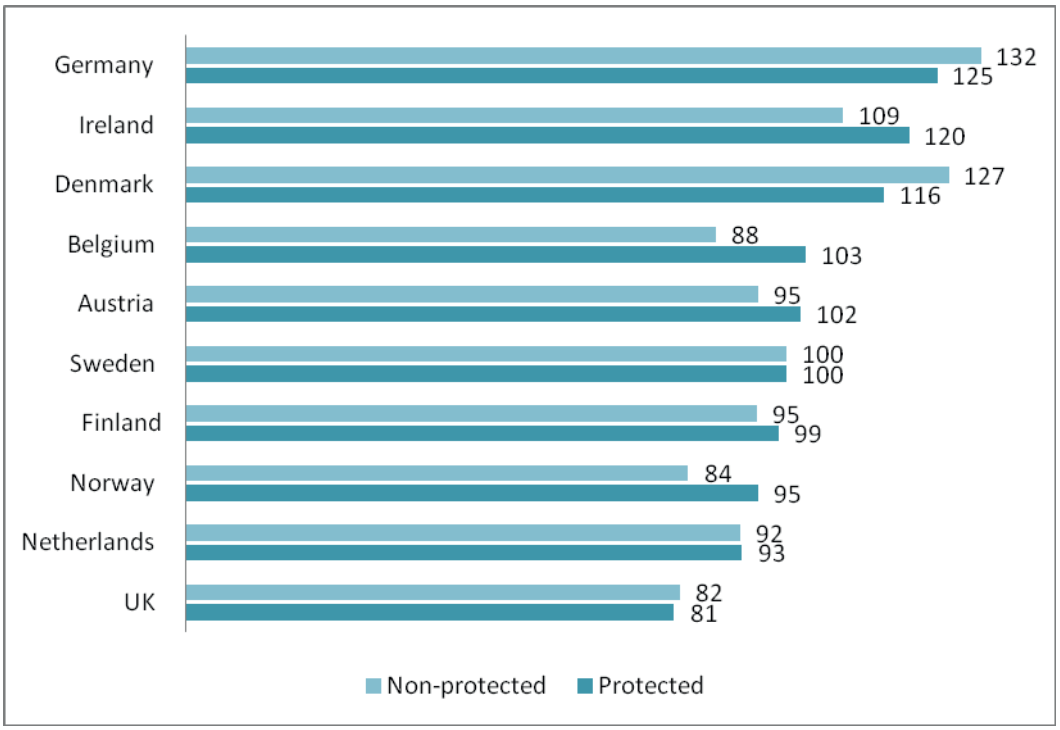


The figure shows that the Swedish price level is on average for this group of countries. Germany is the most expensive country. Importing prices at wholesale level would result in a 29 percent increase in the Swedish pharmaceutical expenditures assuming the consumption is unchanged. The cheapest country is UK with 19 percent lower prices than in Sweden. If we consider retail (pharmacy) prices, the Swedish price level becomes slightly more favorable. This reflects that the pharmacy margins in Sweden are lower than in the reference countries except for UK. Austria and particularly Finland appear to have substantial pharmacy margins as their price indices at retail level become much higher relative to Sweden.

Let us now divide the sample into protected and the non-protected substances and compare prices of the matching substances. Note that we compare price of substances with the same patent status in Sweden and the reference countries, implying that we exclude substances that are protected in

Sweden but not in the reference country, and vice versa. The figure below shows the bilateral price indices at wholesale level for these two market segments. The ranking of countries is based on the price indices for the protected segment, which is also the largest market segment.

Figure 4.4. Bilateral price indices based on average substance prices at wholesale level for protected and non-protected substances.



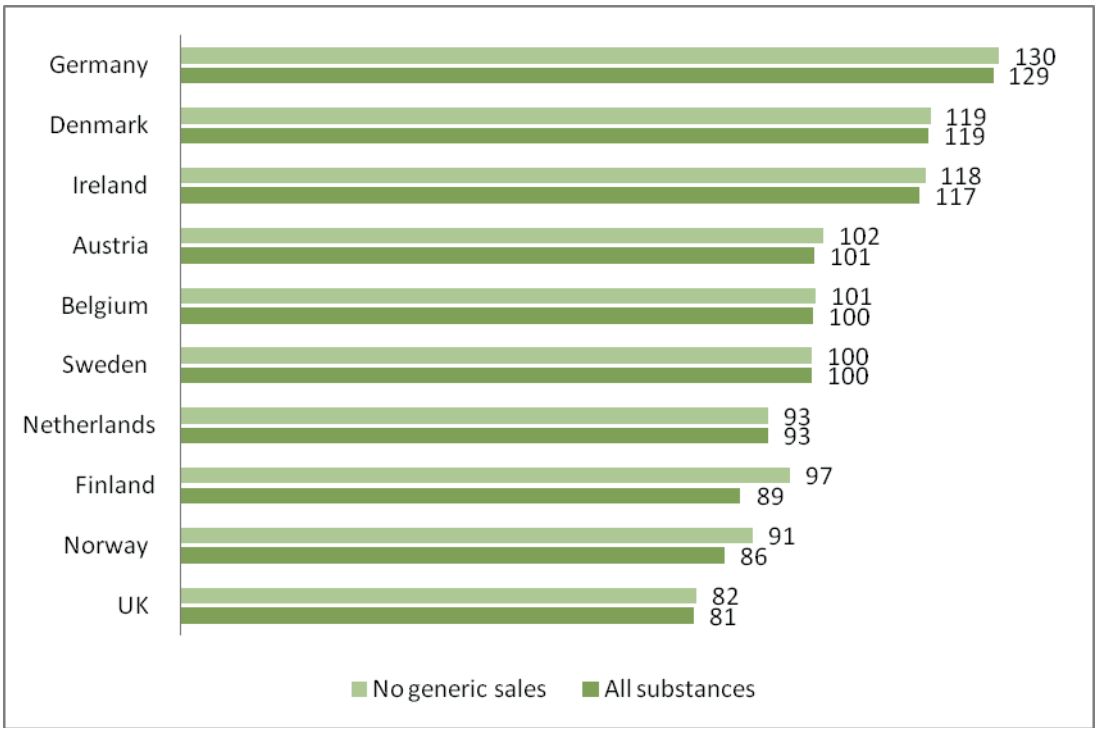
The figure shows that Sweden has a slightly below average price level for the protected substances. Germany is the most expensive country with a 25 percent higher wholesale price level than Sweden. Also Ireland and Denmark have significantly higher wholesale prices than Sweden in the protected segment. UK is the cheapest country. Importing the UK wholesale level would result in a 19 percent reduction in the Swedish pharmaceutical expenditures in the protected segment assuming the consumption is unchanged. The Netherland and Norway also have lower wholesale prices than Sweden, whereas Finland, Austria and Belgium have about the same price level.

The picture is somewhat different for the non-protected substances. In this segment, the Swedish wholesale price level is above average. Germany and Denmark are the two most expensive countries in the market segment with, respectively, 32 and 27 percent higher prices than Sweden. Ireland is also slightly more expensive. However, the rest of the countries have a lower wholesale price level in the non-protected market segment. UK is the cheapest country. Importing the UK price level would result in an 18 percent reduction in the Swedish expenditures on non-protected substances.

4.3 Generic competition

Our sample is defined by the set of substances without generic sales in Sweden. However, as shown in Table 3.1, some of these substances do have generic sales in the reference countries. A potential issue is that generic competition might drive down the price indices for the reference countries, so that Sweden seems to be more expensive than they actually are when accounting for generic competition. Notice, however, that the price indices for the protected segment do not include substances with generic sales in the reference countries as we match only substances that are protected in both countries. To look more carefully at the issue of generic competition, we have computed to different sets of price indices: (i) price indices for substances without generic sale; (ii) price indices for non-protected substances without generic sale. In the figure below we report bilateral price indices at wholesale level for all substances irrespective of whether there is generic competition or not and bilateral price indices for the set of substances that do not have generic sales.

Figure 4.5: Bilateral price indices based on average substance prices at wholesale level for all matching substances and matching substances without generic competition.

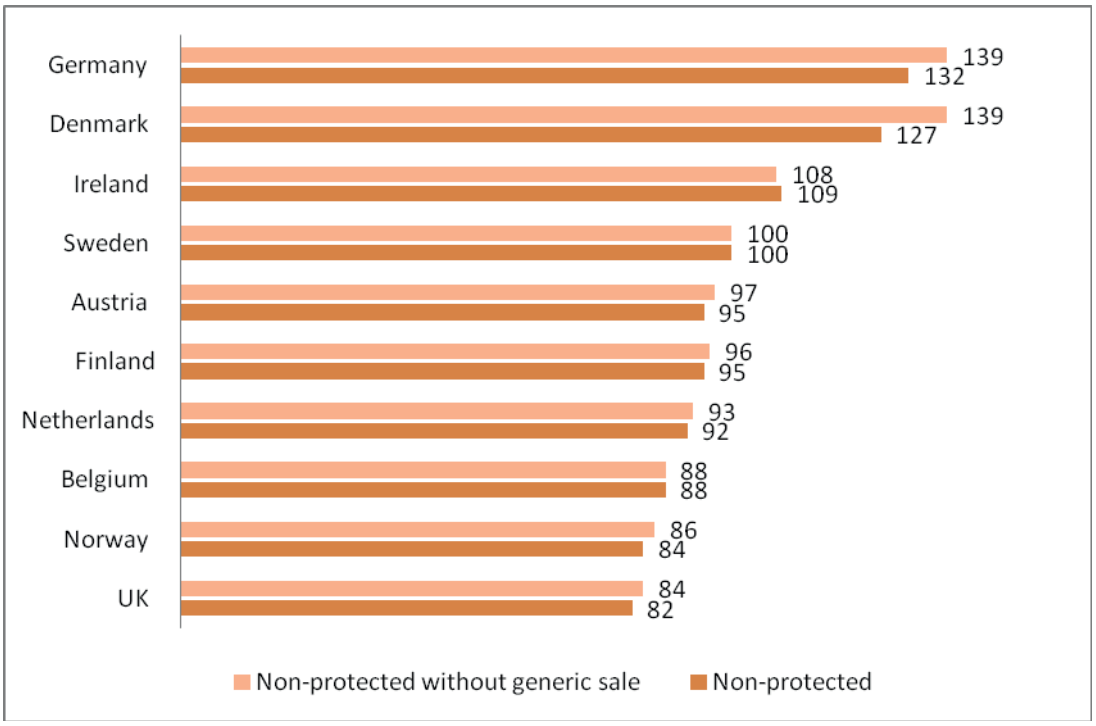


The figure shows that generic competition in the reference countries for some non-protected substances does not matter much for the price indices computed for all matching substances. However, there is a tendency for Sweden becoming slightly cheaper when excluding the substances in the reference countries that have generic sales, as we would expect, but the impact is very

moderate. The only exception is Finland, which is 11 percent cheaper than Sweden at wholesale level for all substances, but only 3 percent cheaper than Sweden when we exclude the substances with generic competition.

We do the same exercise for the non-protected segment. In Table A.3 we report the bilateral price indices for the non-protected substances that do not have generic sale.

Figure 4.6. Bilateral price indices based on average substance prices at wholesale level for non-protected substances with and without generic sales.

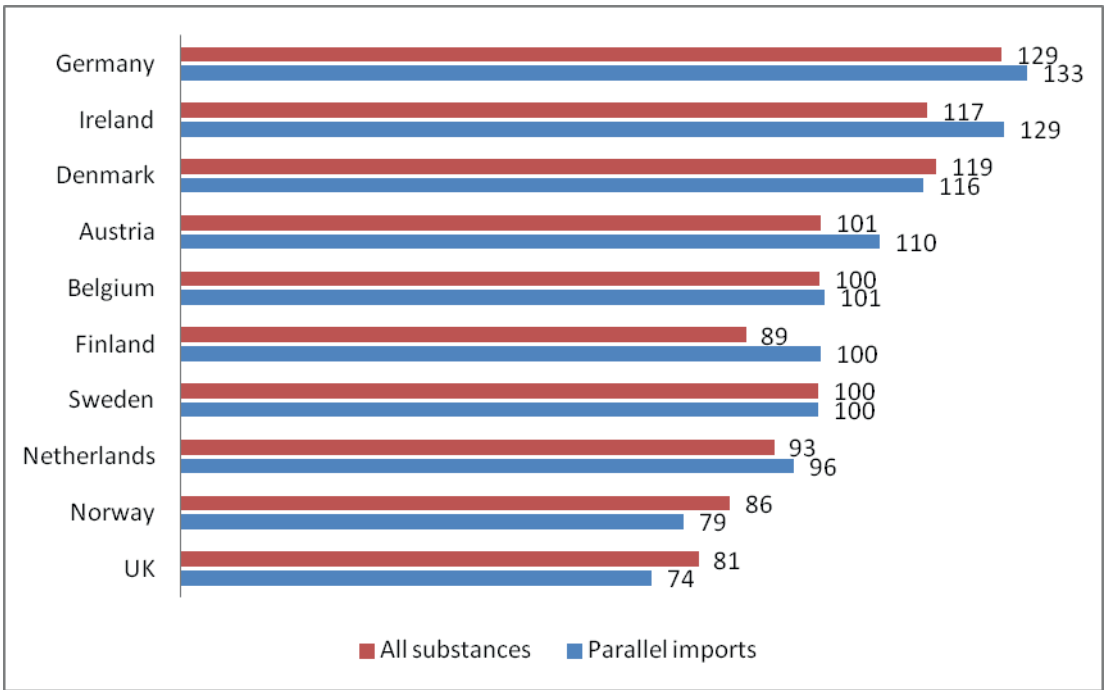


The figure shows mostly the same picture for non-protected substances as for all substances. When excluding substances with generic sale in the reference countries, Sweden becomes cheaper relative to the reference countries. For most countries the effect is small, but for some countries generic sales seem to matter for the price levels. In particular, Denmark and Germany become, respectively, 12 and 7 percent more expensive relative to Sweden when excluding the substances with generic sale in these countries. Thus, generic competition plays a role for the price indices, but the impact is very low in most cases and does not generate any significant upward distortion on the Swedish price level.

4.4 Parallel import

In the EU parallel trade is encouraged among member countries also for pharmaceuticals. Parallel importers constitute a competitive threat for the brand-name producers. In Table 3.1 we showed that the extent of parallel import varies quite a lot among the countries in our sample. Germany has the highest number (122) of substances with parallel import and the highest number of parallel imported packs (759), whereas Ireland has no parallel imports at all for the substances in our sample. In Sweden 59 of 153 substances has parallel import, and 170 of 791 packs are parallel imported. The figure below compares the bilateral price indices at wholesale level for all substances and for the substances with parallel imports in Sweden. We do not restrict the comparison to matching substances with parallel imports, since this number is too low. The figures are, however, reported in Table A.3 in the Appendix.

Figure 4.7: Bilateral price indices based on substance prices at wholesale level for all substances and substances with parallel imports in Sweden.



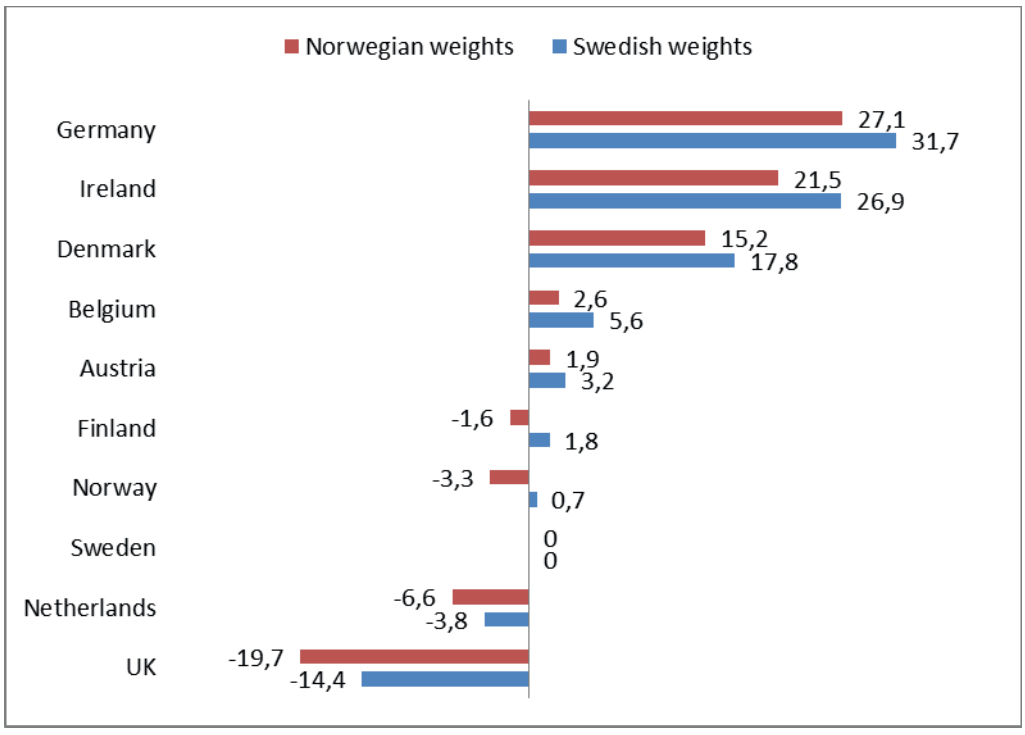
The figure shows a clear pattern. Sweden becomes relatively more expensive for the set of substances that have parallel import. This is perhaps as expected, since parallel import is profitable only if the price level in the importing country is higher than in the exporting countries. Thus, we would expect to observe parallel import for substances with relatively high prices in Sweden. This is probably also the reason why the high-price country Germany has a lot of parallel imports. On the other hand, one would expect that de facto parallel import would lead to lower prices due to

competition with the original brand-name producer. This is, however, not consistent with the results from the price indices above.

4.5 Comparison with the Norwegian study

An interesting question is whether the use of Swedish consumption weights influences the price indices in any significant way. It is usually argued that each country becomes relatively cheaper when being the base country. We therefore compare the results from this study with the Norwegian study by BHS (2011). We focus on the global price indices for substances without generic sale (in all countries), since the set of matching substances is the same in both studies for these indices. The global price indices are reported in table A.3 in this report and table 4.3 in BHS (2011). We modify the price indices in BHS (2011) by assuming Sweden to be the base country. For illustrative purposes we assume the base index to be zero (rather than 100). The figure below shows the comparison of the price indices using Swedish and Norwegian consumption weights.

Figure 4.8. Global price indices, average dose prices, wholesale level, substances without generic sales in all countries (N=73), Norwegian and Swedish weights.



As expected, we see that the price indices are more favorable for Sweden when using Swedish consumption weights. The high-price countries become more expensive, whereas the low-price countries become less cheap relative to Sweden. The same picture is present at retail level as well.

The gain from importing the UK wholesale price level is reduced from 19.7 to 14.4 percent, whereas the cost of importing the German price level is increased from 27.1 to 31.7 percent. This shows that one cannot simply use price indices based on other countries consumption weights to infer cost savings in own home country. In fact, it might be reasonable to assume that the cost savings (increases) generally are lower (higher) using consumption weights from home country, as illustrated in the figure above. The argument is that each country tends to consume more of pharmaceuticals that are relatively cheap. Whether this is due to consumer behavior or regulation is an open question.

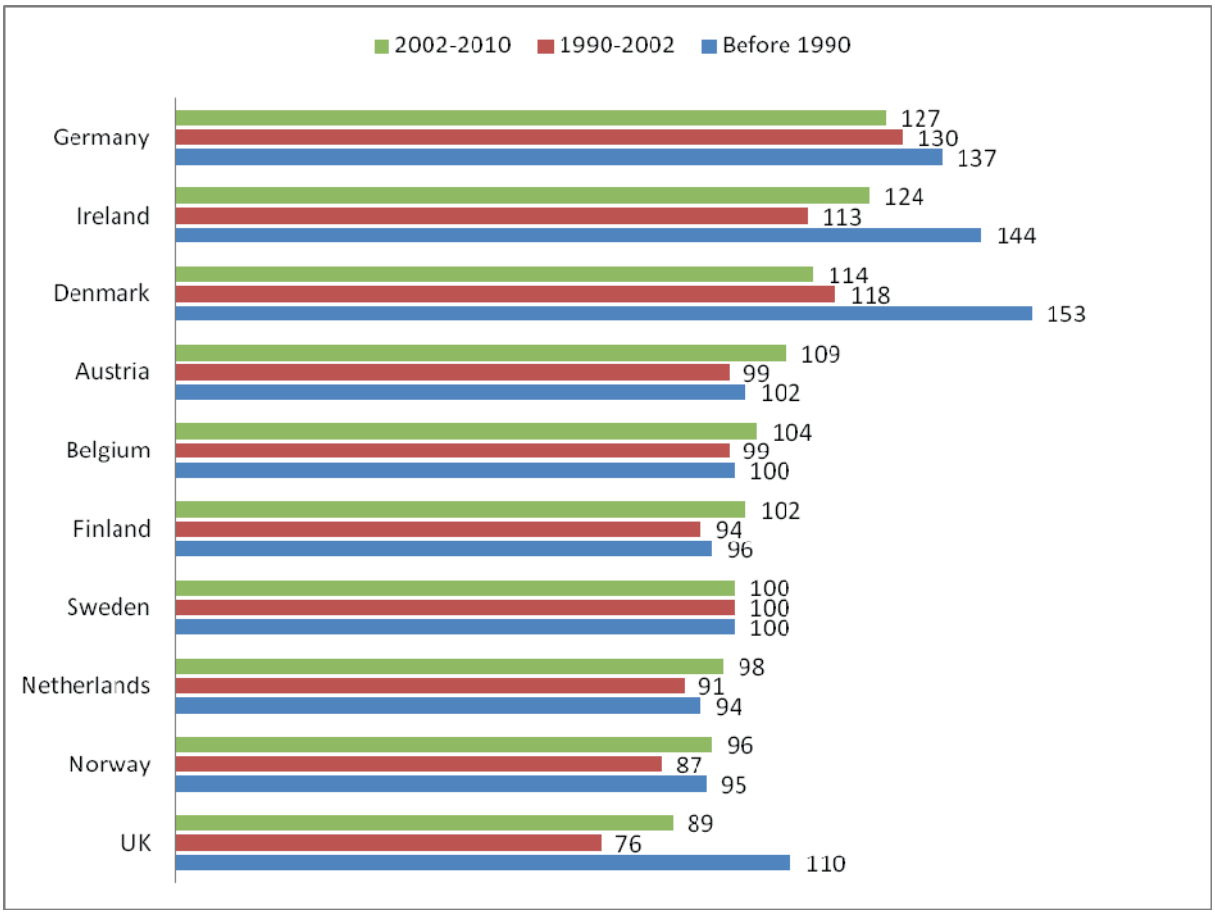
We could have compared the bilateral price indices in this study with the Norwegian study by BHS (2011). If we do so, the Swedish price level would be reduced from 12 to 6 percent higher than the Norwegian price level at wholesale level. The problem is, however, that the set of substances for the residual countries vary across the studies for these indices. The set of matching substances between Norway and the reference countries is not the same as between Sweden and the reference countries, except for between Norway and Sweden of course. This means that differences in price indices in the two studies might be due to different samples of products rather than different consumption weights.

4.6 Price indices for new and old products

Finally, we have added information about the introduction dates on the Swedish market for the substances in our sample. This information can give us an idea of how the prices have developed in the different countries over time. In particular, we can study the price levels of new and old substances. We split the sample into substances launched on the Swedish market before 1990, between 1990 and 2002, and after 2002 until 2010. In the period before 1990, the growth in the pharmaceutical expenditures was fairly stable and moderate, and Apoteket AB (the state-owned wholesaler) had a role in the price setting. In the period between 1990 and 2002 several blockbusters were introduced on the Swedish market, resulting in escalating pharmaceutical expenditures. In this period the responsibility for price setting of pharmaceuticals was transferred to the social insurance body called Riksförsäkringsverket (RFV). In 2002 the responsibility for price setting of pharmaceuticals was transferred to a new regulatory body, which now is called Tandvårds- och Läkemedelsförmånsverket (TLV). At the same time Sweden introduced reference pricing and mandatory generic substitution at pharmacy level.

The figure below shows the price indices for these three periods. We have ranked the countries from lowest to highest prices in the last period (after 2002). The full set of price indices can be found in table A.5 in the Appendix.

Figure 4.9. Bilateral price indices for average substance prices at wholesale level for all substances depending on the introduction date in Sweden.



The figure shows quite some variation in the price differences over time. If we compare the old substances (before 1990) with the new substances (after 2002), we see that some countries (Germany, Ireland, Denmark, and UK) have a higher price level than Sweden on the old substances than on the new substances. UK, which is the cheapest country, is actually 10 percent *more expensive* than Sweden on the old substances, but 11 percent cheaper than Sweden on the new substances. Denmark is 53 percent more expensive than Sweden on the old substances, whereas the price difference is only 14 percent on the new substances. For the rest of the countries, the figures are reversed, though the changes are more moderate. Austria has 2 percent higher prices than Sweden on old substances, but 9 percent higher prices on new substances. Similar figures apply to Belgium, Finland, the Netherlands, and Norway.

If we compare the price differences of substances launched between 1990 and 2002 with the more recent substances launched after 2002, we see a tendency to Sweden becoming less expensive than the reference countries. For instance, UK is 24 percent cheaper than Sweden on the substances introduced between 1990 and 2002, but only 11 percent cheaper on the substances introduced after 2002. The same figures apply to Norway, the Netherlands, Finland, Belgium, Austria, and Ireland. The exceptions are Denmark and Germany, which tends to have slightly lower prices on the more recent substances. Thus, there is a tendency to Sweden being more expensive on the old substances launched before 1990, but less expensive on the more recent substances launched after 2002.

Chapter 5 Conclusions and Remarks

We have analyzed the price level of pharmaceuticals without generic sale in Sweden relative to the following nine European countries: Austria, Belgium, Denmark, Finland, Germany, Ireland, the Netherlands, Norway, and UK. Using detailed product-level data on prices and volumes for all prescription-bound sales for a large set of substance over the first six months in 2010, we have computed a wide set of different price indices, and derived the following set of findings.

First, the Swedish price level is slightly below average compared with the reference countries considering all matching substances. Germany, Ireland and Denmark tend to have the highest prices, whereas UK, Norway and the Netherlands tend to have the lowest prices. The price indices at retail level are more favorable for Sweden due to low pharmacy margins. Second, the Swedish price level is more in the higher-end when considering the non-protected substances. We show that this is partly due to the presence of generic competition in some of the reference countries, though this cannot account for the full price difference. Third, considering the substances with parallel import in Sweden, we find that the Swedish price level is less favorable. This is likely to be due to the fact that parallel import is more profitable for products with relatively high prices.

Fourth, we compare the price indices in this study with the BHS (2011) study that uses the same data set, but computes the price indices using Norwegian rather than Swedish consumption weights. As expected, we find that Sweden becomes relatively cheaper when being the base country. For the bilateral price indices, the BHS study find that Norway has 12 percent lower wholesale prices, whereas in the current study we find that Sweden has only 6 percent higher wholesale prices. Both figures are correct, but show that one cannot infer the inverse price difference, and that there is a tendency for each country to become relatively cheaper when being the base country.

Finally, we split the sample into three groups depending on their launching date on the Swedish market. We find that Sweden tends to have higher prices on the old substances introduced before 1990, but relatively lower prices on the more recent substances launched after 2002.

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APPENDIX

Table A.1. List of substances with information on rang, generic sales, patent protection, and parallel import

Molecule	Rang: Sales in Sweden	Sale Generics. Number of countries	Protected Sweden	Protected. Number of countries	P-import Sweden	P-import. Number of countries
ETANERCEPT	1	0	1	8	0	2
ADALIMUMAB	2	0	1	8	0	1
BUDESONIDE,FORMOTEROL	3	1	0	1	1	4
OCTOCOG ALFA	4	0	1	7	0	1
ATORVASTATIN	5	1	1	7	1	6
OLANZAPINE	6	2	1	6	1	5
CANDESARTAN CILEXETIL	7	0	1	9	1	4
PREGABALIN	8	0	1	9	1	6
ESOMEPRAZOLE	9	4	0	1	1	3
TIOTROPIUM BROMIDE	10	0	1	9	0	4
FLUTICASONE,SALMETEROL	11	0	1	8	1	6
INSULIN GLARGINE	12	0	1	9	1	4
INSULIN ASPART	13	0	1	9	0	3
INSULIN ASPART PROTAMINE CRYSTALLINE	14	0	1	9	0	4
DALTEPARIN SODIUM	15	0	0	0	0	4
DARBEPOETIN ALFA	16	0	1	8	0	2
RANIBIZUMAB	17	0	1	7	0	2
QUETIAPINE	18	3	1	6	1	5
DONEPEZIL	19	3	1	5	1	4
SILDENAFIL	20	1	1	8	0	5
ESCITALOPRAM	21	3	1	5	1	5
MOROCTOCOG ALFA	22	0	1	8	0	0
INSULIN HUMAN ISOPHANE	23	0	1	9	0	4
LATANOPROST	24	1	1	8	1	3
ARIPIPRAZOLE	25	0	1	9	1	5
DULOXETINE	26	0	1	9	1	4
EPTACOG ALFA	27	0	1	4	0	0
PRAMIPEXOLE	28	1	0	0	0	4
TOLTERODINE	29	0	1	8	0	4
EPOETIN BETA	30	0	1	8	0	2
TADALAFIL	31	0	1	9	0	5
CANDESARTAN CILEXETIL, HYDROCHLOROTHIAZIDE	32	0	1	8	1	3
MONTELUKAST	33	2	1	6	0	4
TERBUTALINE	34	4	0	0	0	4
LEVETIRACETAM	35	0	0	0	1	4
WARFARIN	36	3	0	0	0	0
DESLORATADINE	37	0	1	9	0	5
DESOGESTREL	38	0	0	8	0	4
INSULIN LISPRO	39	0	1	9	0	3
EZETIMIBE	40	0	1	9	0	5
ZOLMITRIPTAN	41	0	1	9	1	6
BOSENTAN	42	0	1	7	0	1
INSULIN DETEMIR	43	0	1	9	0	4
MEMANTINE	44	0	1	9	1	4
GALANTAMINE	45	0	1	8	1	4
ATOMOXETINE	46	0	1	9	0	3
SOLIFENACIN	47	0	1	9	0	4
FOLLITROPIN ALFA	48	0	1	9	1	3
RIVASTIGMINE	49	0	1	8	1	6
FOLLITROPIN BETA	50	0	1	9	1	3
BETAMETHASONE, CALCIPOTRIOL	51	0	1	9	1	4
PEGINTERFERON ALFA-2A	52	0	1	8	0	2
LEVONORGESTREL	53	1	0	3	0	3
IRBESARTAN	54	0	1	7	1	4

ORLISTAT	55	0	0	0	1	6
HYDROCHLOROTHIAZIDE, VALSARTAN	56	0	1	7	1	5
RIBAVIRIN	57	0	0	0	1	2
ETORICOXIB	58	0	1	9	1	3
VALSARTAN	59	1	1	7	0	3
PIVMECILLINAM	60	3	0	0	0	1
DORZOLAMIDE, TIMOLOL	61	3	1	5	1	5
HYDROXYZINE	62	3	0	0	1	3
HYDROCORTISONE, OXYTETRACYCLINE, POLYMYXIN B	63	0	0	0	1	0
VARENICLINE	64	0	1	9	1	3
LANREOTIDE	65	0	1	7	0	2
CARBIDOPA, ENTACAPONE, LEVODOPA	66	0	1	9	1	5
HYDROCHLOROTHIAZIDE, IRBESARTAN	67	0	1	7	1	4
RIZATRIPTAN	68	0	1	8	0	5
SITAGLIPTIN	69	0	1	9	1	5
DIPYRIDAMOLE	70	4	0	0	0	4
DROSPIRENONE, ETHINYLESTRADIOL	71	0	1	9	0	2
PEGINTERFERON ALFA-2B	72	0	1	9	0	1
ENOXAPARIN SODIUM	73	0	1	8	0	3
FUSIDIC ACID	74	2	0	0	1	5
BUPROPION	75	0	0	4	1	5
VORICONAZOLE	76	0	1	9	0	4
THALIDOMIDE	77	1	1	6	0	0
NYSTATIN	78	3	0	0	0	2
BUPRENORPHINE, NALOXONE	79	0	1	6	1	0
OMALIZUMAB	80	0	1	8	0	1
SALMETEROL	81	1	0	0	1	5
ETHINYLESTRADIOL, ETONOGESTREL	82	0	1	9	0	2
LATANOPROST, TIMOLOL	83	0	1	8	1	3
METHYLPREDNISOLONE	84	3	0	0	1	5
TRAVOPROST	85	0	1	9	1	3
VALGANCICLOVIR	86	0	1	9	0	2
DROSPIRENONE, ETHINYLESTRADIOL BETADEX	87	0	1	9	0	0
ZIPRASIDONE	88	0	1	6	1	3
ATOVAQUONE, PROGUANIL	89	0	1	9	0	3
AMITRIPTYLINE	90	5	0	0	0	0
ABCIXIMAB	91	0	1	3	0	0
FESOTERODINE	92	0	1	9	1	4
RASAGILINE	93	0	1	9	0	4
BRINZOLAMIDE	94	0	1	8	1	5
ALIMEMAZINE	95	0	0	0	0	1
SEVELAMER	96	0	1	7	1	6
ACETYLSALICYLIC ACID, DIPYRIDAMOLE	97	0	0	7	0	4
RILUZOLE	98	0	1	9	0	3
EBASTINE	99	1	0	0	0	2
DICLOFENAC, MISOPROSTOL	100	0	1	7	1	4
TIBOLONE	101	1	0	0	1	5
PERPHENAZINE	102	2	0	0	0	2
CLOBETASOL	103	6	0	0	0	4
LINEZOLID	104	0	1	6	0	3
METHENAMINE	105	2	0	0	0	0
CELECOXIB	106	0	1	9	0	5
TIMOLOL, TRAVOPROST	107	0	1	9	1	3
LYMECYCLINE	108	0	0	0	0	1
C1 INHIBITOR (HUMAN)	109	2	0	2	0	0
ROSIGLITAZONE	110	0	1	9	1	4
CALCIPOTRIOL	111	4	0	0	0	4
ANAGRELIDE	112	0	1	8	0	4
ENTECAVIR	113	0	1	9	1	2
FLECAINIDE	114	7	0	0	0	2
VARDENAFIL	115	0	1	9	0	5
METHOXY PEG-EPOETIN BETA	116	0	1	7	0	1
METOCLOPRAMIDE	117	7	0	0	1	2
PIOGLITAZONE	118	0	0	0	1	5
NAFARELIN	119	0	0	0	0	2
EPINEPHRINE, LIDOCAINE	120	5	0	0	0	0

MELATONIN	121	0	1	9	0	3
DEFERASIROX	122	0	1	8	0	2
SIBUTRAMINE	123	1	1	8	0	4
IMIQUIMOD	124	0	0	0	1	5
DESOGESTREL, ETHINYLESTRADIOL	125	4	0	0	0	5
TAFLUPROST	126	0	1	3	0	0
DARIFENACIN	127	0	1	7	0	2
METFORMIN, ROSIGLITAZONE	128	0	1	9	1	4
NIFEDIPINE	129	8	0	0	0	5
TELMISARTAN	130	0	1	9	0	5
PEGVISOMANT	131	0	1	8	0	1
LEVOCABASTINE	132	0	0	0	1	2
OLOPATADINE	133	0	1	8	1	4
NITISINONE	134	0	1	6	0	1
LEFLUNOMIDE	135	0	0	0	0	3
ZONISAMIDE	136	0	1	7	1	3
TERIPARATIDE	137	0	1	9	0	1
DORNASE ALFA	138	0	1	9	0	4
BETAMETHASONE, SALICYLIC ACID	139	1	0	0	0	6
ETHINYLESTRADIOL, NORELGESTROMIN	140	0	1	1	1	2
FLUTICASONE FUROATE	141	0	1	9	0	3
ROTIGOTINE	142	0	1	9	0	2
LERCANIDIPINE	143	8	0	0	0	5
HYDROCHLOROTHIAZIDE, TELMISARTAN	144	0	1	9	0	5
AMLODIPINE, VALSARTAN	145	0	1	9	0	4
ELETRIPTAN	146	0	1	9	0	5
PROGESTERONE	147	6	0	1	0	3
GOLIMUMAB	148	0	1	6	0	0
BUMETANIDE	149	4	0	0	0	2
PIROXICAM BETADEX	150	0	0	0	0	2
FLUVASTATIN	151	7	0	0	0	2
NALOXONE,OXYCODONE	152	0	1	9	0	0
METFORMIN, VILDAGLIPTIN	153	0	1	9	0	2

Table A.2: Bilateral price indices at wholesale (AIP) and pharmacy (AUP) level based on prices of identical packs (same formulation, pack size and strenght).

	Sweden	Norway	Denmark	Finland	UK	Germany	Netherlands	Belgium	Austria	Ireland
All substances										
AIP per pack	100	88.9	116.0	89.6	76.2	119.3	94.0	97.2	102.3	139.4
AUP per pack	100	89.5	117.5	112.1	71.9	124.2	96.5	99.1	116.9	144.9
Number of substances	153	128	139	123	115	126	122	109	114	110
Number of packs	791	438	493	448	313	434	337	282	288	272
Substances without generic sales in both countries										
AIP per pack	100	90.8	116.0	95.8	76.5	119.6	94.0	97.6	102.6	139.7
AUP per pack	100	91.1	118.1	119.2	72.3	124.1	96.6	99.5	117.4	145.3
Number of substances	153	126	137	121	110	120	119	107	110	108
Number of packs	791	415	478	421	306	415	328	273	281	267
Substances with patent status “Protected” in both countries										
AIP per pack	100	102.8	117.3	101.6	72.4	114.3	92.2	102.5	103.8	134.8
AUP per pack	100	101.7	120.3	127.5	69.1	118.8	96.8	104.7	118.4	144.8
Number of substances	106	75	100	78	86	95	90	82	86	83
Number of packs	566	263	364	274	248	337	262	225	229	213
Substances with patent status “Not-Protected” in both countries										
AIP per pack	100	94.9	114.8	104.2	85.5	143.5	98.6	84.8	100.1	150.7
AUP per pack	100	92.3	113.9	121.6	78.9	149.1	96.2	86.8	114.9	147.7
Number of substances	47	34	35	30	28	27	27	25	23	22
Number of packs	225	97	116	85	63	82	64	50	51	48
Substances without generic sales and patent status “Not-Protected” in both countries										
AIP per pack	100	99.6	127.5	103.2	88.1	146.7	108.4	84.9	103.2	153.1
AUP per pack	100	95.3	123.9	120.6	82.2	150.1	106.5	87.0	120.6	151.5
Number of substances	47	31	22	22	15	13	14	18	17	15
Number of packs	225	87	58	60	42	52	31	39	35	34

Substances with parallel import in Sweden										
AIP per pack	100	85.1	111.6	83.1	67.5	114.6	90.1	97.6	97.2	136.5
AUP per pack	100	86.0	114.5	106.1	64.7	119.5	93.2	100.1	114.6	147.6
Number of substances	59	52	57	49	50	53	52	49	49	52
Number of packs	412	212	248	223	163	216	172	132	137	139
Substances with parallel import in both countries										
AIP per pack	100	69.5	111.7	111.0	68.3	115.4	90.1	-	-	-
AUP per pack	100	69.6	114.6	135.4	65.4	120.1	93.2	-	-	-
Number of substances	59	21	46	10	44	49	49	0	0	0
Number of packs	412	90	221	49	149	206	168	0	0	0

Table A.3. Bilateral price indices at wholesale (AIP) and pharmacy (AUP) level based on volume-weighted average substance prices per dose.

	Sweden	Norway	Denmark	Finland	UK	Germany	Netherlands	Belgium	Austria	Ireland
All substances										
AIP per dose	100	86.2	118.5	88.7	81.3	128.8	93.1	100.2	100.5	117.1
AUP per dose	100	89.5	122.2	109.7	77.3	133.6	98.2	104.7	115.6	125.8
Number of substances	153	153	148	142	137	143	144	130	139	136
Substances without generic sale										
AIP per dose	100	90.6	118.8	96.5	81.7	129.7	93.1	100.7	101.9	118.0
AUP per dose	100	93.8	122.8	118.8	77.4	133.7	97.6	104.7	117.0	127.6
Number of substances	153	141	134	127	119	123	123	118	128	124
Substances with patent status “Protected” in both countries										
AIP per dose	100	95.2	116.3	98.7	81.3	125.1	92.6	103.2	102.4	120.4
AUP per dose	100	98.9	121.0	121.2	77.0	128.2	96.7	106.8	117.0	130.4
Number of substances	106	90	105	84	93	102	97	90	97	93
Substances with patent status “Not-Protected” in both countries										
AIP per dose	100	83.6	127.0	95.0	82.3	132.4	92.3	88.2	95.3	109.4
AUP per dose	100	86.4	126.3	115.8	79.2	144.6	100.2	96.5	111.8	112.9
Number of substances	47	41	38	42	41	36	40	38	36	36
Substances without generic sales and patent status “Not-Protected” in both countries										
AIP per dose	100	85.7	139.4	96.2	83.7	138.8	93.0	87.6	97.1	108.0
AUP per dose	100	88.5	136.2	118.0	79.7	147.1	99.1	93.5	113.2	115.0
Number of substances	47	37	25	33	24	17	21	27	26	25
Substances with parallel import in Sweden										
AIP per dose	100	77.5	112.5	78.1	77.0	128.0	90.1	96.6	92.0	117.0
AUP per dose	100	79.0	116.4	100.4	74.0	132.7	96.2	101.0	109.6	129.2
Number of substances	59	59	58	57	54	56	56	56	55	57
Substances with parallel import in both countries										
AIP per dose	100	67.9	112.8	97.5	78.4	131.0	90.2	-	-	-
AUP per dose	100	69.9	116.8	123.5	75.1	135.3	95.9	-	-	-
Number of substances	59	23	46	42	48	52	52	0	0	0

Table A.4. Global price indices (AIP and AUP) for substances present in all countries based on volume-weighted average substance prices per dose.

	Sweden	Norway	Denmark	Finland	UK	Germany	Netherlands	Belgium	Austria	Ireland
All substances (N = 104)										
AIP per dose	100	86.4	118.6	87.0	81.9	133.2	93.8	99.6	97.0	119.7
AUP per dose	100	87.5	121.3	110.6	77.5	137.9	98.4	104.3	114.6	129.6
Substances without generic sale in all countries (N = 73)										
AIP per dose	100	100.7	117.8	101.8	85.6	131.7	96.2	105.6	103.2	126.9
AUP per dose	100	101.0	120.4	128.4	80.0	134.8	99.6	110.2	122.0	137.5
Substances with patent status “Protected” in all countries (N = 54)										
AIP per dose	100	103.3	118.6	101.1	88.8	131.7	97.2	107.0	105.0	130.2
AUP per dose	100	103.1	120.6	127.4	82.9	134.3	100.4	111.0	123.3	140.3
Substances with patent status “Protected” in all countries (N = 23)										
AIP per dose	100	88.4	127.3	111,7	97.2	189.4	96.1	111.6	120.6	128.7
AUP per dose	100	87.0	123.4	132.4	90.2	199.9	105.6	112.9	126.1	124.1
Substances without generic sales and patent status “Protected” in all countries (N = 6)										
AIP per dose	100	98.6	108.1	116.7	74.6	157.7	96.2	112.4	124.9	128.3
AUP per dose	100	99.3	112.5	149.7	71.3	160.7	96.0	114.2	148.2	142.3
Substances with parallel import in Sweden (N = 49)										
AIP per dose	100	77.2	112.2	79.0	76.6	128.6	90.0	96.7	91.3	117.8
AUP per dose	100	78.7	116.2	101.5	73.2	133.3	95.0	101.1	108.9	130.1

Table A.5: Bilateral price indices at wholesale (AIP) and pharmacy (AUP) level, substances without generic sales in both countries.

	Sweden	Norway	Denmark	Finland	UK	Germany	Netherlands	Belgium	Austria	Ireland
Substances introduced before 1 January 1990										
AIP per dose	100	95.2	153.2	96.3	109.6	137.2	94.0	100.0	101.6	144.4
AUP per dose	100	96.3	144.2	114.0	99.1	150.9	105.7	105.4	107.5	138.3
Number of substances	22	21	14	15	10	7	8	14	12	12
Substances introduced in the period 1 January 1990 to 1 January 2002										
AIP per dose	100	87.4	117.8	93.7	75.6	130.3	90.6	99.2	98.6	113.1
AUP per dose	100	90.3	122.0	116.7	72.1	133.7	95.4	103.6	114.4	123.4
Number of substances	76	68	66	65	62	64	64	62	68	64
Substances introduced after 1 January 2002										
AIP per dose	100	95.5	113.8	101.7	88.6	127.4	97.5	104.3	108.6	123.6
AUP per dose	100	99.7	119.1	124.3	83.6	130.1	100.2	107.1	124.7	133.8
Number of substances	54	51	53	47	47	51	51	42	48	48

We study the price level of pharmaceuticals in Sweden relative to the following nine European countries; Austria, Belgium, Denmark, Finland, Germany, Ireland, the Netherlands, Norway, and United Kingdom (UK). Our sample consists of prescription drugs that do not have generic sale in Sweden. Using IMS Health data on prices and sales volumes for the first half of 2010, we compute several price indices to describe the price differences and potential cost savings in the non-generic market segment. Our results show that the Swedish price level is slightly below average relative to the other European countries. UK, Norway and the Netherlands tend to have lower prices than Sweden, whereas Germany, Ireland and Denmark tend to have higher prices. Finland has lower prices than Sweden on wholesale level, but slightly higher prices at retail level. Austria and Belgium have about the same price level as Sweden.

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