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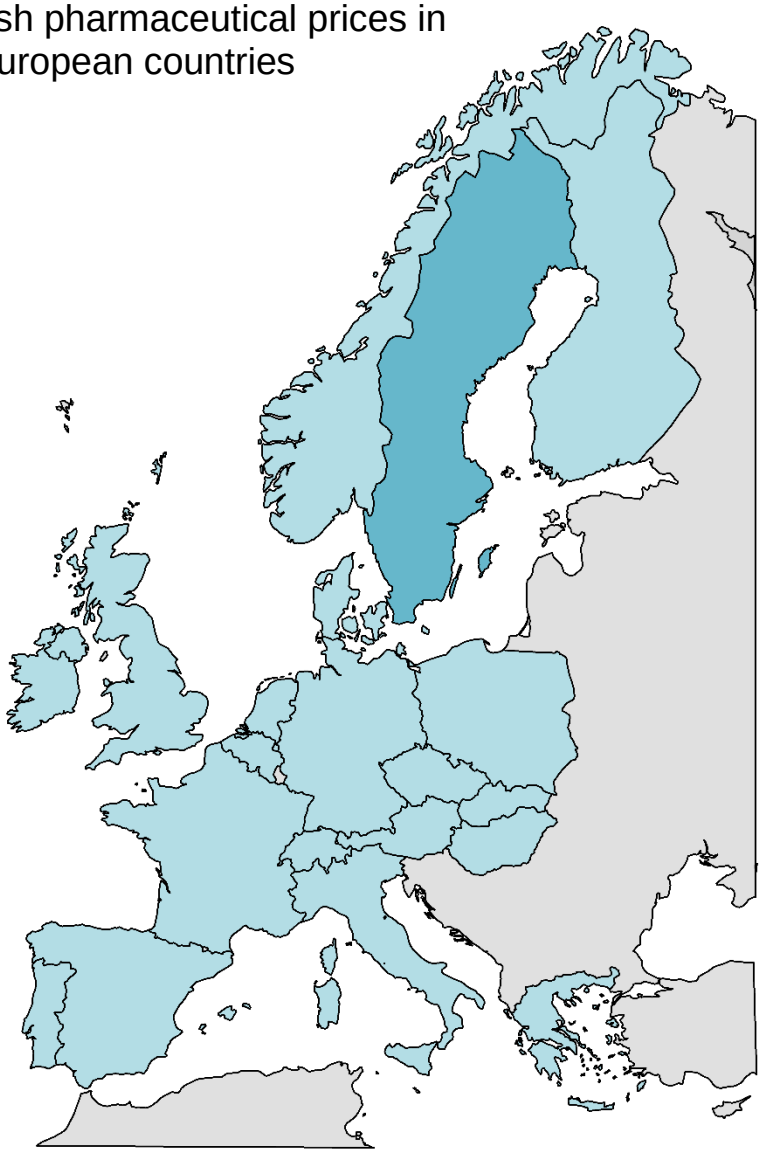
LÄKEMEDELSFÖRMÅNSVERKET

International price comparison 2021

An analysis of Swedish pharmaceutical prices in relation to 19 other European countries



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Preface

The Dental and Pharmaceutical Benefits Agency's (TLV's) mandate includes monitoring and analysing the price development of pharmaceuticals from an international perspective.

TLV presents the results of the analysis, which is based on price and volume data for the first quarters during the period 2014 to 2021 in Sweden in comparison with 19 other European countries. The analysed segments are pharmaceuticals without competition and pharmaceuticals with competition. Pharmaceuticals with competition include pharmaceuticals available as substitutable pharmaceuticals in the product-of-the-month system as per March 2021.

The working group for the report included Mattias Hult, Oskar Johansson, and Jonas Nilsson.

The report should be seen as a basis for TLV's continuous monitoring of the dynamics of Swedish prices and how Swedish prices relate to prices in other countries.

Agneta Karlsson
Director General

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Summary

This report is part of TLV's mandate to monitor developments in the Swedish pharmaceutical market from an international perspective. The report is the eighth of its kind.

The report compares Swedish pharmaceutical prices with prices in 19 other European countries. List prices (pharmacy's wholesale prices, AIP) were used, meaning that any agreements on discounts on pharmaceuticals in different countries were not taken into account in the analyses. The focus of the report has been prescription pharmaceuticals. A division has also been made based on the competitive situation for a pharmaceutical, as the conditions vary greatly depending on whether there is generic competition.

The analyses in the report show that Sweden's relative pharmaceutical prices are the sixth lowest in the segment Pharmaceuticals without competition and the lowest in the segment Pharmaceuticals with competition compared with the 19 comparison countries. Prices in Sweden have fallen in relation to prices in other countries during the period studied (2014–2021).

One important explanation for the falling prices, especially for pharmaceuticals without competition, is the weaker Swedish krona. As AIP is set in SEK, a weaker currency exchange rate for the Swedish krona leads to lower Swedish prices in relation to other currencies. If the effect of the changed currency exchange rate is removed, Swedish prices are largely unchanged in relation to other countries over time.

A life cycle analysis shows that Sweden's relative pharmaceutical prices are slightly below average during the first five years after market introduction, but then end up above average between year 5 and year 15. After 15 years on the market, which roughly corresponds to the date of expiry of a pharmaceutical's patent, Sweden's relative pharmaceutical prices fall below the average. Depending on which years are included in the input data for the life cycle analysis, the levels of the magnitude of the curve change, but the overall pattern remains.

During the entire period 2014–2021, Sweden's pharmaceutical prices in the Product-of-the-month system were the lowest in Europe, or among the lowest. In 2021, Sweden's prices for pharmaceuticals with competition were approximately 50 percent lower than the average for the other 19 countries.

A deeper analysis of substances in the group of Pharmaceuticals with competition shows that for substances where the degree of substitutability is lower (for example because prescribers or pharmacists refuse substitutes) and the competitive pressure is thus lower, the Swedish system gives higher relative prices compared with other countries.

Terms and concepts

Active substance - the substance in a pharmaceutical product that gives it its medical effect.

ATC - *Anatomical Therapeutic Chemical Classification, (ATC),* is a pharmaceutical classification system. The ATC system has 14 main groups into which pharmaceuticals are classified based on their main indication.

A Alimentary tract and metabolism
B Blood and blood forming organs
C Cardiovascular system
D Dermatologicals
G Genito urinary system and sex hormones
H Hormonal preparations excluding sex hormones
J Infectious diseases
L Tumours and immune system disorders
M Musculoskeletal system
N Nervous system
P Antiparasitic products, insecticides, and repellents
R Respiratory system
S Sensory organs
V Various

Bilateral price index - the same product needs to be available in Sweden and in one of the comparison countries to be included in the bilateral price index for that country.

Branded pharmaceutical - the first pharmaceutical on the market that contains a particular active substance. These pharmaceuticals are patent protected and thus not exposed to competition from generic equivalents.

Ceiling price - the maximum accepted price (AIP/unit) of a pharmaceutical in a package size group.

Cross-sectional price index - the same product needs to be available in several countries to be included in any of the countries' price indices. The threshold, so-called matching rate, has been set at 40 percent in cases where cross-sectional indices are used. This means that a pharmaceutical (substance, dosage form, and strength) needs to be available in at least eight other countries in addition to Sweden. In countries that do not have sales for a year of a pharmaceutical available in Sweden, Swedish prices are used instead.

Discount see Repayment

Dosage form - different forms of how a pharmaceutical can be delivered to the body, for example, via tablet, injection, or patch.

EHM - The Swedish e-Health Agency

ERP - **International Reference Price (IRP)** - Pricing method where the price(s) of a pharmaceutical in one or more countries is/are taken into account in the national pricing of pharmaceuticals. Common synonymous terms are international reference pricing (IRP), external price reference (EPR), external reference pricing (ERP), or simply reference pricing. The pricing method can be formal or informal/supporting, in combination with another method (e.g., assessment of benefit or value). Some countries employ the concept of *internal* reference pricing, which is why, in some literature, the acronym IRP is used differently than in this report.

Ex-factory - sales price from the marketing authorisation holder. Costs for transport from the factory and other taxes and surcharges will be added.

Generic pharmaceutical - pharmaceuticals containing the same active substance as an original product used as a reference product upon approval, in the same dosage form, and with the same strength, and
which give the same effect.

INN - Generic name - like the chemical name, describes a substance. INN stands for *International non-proprietary name*. The purpose of generic names is to enable brand-independent communication about pharmaceutical substances. Generic names are established by several different countries and by the WHO.

IRP - see *ERP*

List price - Price paid without regard to discounts or repayments. Corresponds to fixed prices at wholesale price (AIP in Sweden). When countries, including Sweden, are referred to as a group, the term list prices is also used to describe Sweden's prices (AIP).

Managed Entry Agreement -collective name of an agreement that means that the cost of using the pharmaceutical is reduced, such as risk-sharing agreements, discount and repayment agreements. In Sweden, these agreements are concluded between the pharmaceutical companies and the regions.

Managed introduction - In Sweden called *National managed introduction of new pharmaceuticals* and coordinated by the New Therapies (NT) Council. Sweden's regions collaborate on which new pharmaceuticals to introduce in healthcare.

Pharmaceutical benefits - a pharmaceutical included in the pharmaceutical benefits scheme is subsidised and included in the high-cost protection system.

Product - a pharmaceutical with the same substance, dosage form, and strength.

PRP - Pharmacy retail price (Sw. AUP) - the pharmacy sales price in SEK. Determined by TLV.

PV - Product-of-the-month - The products-of-the-month are the available generic substitutable pharmaceuticals with the lowest prices that pharmacies must offer their customers when substituting pharmaceuticals. Each month, the product in

each package size group with the lowest sales price per unit that the pharmaceutical company has confirmed can be provided to the entire market with a sufficient shelf life for the entire price period becomes the product-of-the-month.

PWP - Pharmacy wholesale price (Sw. AIP) - the pharmacy wholesale price in SEK. Determined by TLV.

Relative prices - prices in relation to average prices. If relative prices in Sweden rise, it means that Sweden has become more expensive in relation to average prices. This may be due to Sweden's prices rising, or other countries lowering their prices and Sweden maintaining the same level.

Repayment - a form of compensation paid in arrears. In Sweden, the pharmaceutical companies pay a repayment to the regions based on what is stated in the managed entry agreements Internationally often referred to as a discount.

Risk-sharing agreements - agreements where the final cost for the use of a pharmaceutical depends on future outcome. Often used for new expensive pharmaceuticals where the therapeutic benefit is uncertain.

Substitutable pharmaceuticals - pharmaceuticals that contain the same active substance, in the same dosage form, with the same strength,
and give the same medical effect, and that the Swedish Medical Products Agency has determined are substitutable with one another.

The PV system - see PV - *Product-of-the-month*.

The segment Pharmaceuticals without competition - includes products where there has been no competition between two different substitutable pharmaceuticals in Sweden. However, competitive conditions may differ between the various countries
in the price comparison.

The segment Pharmaceuticals with competition (in the PV system) - includes all pharmaceuticals in Sweden included in the product-of-the-month list as per March 2021.

1 Introduction

1.1 Assignment

The ordinance (SFS 2007:1206) with instructions for TLV states, inter alia, that the agency shall monitor and analyse developments in other countries and make use of their experiences, compare the price level in Sweden with prices in other countries for relevant products in the pharmaceutical sector, and monitor price developments in the sector from an international perspective. The statistics analysed in the report are based on list prices. In Sweden, list prices consist of the wholesale price (AIP) determined by TLV.

The purpose of this report is to compare and analyse Sweden's pharmaceutical prices compared with 19 other European countries. In addition to the official prices analysed in the report, there are confidential agreements that regulate the cost of certain pharmaceuticals, so that the countries end up paying less than what is stated in the list price. In Sweden, there are Managed Entry Agreements between regions and pharmaceutical companies that involve repayment of parts of the pharmaceutical costs. Thus, society's pharmaceutical costs are affected by repayment from Managed Entry Agreements. The effect of different countries' varying repayment agreements is not captured in this report. The analysis within the framework of this report focuses on price development over time, which makes the analyses less sensitive to the existence of different agreements. In cases where analyses and comparisons are made at a certain time, it is important to be aware of this limitation or delimitation.

Table 1. Countries included in the analysis

Belgium	Portugal
Denmark	Switzerland
Finland	Slovakia
France	Spain
Greece	United Kingdom
Ireland	Sweden
Italy	Czechia
The Netherlands	Germany
Norway	Hungary
Poland	Austria

The report primarily uses currency exchange rates calculated as a three-year moving average. This is so as not to overestimate the short-term effects of exchange rate changes while the effects of long-term exchange rate changes remain. Read more about the impact of the exchange rate in *Appendix 1 (Section 1 Currency exchange rate)*. The analysed prices are prices for the first quarter each year during the time period and the volume weighting is rolling 12 months from the first quarter each year.

1.1.1 Delimitation and definitions

The assignment does not include determining whether Swedish pharmaceutical prices are at the desired level, nor how to design potential changes to reach such a level. The main focus of this report is prescription pharmaceuticals dispensed in pharmacies. These pharmaceuticals account for about two thirds of sales in Sweden. Thus, inpatient pharmaceuticals are given limited space. However, the proportion of pharmaceuticals dispensed within inpatient and outpatient care varies greatly between countries.

1.2 Outline

Under the heading *Methodology and data (Section 1.3),* there is a summary of the report's methodology, choice of exchange rate period, and data sources. This is followed by a section on the pharmaceutical market in general and information on pricing and subsidy systems for the selected countries.

The *Price comparisons* section *(Section 3)* is divided into three sections. First, an in-depth study of the pharmaceutical life cycle, where prices are analysed based on the pharmaceutical age. Then, a more detailed description of pharmaceuticals without generic competition (outside the product-of-the-month system, hereinafter called the PV system), followed by pharmaceuticals with generic competition, within the PV system.

The report concludes with a discussion of the main results of this year's study and information on continued work.

The report has two appendices. The first appendix (*Appendix 1: Sensitivity analyses*) presents a number of sensitivity analyses. A more detailed description of the analytical methods used is provided in *Appendix 2: Methodology and data*.

1.3 Methodology and data

1.3.1 Description of data sources

Methodology and data selection are briefly described here. A more in-depth account can be found in *Appendix 2: Methodology and data*.

TLV has used price and sales data from the company IQVIA for the first quarters of the years 2014 to 2021. The price level in Sweden is compared with 19 other European countries.

The selection consists of prescription medicines for human use in Sweden that are included in the pharmaceutical benefits scheme, and with the highest sales volumes. In addition, there are substances that have relatively low sales in Sweden but high sales in Europe, as well as new substances (EFPIA 2019). By complementing the selection with European bestsellers, the comparison becomes fairer, as more relevant pharmaceuticals are compared. A total of 799 substances and 9,122 pharmaceuticals are included in the analysis.[1] The market has been divided into pharmaceuticals without and with competition. Competition means that the pharmaceuticals have generic competition and are substitutable in Swedish pharmacies, which means that the pharmaceutical is included in the Swedish PV system (TLV 2021a). Divided in accordance with this definition, the analysis for 2021 includes[2]:

- **Pharmaceuticals without competition**
  745 substances and 4,744 pharmaceuticals.
- **Pharmaceuticals with competition**
  173 substances and 623 pharmaceuticals

In Sweden, pharmaceuticals without competition during Q1 2021 accounted for approximately 83 percent of the sales volume (AIP) and pharmaceuticals with competition accounted for approximately 17 percent. IQVIA's data covers around 89 percent of sales in Sweden in 2021. The price comparison is based on prices in other countries and in Sweden.

1.3.2 Method

One challenge with price comparisons between different countries is that not all countries use the same pharmaceuticals as Sweden. The proportion of the same pharmaceutical used in two countries being compared is called matching rate. The higher the matching rate, the more similar the use is to that in Sweden. The report uses three methods to compare prices. The methods are partly similar but differ in how they handle the comparison when one or more pharmaceuticals are not available in all the countries studied:

- **Bilateral comparison**
  Prices are *only* compared for the pharmaceuticals available in an individual country and in Sweden. If, for example, Finland uses 59 percent of the

[1] Pharmaceuticals are defined as a combination of substance, dosage form, and strength.
[2] A substance can be found in the segments pharmaceuticals with and without competition. This is because different forms and strengths of the same substance can have different competitive status.

pharmaceuticals used in Sweden, the price comparison only covers these pharmaceuticals. Pharmaceuticals with very low sales in relation to the base country's local market are excluded.

- **Bilateral average**
  The bilateral comparison described above is partly affected by the fact that Swedish volumes are used. This is because pharmaceuticals frequently used in Sweden usually have a relatively low Swedish price. Therefore, in addition to the bilateral comparison, an alternative measure is also calculated, which includes information from all countries' pharmaceutical use. This measure, called the *bilateral average*, is calculated in such a way that the bilateral comparison is repeated for all combinations of countries, in pairs. The combined bilateral average index for each country is then calculated as an average of all the bilateral price index pairs that include this country. This results in an index that considers the use of pharmaceuticals in all countries included in the comparison.

- **Cross-sectional comparison**
  Assumes that *all* countries in the study have *all* pharmaceuticals used in Sweden. If a country does not use a pharmaceutical, it is assumed that this country's price is the same as the average price of the pharmaceutical in the countries that use it. To ensure that enough countries use a particular pharmaceutical, the pharmaceutical must have sold in at least eight countries to be included in the comparison.

The cross-sectional analysis is used to calculate the development of Swedish prices in relation to the European average. The bilateral price comparison instead describes price differences between individual countries and Sweden. Both the bilateral and cross-sectional price comparisons are based on Swedish volumes of each pharmaceuticals. The bilateral average analysis takes the volumes of all countries into account. For more detailed information on the methodology, see *Appendix 2: Methodology and data*.

2 The pharmaceutical market

The healthcare systems in the countries being compared have both similarities and differences in pricing pharmaceuticals. This relates to, for example, transparency regarding list prices and whether or not discount systems are institutionalised and included in pharmacy purchase prices, or if there are other agreements in place that mean that certain list prices do not fully reflect the actual price of a pharmaceutical.

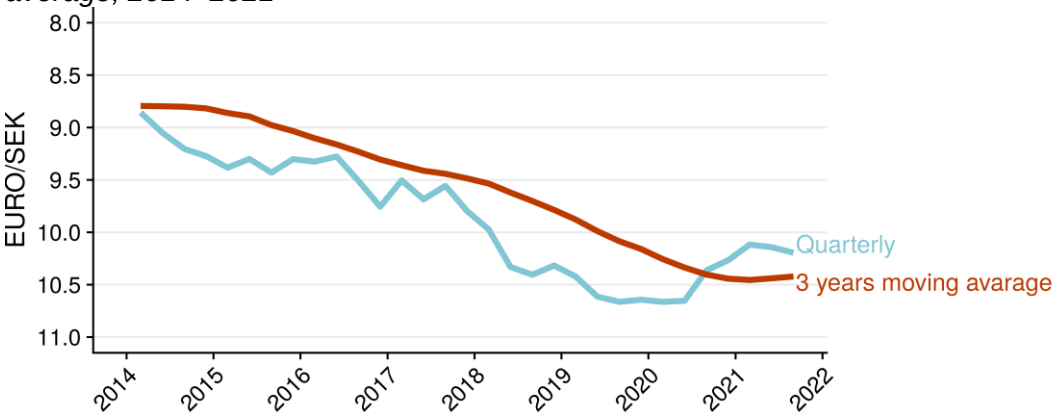
Globally, pharmaceuticals had sales of approximately SEK 9,899 billion in 2020, calculated as the price from the manufacturer. North America dominates the pharmaceutical market and accounts for about 49 percent of sales in the world market. Europe accounts for about 24 percent. Africa, Asia (excluding Japan and China), and Australia combined account for about 8 percent; China just over 8 percent; Japan 7 percent; and Latin America about 3.5 percent (EFPIA 2021).[3]

2.1 Currency exchange rate

For a number of years, the Swedish krona has fallen in value against the euro, which has also affected Swedish pharmaceutical prices compared with other countries. Since 2020, however, the value of the krona in relation to the euro has strengthened somewhat, which affects the analyses presented in this report. To get a more balanced picture of Swedish relative prices, exchange rates have therefore been calculated as a three-year moving average.

Figure 1 below shows the development of the Swedish krona quarterly and as a three-year moving average to clarify the difference depending on the method used.

Figure 1. The development of the Swedish krona, quarterly and in a 3-year moving average, 2014–2021



Source: Eurostat
Note: EURO/SEK; the number of Swedish kronor per euro.

[3] EFPIA, The Pharmaceutical Industry in Figures 2021, states that global sales amount to 943,667 million euros by 2020. Calculation to SEK according to the average exchange rate (10.49) in 2020.

Figure 1 shows that the Swedish krona has strengthened (quarterly) since the latter part of 2020. However, the moving three-year average has seen a continued weakening of the Swedish krona against the euro between 2020 and 2021. As the rolling three-year average is the one predominantly [4] used for the calculations in the report, the currency effect has continued between 2020 and 2021, helping to keep Swedish relative prices on pharmaceuticals down.

In some analyses, a *fixed currency exchange rate* is used. It may be that the 2014 exchange rates are used for prices in all years between 2014 and 2021. Fixing the exchange rate better describes what price changes different countries experience in local currency and reflects whether there is a price dynamic in addition to exchange rates. (See *Section 1.1: Currency exchange rate in Appendix 1* for further information.)

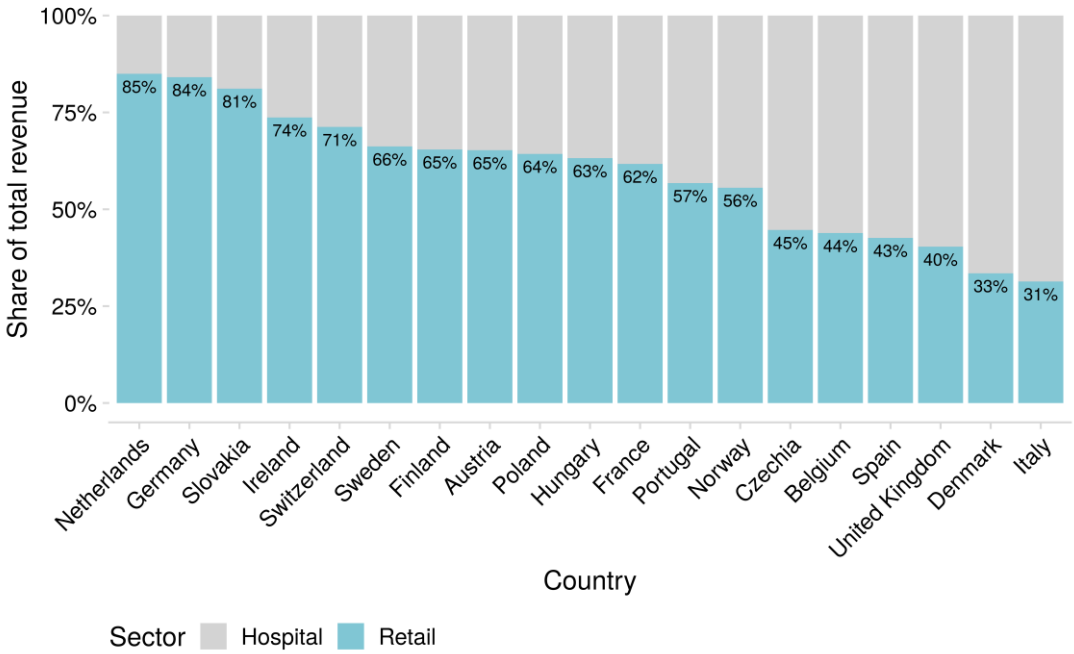
2.2 Prescription pharmaceuticals and inpatient pharmaceuticals

In Sweden, the majority of pharmaceutical use consists of prescription pharmaceuticals that are dispensed in pharmacies. The proportion of pharmaceuticals dispensed in outpatient pharmacies and inpatient pharmaceuticals[5] differs between the countries surveyed. Comparisons that only include data from outpatient care must therefore be made with some caution. Depending on how pharmaceuticals are managed, as prescription pharmaceuticals or as inpatient pharmaceuticals, this type of comparison is made more difficult if you lack knowledge of specific national conditions.

Figure 2 shows the percentage of total pharmaceutical sales in each country dispensed via prescriptions within outpatient care and in hospitals within inpatient care. On average, these 19 countries manage just over 60 percent of total sales within outpatient care. Denmark, Italy, the United Kingdom, and Spain have a relatively low sales value within outpatient care and a significantly higher proportion managed within inpatient care. In Sweden, around two-thirds are managed through prescriptions and around one-third are handled within inpatient care.

[4] A rolling three-year exchange rate is used in all analyses unless stated otherwise.
[5] The report mainly uses the terms prescription pharmaceuticals and inpatient pharmaceuticals to distinguish pharmaceuticals that are prescribed and dispensed in pharmacies and pharmaceuticals that are procured by the regions and dispensed in hospitals. In the data from IQVIA, these segments are referred to as "Retail" and "Hospital".

Figure 2. Percentage of sales value in AIP for inpatient pharmaceuticals and prescription pharmaceuticals, by country



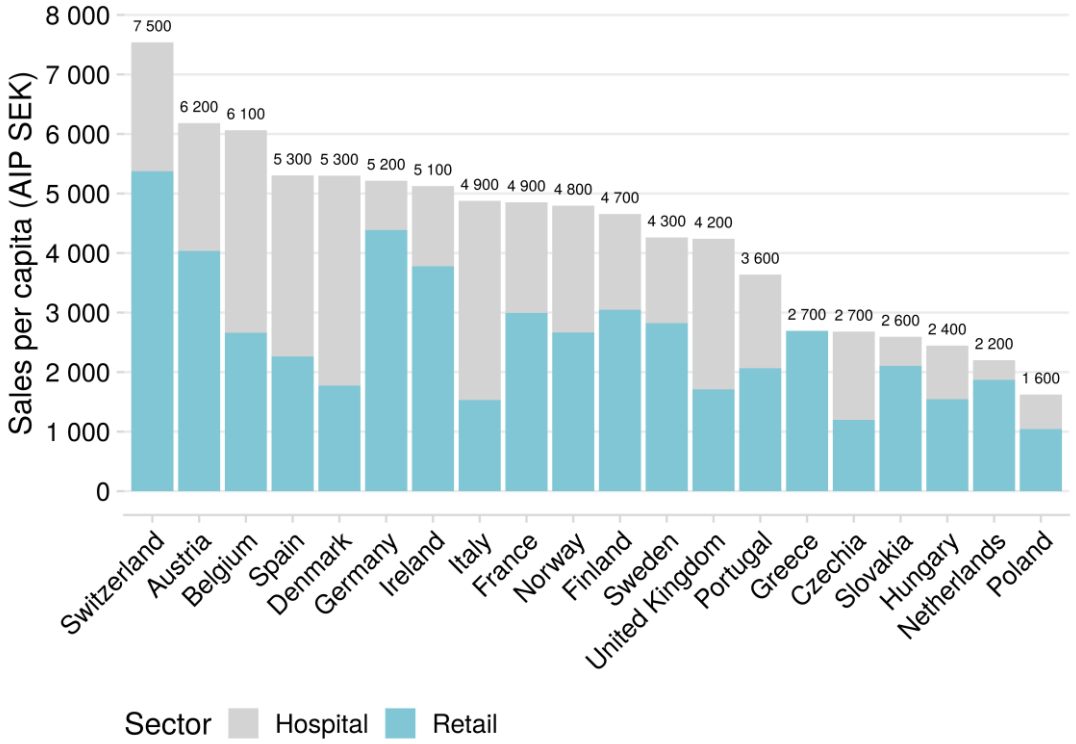
Source: IQVIA and TLV analysis.
Note: Data applies to March 2021, rolling 12 months. Greece is excluded as there is no available information on inpatient pharmaceuticals.

The share of prescription pharmaceuticals in Sweden in the 2019 report was 75 percent, but Figure 2 illustrates that the corresponding share in 2021 is 66 percent. The difference is mainly due to the fact that IQVIA no longer has access to data on inpatient care use of pharmaceuticals from the Swedish eHealth Agency (EHM), which includes the repayment agreements for inpatient pharmaceuticals. The changed application has thus meant that TLV can no longer provide a complete picture of the pharmaceutical costs for inpatient pharmaceuticals.

Figure 3 shows outpatient and inpatient care sales of pharmaceuticals per capita in Europe. The average amounts to approximately SEK 4,300. Total sales value per capita is highest in Switzerland (around SEK 7,500 per capita), followed by Austria (SEK 6,200 per capita). Sweden has the twelfth highest sales of all countries with around SEK 4,300 per capita.

In terms of total sales value per capita, our Nordic neighbouring countries, Denmark, Norway, and Finland, have slightly higher costs compared with Sweden. See Figure 3 below.

Figure 3. The sales value in SEK AIP per capita for inpatient pharmaceuticals and prescription pharmaceuticals, by country



Source: IQVIA and TLV analysis.
Note: Data applies to March 2021, rolling 12 months, rounded to even hundreds. Greece has no information on inpatient care.

The figure above includes pharmaceuticals dispensed at outpatient pharmacies and pharmaceuticals dispensed within inpatient care. The remainder of this report only covers prescription pharmaceuticals dispensed in pharmacies. The reason for this is that the prices used when pharmaceuticals are procured by healthcare providers are not as transparent and that TLV sets prices for prescription pharmaceuticals.

The pharmaceuticals used in different countries differ. For example, countries may use different pharmaceuticals to treat the same condition, or a pharmaceutical may only be approved in some of the countries in the study. The analyses in this report are based on pharmaceuticals used in Sweden and the price comparison of these pharmaceuticals in Sweden with the prices in other countries. This means that the pharmaceuticals compared are not necessarily used to the same extent in all countries. If a pharmaceutical requires a prescription in Sweden but does not in one of the other 19 countries, it will not be included in the comparison.

3 Price comparisons

In this chapter, we present the results of the comparison of Sweden's pharmaceutical prices in relation to other countries. The results are presented in three sections:

- *Prices throughout the pharmaceutical life cycle*
- *Pharmaceuticals without competition*
- *Pharmaceuticals with competition*

The first section analyses Swedish pharmaceutical prices in relation to the average for other countries over a pharmaceutical's life cycle, i.e. based on the number of years after market approval.

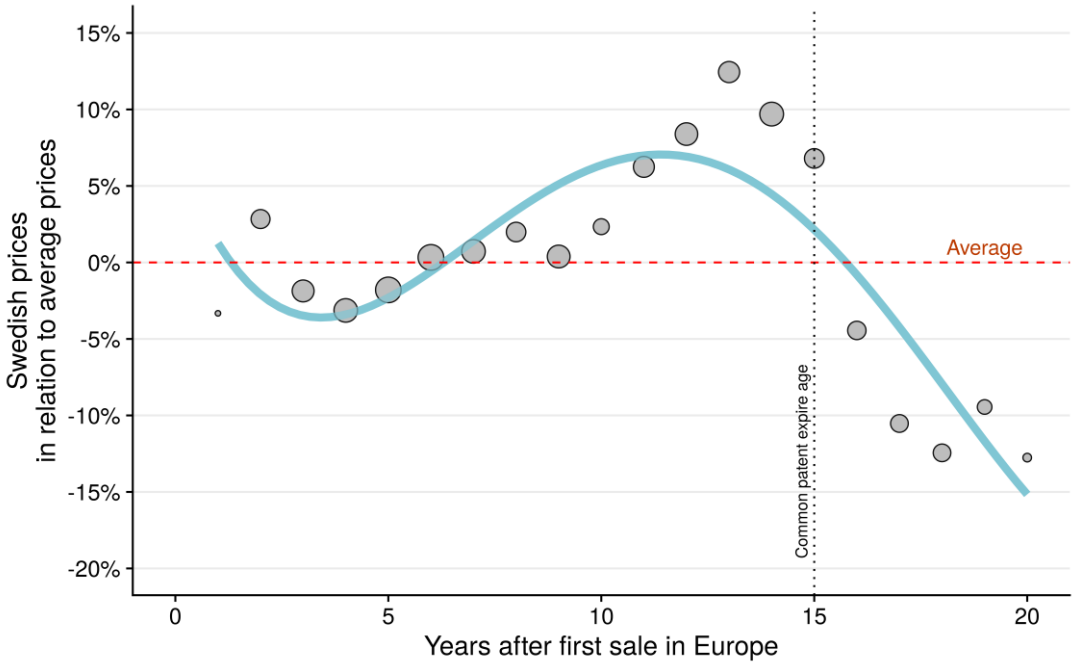
In the following sections, pharmaceuticals are divided into two different segments based on the competitive situation defined as whether a pharmaceutical is included in the Swedish PV system or not. The division is based on the fact that the price dynamics and the market situation differ greatly between pharmaceuticals with and without generic competition.

3.1 Prices throughout the pharmaceutical life cycle

The following section compares prices in Sweden against other countries' averages over a pharmaceutical's life cycle - for all pharmaceuticals. Pharmaceutical prices can change a lot over time based on the competitive situation, different types of interventions such as reviews. Figure 4 covers the entire period 2014–2021, meaning that the same pharmaceutical can be included in several age categories (calculated as years after market approval). Sales volume in 2014–2021, calculated as the total AIP per year after market approval, is indicated by the size of the circles in the figure, where a larger circumference means higher sales. The light blue curve is an approximate calculation to show the trend over the life cycle.

Figure 4 shows that Sweden's relative pharmaceutical prices are slightly below the average during the first five years, but then end up above the average between year 5 and year 15. Finally, after 15 years on the market, which roughly corresponds to the expiry of a pharmaceutical's patent, Sweden's relative pharmaceutical prices fall below the average.

Figure 4. Sweden's relative pharmaceutical prices in 2014–2021 compared with the average price for the report's 20 European countries. The comparison takes place per year after market approval (first sale)

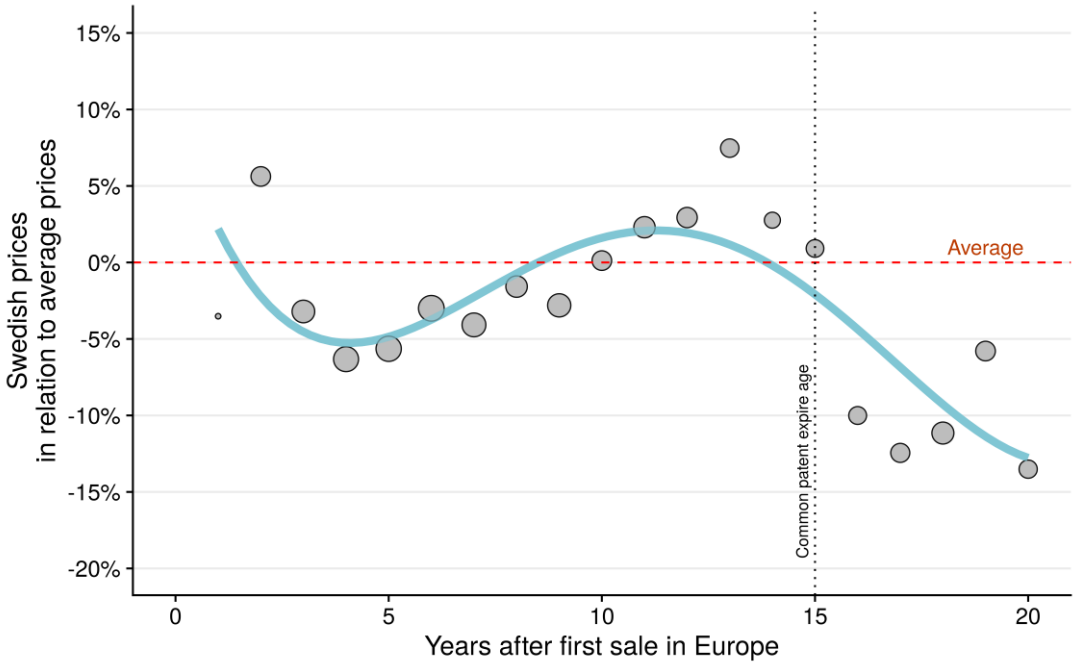


Source: IQVIA and TLV analysis.
Note 1: The red dashed line shows the average prices for 20 European countries. The position of the circles shows the actual deviation from the average prices, and their size shows how large the sales value is in Sweden for pharmaceuticals of that age. The light blue curve in the figure is a polynomial regression (fourth degree polynomial), i.e. a model adapted to the data points. Sales data, 2014–2021.
Note 2: The figure should be interpreted as Sweden's average relative price per pharmaceutical age for all years 2014–2021. Thus, it only tells us Sweden's relative price level for the entire period.

The fact that the light blue curve ends up above the average should not be interpreted as meaning that Swedish pharmaceutical prices increase in this age range. The explanation is instead that the prices of these pharmaceuticals are falling in other countries while Swedish prices remain at the original price level. For pharmaceuticals older than 15 years, Swedish pharmaceutical prices are below average. On the one hand, the 15-year rule is applied, which lowers the price by 7.5 percent on pharmaceuticals (substance forms) that have been approved on the market for 15 years (TLV 2020a). More important from a price point of view, however, is that patents expire after about 15 years on the market, which for many pharmaceuticals means that generic competition arises and lowers prices. Sweden applies the product-of-the-month system (PV system) to pharmaceuticals with competition, meaning the pharmacy substitutes the prescribed pharmaceutical with the pharmaceutical that has the lowest price in each substitution group that month (provided that the patient, prescriber, or pharmacist does not refuse the substitute) (TLV 2021a). As evident from the circles in Figure 4, pharmaceuticals between 5 and 15 years old are a large group in terms of sales, accounting for 43 percent of prescription pharmaceutical costs in Sweden during the period 2014–2021.[6]

[6] Pharmaceuticals younger than of 5 years account for 14 percent of the pharmaceutical costs and pharmaceuticals older than 15 years account for 43 percent.

Figure 5. Sweden's relative pharmaceutical prices in 2018–2021 compared with the average price for the report's 20 European countries. The comparison is made per year after market approval (first sale).

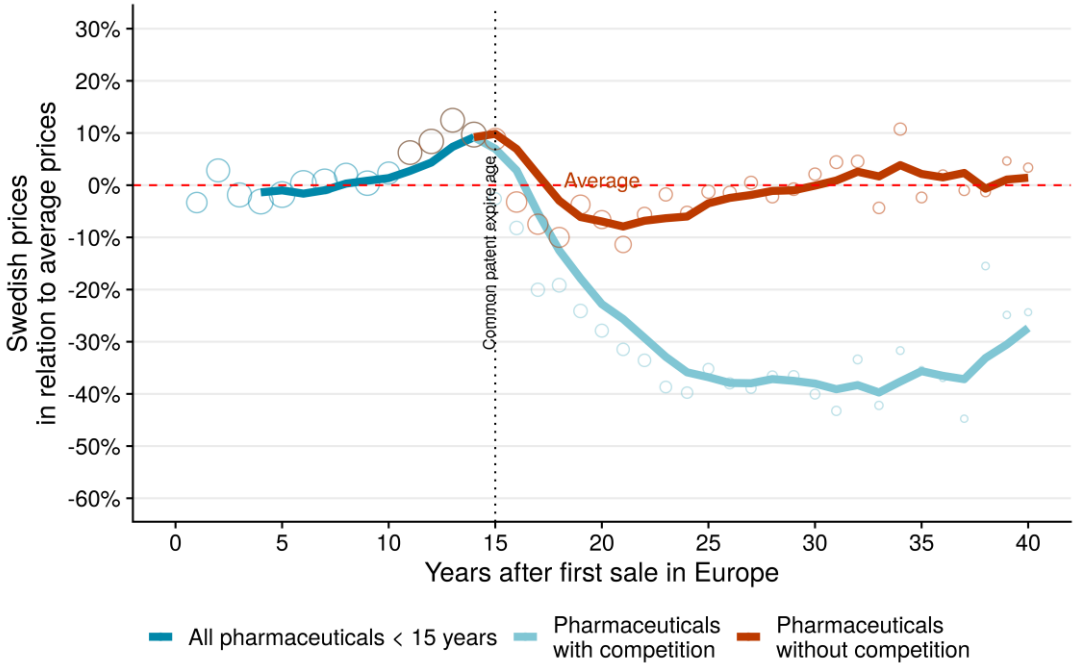


Source: IQVIA and TLV analysis.
Note 1: The red dashed line shows the average prices for 20 European countries. The position of the circles shows the actual deviation from the average prices, and their size shows how large the sales value is in Sweden for pharmaceuticals of that age. The light blue curve in the figure is a polynomial regression (fourth degree polynomial), i.e. a model adapted to the data points. Sales data, 2014–2021.
Note 2: The figure should be interpreted as Sweden's average relative price per pharmaceutical age for all years 2014–2021. Thus, it only tells us Sweden's relative price level for the entire period.

Figure 5 illustrates how the selection of a shorter period (2018–2021) closer in time affects the analysis. The share of sales before 5 years is lower and Swedish prices are lower than the average. The profile is similar but it is offset downwards. This is largely due to the exchange rate but also to the fact that best-sellers in the TNF segment have lost patent protection and become relatively cheaper in Sweden. This illustrates that the choice of time period affects the analysis, even though the general conclusion is the same. Sweden's relative pharmaceutical prices are at their highest between the age of 5 and 15 years.

In Figure 6, pharmaceuticals older than 15 years are divided into pharmaceuticals with and without generic competition based on the period 2014-2021.

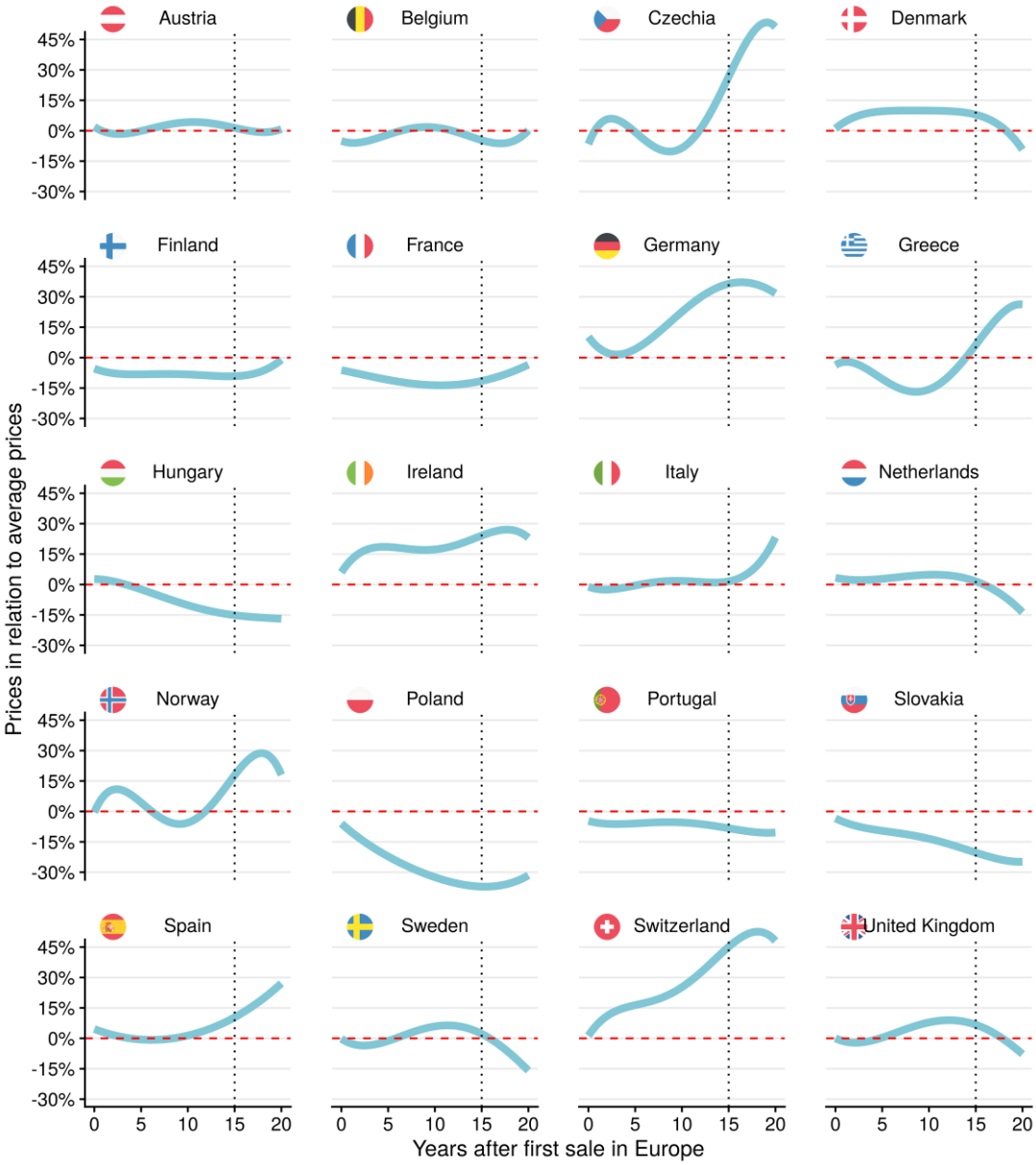
Figure 6. Sweden's relative pharmaceutical prices in 2014–2021 compared with the average price for the report's 20 European countries. The comparison is made per year after market approval (first sale)



Source: IQVIA and TLV analysis.
Note 1: The red dashed line shows the average prices for 20 European countries. The position of the circles shows the actual deviation from the average prices, and their size shows how large the sales value is in Sweden for pharmaceuticals of that age. The dark blue, light blue and red graphs are calculated moving averages for each segment (four-year interval). Sales data, 2014–2021.
Note 2: The figure should be interpreted as Sweden's average relative price per pharmaceutical age for all years 2014–2021. Thus, it only tells us Sweden's relative price level for the entire period.

In Figure 6 a significant difference in relative prices between pharmaceuticals with and without generic competition is shown. For pharmaceuticals that have been on the market for 20–25 years, the prices are below average for both pharmaceuticals with and without generic competition. For pharmaceuticals with competition that have been on the market for more than 30 years, Swedish prices are much lower (about 40 percent) than the average in the compared countries. In Sweden, pharmaceuticals with competition are included in the PV system, which means that a product (within a group of substitutable pharmaceuticals with comparable package sizes) that is available and has the lowest price becomes the product-of-the-month for one month. This system puts a lot of pressure on the prices in the segment.

Figure 7. Relative list prices of all countries in 2014–2021 in comparison with the average price for the report's 20 European countries, per year after market approval (first sale)



Source: IQVIA and TLV Analysis
Note 1: Norway and Czechia should be interpreted with caution for pharmaceuticals older than 15 years. This is because the structure of their subsidy system means that list prices and transaction prices differ significantly. The observations in this figure only show list prices.
Note 2: The red dashed line shows the average prices for 20 European countries. The light blue curve in the figures is a polynomial regression (fourth degree polynomial), i.e. a model adapted to the data points. Sales data for outpatient pharmaceuticals, year 2014–2021.

In Figure 7 prices throughout the life cycle in relation to the average, for each country in the survey is shown. The figure illustrates that the different countries' price and subsidy systems lead to major differences in price development over time.

In Sweden, decisions on subsidies are made based on whether the cost of a pharmaceutical is considered reasonable in relation to the benefit the treatment provides, so-called value-based pricing (TLV 2020d). The regions receive

compensation from the central government for the pharmaceutical costs, based on an annual forecast published by the National Board of Health and Welfare (Socialstyrelsen 2021). The forecast is based on expected use in the coming years and there is thus no strict budget at national level for prescription pharmaceuticals in Sweden. The management of pharmaceuticals from a budgetary perspective varies among different regions.

Several countries have regulatory frameworks that deal with pharmaceutical prices once the pharmaceuticals have been on the market for a few years. One example is Finland, which has time-limited subsidies that are valid for a maximum of three years, and where companies must re-apply for a subsidy (COWI 2014, p. 9). Finland has lower prices than Sweden for pharmaceuticals between 5 and 15 years old. Another example is France, which regularly reconsiders price and subsidy status after five years (HST 2015). France also applies volume agreements upon market entry, which are then converted into list price reductions after a number of years based on framework agreements with manufacturers. Compared with Sweden, France has lower prices on pharmaceuticals that have been on the market between 5 and 15 years.

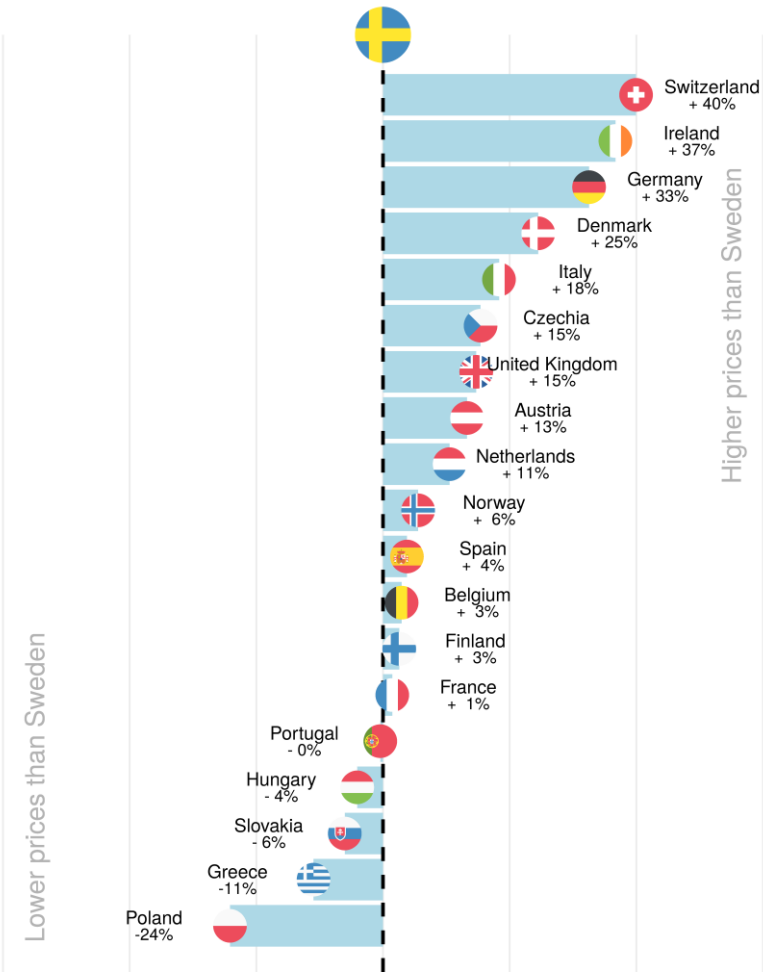
Sweden's low prices, in relation to the average, on pharmaceuticals older than 15 years can largely be explained by the PV system, which promotes price competition (TLV 2020a). A similar pattern, with falling prices after 15 years, can be seen in the Netherlands and Denmark, for example, which, like Sweden, apply a system for generic substitution of off-patent pharmaceuticals.

3.2 Pharmaceuticals without competition

The segment Pharmaceuticals without competition mainly consists of new and relatively new pharmaceuticals that still have active patents, as well as older pharmaceuticals that are not subject to competition as there are no generics on the market. The latter is, for example, the case with pharmaceuticals that the Swedish Medical Products Agency has determined not to be substitutable.

In Figure 8 the bilateral price comparison is presented, which is weighted based on sales volumes in Sweden. Only pharmaceuticals available in both Sweden and the comparable country are included in the calculation. Exactly which pharmaceuticals are sold in both Sweden and the comparable country differs between countries, which affects the reliability of the comparison. This means that the pharmaceutical included in the comparison between, for example, Sweden and Norway, is not the same as the one included in the comparison between Sweden and Spain. Therefore, Figure 8 cannot be used to compare prices between, for example, Norway and Spain.

Figure 8. Bilateral price comparison for pharmaceuticals without competition, 2021



Source: IQVIA and TLV analysis.
Note: Prices during Q1 2021. Volumes running 12 months up to and including March 2021. 3-year average exchange rate.

Figure 8 illustrates that most countries in the survey have higher list prices than Sweden. The figure should be understood to mean that Sweden's costs, for pharmaceuticals without competition sold, for example, in both Sweden and Switzerland, would have been 40 percent higher if they had been purchased at Swiss prices instead of at Swedish prices. Similarly, the cost of pharmaceuticals without competition sold in both Poland and Sweden would have been 24 percent lower if they had been purchased at Polish prices compared with Swedish prices.

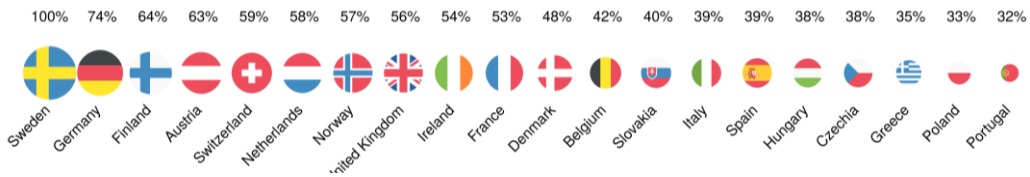
Sweden has higher prices than five of the countries. The countries with lower prices than Sweden generally have a low matching rate with respect to Swedish use, which means that the results should be interpreted with caution. Countries with higher prices than Sweden generally have a higher matching rate. The concept of a matching rate and its significance for the analysis is described in the next section.

3.2.1 Matching rate

The matching rate illustrates the proportion of prescription pharmaceuticals sold at pharmacies in Sweden that are also available in other countries and sold at pharmacies (see Figure 9). Pharmaceuticals used within inpatient care are not included in the analysis. Pharmaceuticals with significantly fewer sales per capita

than in Sweden are also excluded from the bilateral comparison. See Appendix 1 for more information.

Figure 9. Swedish matching rate for pharmaceuticals without competition



Source: IQVIA and TLV analysis.

In Sweden, there are a total of 4,744 pharmaceuticals in the selection for this segment. These pharmaceuticals form the basis of the price comparison with other countries. Sales of pharmaceuticals in other countries that do not match those available in Sweden have therefore been excluded (even if the substance itself is available in other countries). The number of pharmaceuticals available in Sweden (counted as substance, form, and strength) is therefore the maximum number of pharmaceuticals.

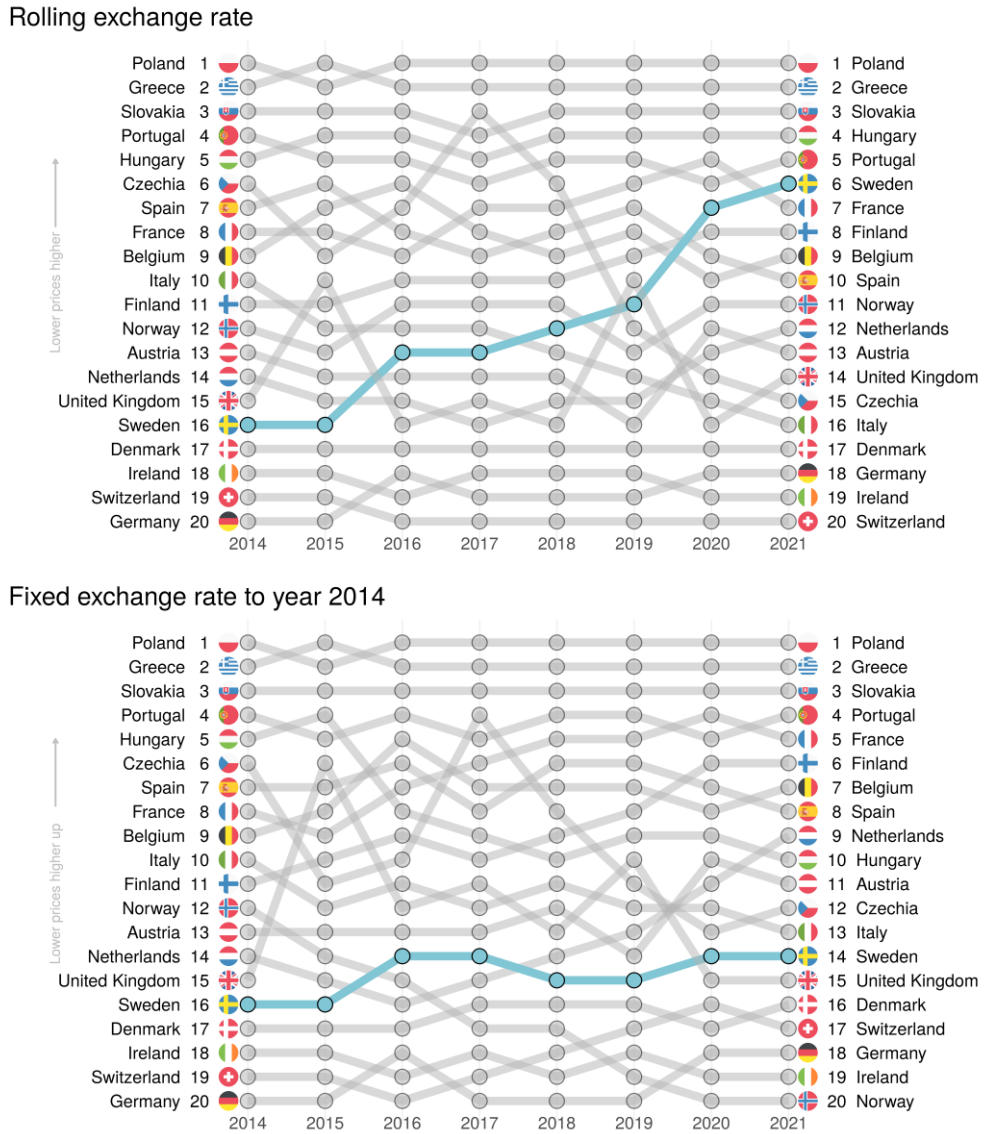
For pharmaceuticals without competition, the matching rate is highest for Germany, where 74 percent of the pharmaceuticals used in Sweden are used. Germany is followed by Finland, Austria, Switzerland, the Netherlands, Norway, and the United Kingdom, with a matching rate between 56 and 64 percent. The lowest matching rate is with countries such as Portugal, Poland, Greece, Czechia, Hungary, Spain, and Italy, all of which have a matching rate below 40 percent. A comparison between Germany and Sweden is thus based on 74 percent of the pharmaceuticals available in Sweden and a comparison with Portugal is based on only 32 percent. In bilateral price comparisons, it is thus only possible to compare each country with Sweden, not other countries between themselves. Differences in the matching rate may, for example, be due to some countries using other pharmaceuticals than those used in Sweden, or that prescription pharmaceuticals in Sweden are dispensed as inpatient pharmaceuticals in other countries and vice versa.

Differences in the matching rate between countries are important to consider when studying differences in a bilateral price comparison. A high matching rate and a pharmaceutical use similar to that in Sweden makes the price comparison more robust. Comparisons with countries with very low matching rates are more difficult to generalise, as the comparison is only relevant to the few products the countries have in common.

3.2.2 Historical development

In recent years, pharmaceutical prices in Sweden have fallen in relation to other countries in the comparison. This is primarily explained by the fact that the Swedish krona's decrease in value compared to the euro.

Figure 10. Development of the bilateral price comparison over time, 2014–2021. Three-year average exchange rate. Pharmaceuticals without competition



Source: IQVIA and TLV analysis.
Note 1: Rank 1 means that the country has the lowest prices. Running 3-year average exchange rates per year.
Note 2: As the bilateral comparison uses Sweden's volume weights, interpretations between countries other than Sweden shall not be made.

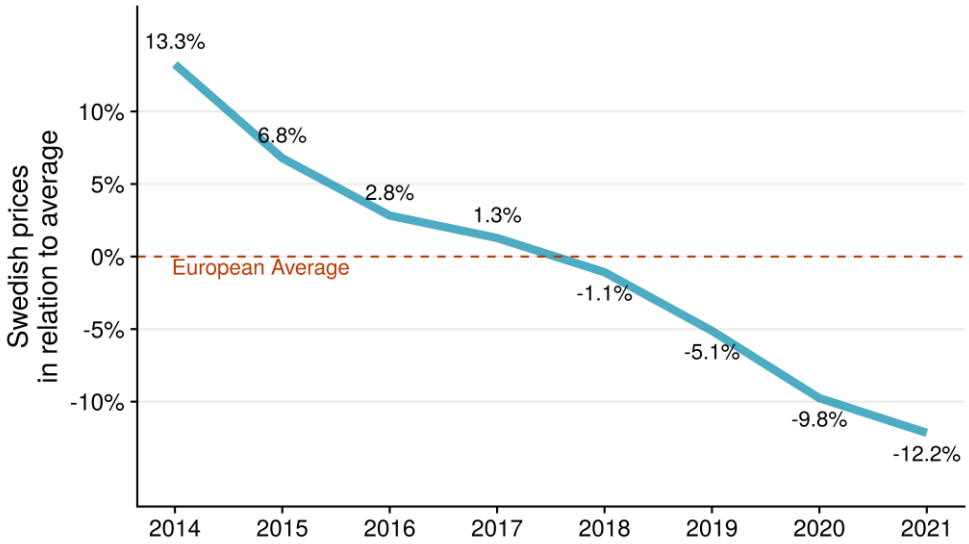
The top part of Figure 10 illustrates how Sweden's prices have changed in relation to other countries between 2014 and 2021. During the period, Sweden has gone from having the sixteenth to having the sixth lowest prices. The main explanation for this change has been the exchange rate. In the bottom figure, where the exchange rate is kept constant, Sweden has moved from sixteenth to fourteenth place. Sweden's prices fell in relation to other countries between 2015 and 2016, when many reviews were done. From 2016 onwards, Sweden's relative prices have instead risen slightly, when the exchange rate effect is deducted.

In many cases, the percentage difference in price level between the countries is small. Sweden's placement may therefore be moved down, i.e. Swedish relative

prices will increase if the Swedish krona strengthens. A general observation is that the countries whose currency is not tied to the euro have a greater variation in placement compared with other countries.

Figure 11 shows that Sweden's prices in relation to the rest of Europe have decreased since 2014. To get a better idea of the development, it is also interesting to look at the size of this change. Figure 11 shows the percentage deviation between prices in Sweden and the average prices in other countries from 2014 to 2021.

Figure 11. Sweden's relative prices compared with the average per year, calculated as a cross-section. Pharmaceuticals without competition



Source: IQVIA and TLV analysis.
Note: Calculation based on cross-section. Exchange rate 3-year running average each year.

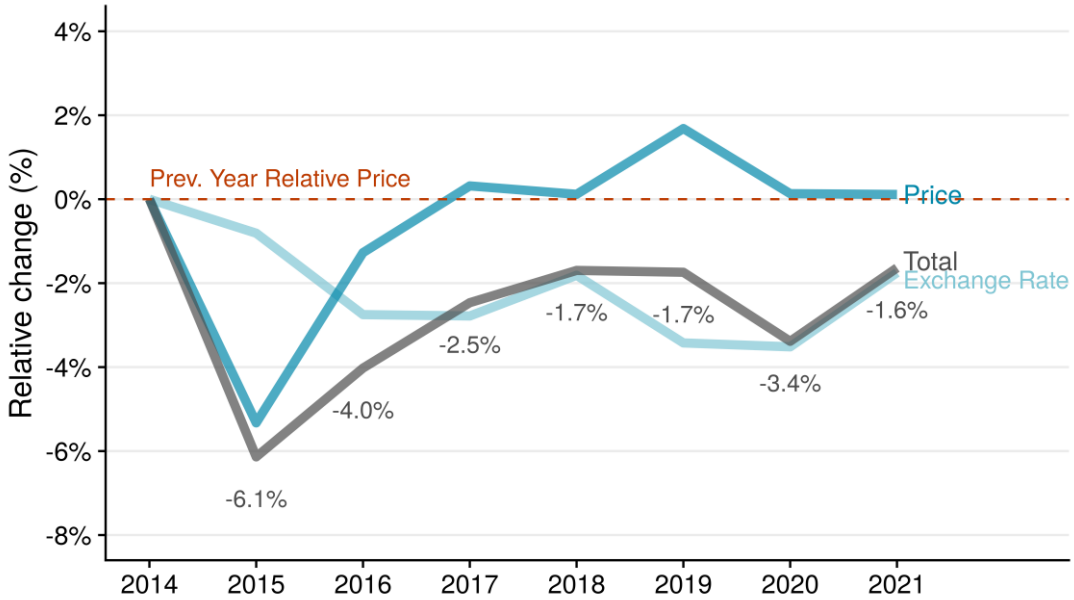
Figure 11 illustrates that Sweden's prices in 2014 were 13.3 percent higher than the average for all countries. Over time, Sweden's prices have gradually decreased by more than twenty percentage points until the first quarter of 2021, when Sweden's prices were 12.2 percent lower than the average. The change is largely driven by the exchange rate change.[7] From 2014 to 2016, however, the relative price reduction was mainly driven by reviews and the introduction of regular price reductions for pharmaceuticals 15 years and older. This change is more clearly shown in Figure 12 below. As previously mentioned, Swedish prices are likely to rise if the Swedish krona increases in value again. The following section provides a more detailed description of the reasons behind this price development.

3.2.3 Price and currency effects

The relative price development for pharmaceuticals in Sweden compared with other European countries is influenced by several different factors. Figure 12 shows a decomposition of how much of the change in the relative price level between each year is driven by changes in the exchange rate and how much is driven by actual price changes on pharmaceuticals (in both Sweden and other countries).

[7] A version of the figure, with a fixed exchange rate, can be found in section 1.1 of Appendix 1. See also figure 12 on the next page.

Figure 12. The change effects of the relative price divided into price and currency changes. Pharmaceuticals without competition weighted based on the use in Sweden in 2014.



Source: IQVIA and TLV analysis.

The *currency* category includes the part of Sweden's relative price level entirely driven by the falling Swedish krona. The second category, *price*, is influenced in part by changes in pharmaceutical prices in the rest of Europe, and partly by changes in Swedish pharmaceutical prices. Thus, the negative price change effect in Figure 12 may be due to falling prices in Sweden *or* rising prices in other countries. The 2015 price reduction effect is largely due to price reductions as a result of reviews in Sweden and the introduction of the 15-year rule. Since 2016, reviews have also been carried out as regions and companies have signed managed entry agreements on repayments, which has contributed to lower costs (TLV 2021b). Cost changes as a result of managed entry agreements are not included in Figure 12 above.

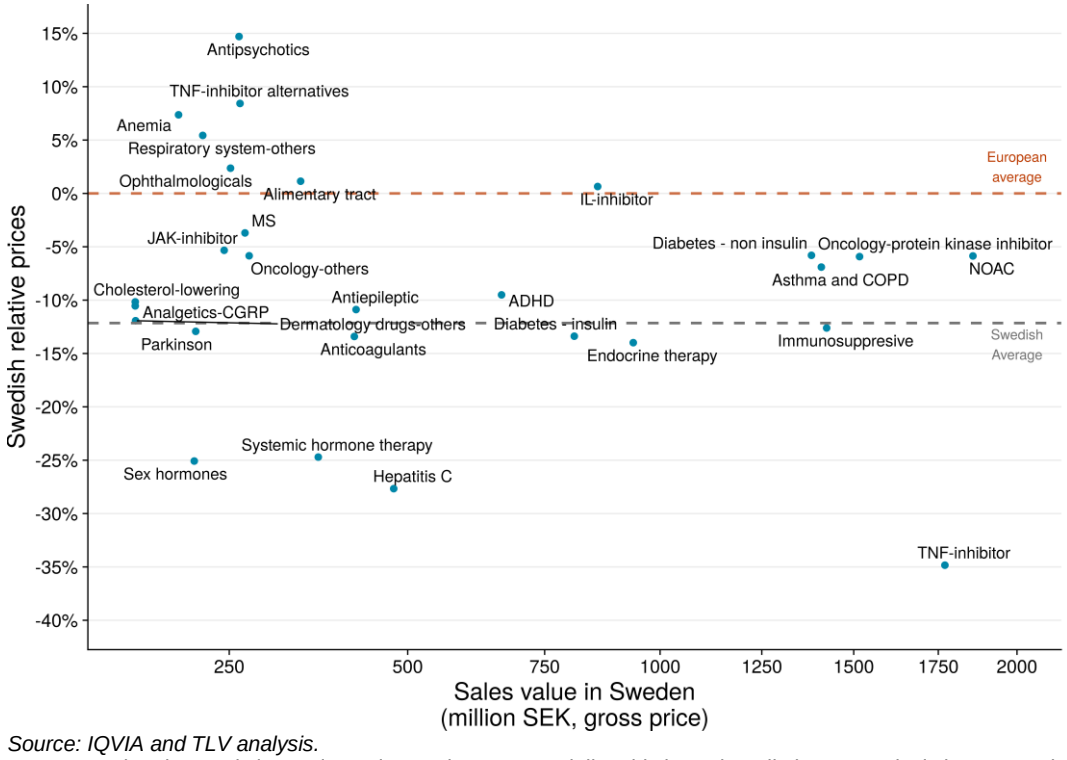
In order to distinguish the price effect from the cost changes that arise as a result of the varying degree of use of different pharmaceuticals over the years, the analysis only includes pharmaceuticals used in the years between 2014 and 2021. For the same reason, the use is weighted based on how these pharmaceuticals were used in 2014. As in previous analyses based on cross-sections, the price category is weighted based on how much use a certain pharmaceutical has in Sweden. Meaning, price changes on pharmaceuticals with high use have a greater effect than an equally large price change on a pharmaceutical with lower use.

The sum of the two components price and currency constitutes *Total relative price change*. A negative total effect below the dashed red line means that Swedish relative prices are lower compared with the previous year. A more detailed description of the calculations and methodology behind Figure 12 is presented in *Appendix 2*.

3.2.4 Pharmaceutical classes

To examine price differences on a more detailed level, Figure 13 shows Sweden's prices in comparison with the 19 European comparison countries, as well as total sales in Sweden in 2021 based on the total AIP,[8] divided into different pharmaceutical classes.[9]

Figure 13. Swedish prices for pharmaceutical classes in comparison with the European average AIP, 2021. Pharmaceuticals without competition



Source: IQVIA and TLV analysis.
Note: Note that the x-axis intervals are increasing exponentially. This is so that all pharmaceutical classes can be shown together. Pharmaceutical classes with AIP sales of less than SEK 150 million have been excluded for the same reason. 10 SEK ≈ 1 EUR.

The pharmaceuticals included in this analysis are not part of the PV system as they still have active patents and are therefore not subject to generic competition, or the patent has expired but no generic competition has arisen. The distribution of pharmaceuticals in the different pharmaceutical classes is described in *Appendix 2 (2.8 Pharmaceutical classes)*.

The pharmaceutical classes with the highest sales in Sweden are Non–vitamin K Antagonist Oral Anticoagulants (NOAC), Oncology-protein kinase inhibitors, TNF inhibitors, Obstructive Airway Diseases, and finally Diabetes-excl. insulin, all of which are at a relative price level below the European average. If the Swedish krona strengthens further, the prices of these medicines will be higher in relation to the European average.

Within the immunosuppressive pharmaceutical classes, Figure 13 shows that TNF inhibitors have high sales in Sweden with a relative price level well below both the

[8] The sales amount is calculated as the price range for Q1 2021 multiplied by the volume rolling 12 months for each pharmaceutical in Q1 2021.
[9] For more information on pharmaceutical classes, see *Appendix 2* and the subheading *Pharmaceutical classes*.

Swedish and European average. During the comparison period, there have been managed entry agreements regarding the TNF inhibitors and the actual price has therefore been even lower. The managed entry agreements in Sweden expired in October 2021 and new ones are yet to be drawn up. As other countries may also have hidden agreements or confidential procurements of pharmaceuticals, it is not possible to comment on the actual price level in Sweden compared with other countries, even though the visible prices are lower.

For the other immunosuppressive pharmaceutical classes, i.e. Alternative TNF inhibitors, IL inhibitors, JAK inhibitors, and other immunosuppressive pharmaceuticals, sales levels are significantly lower than for TNF inhibitors and the price levels are more in line with the European and Swedish average. Among these classes, only the JAK inhibitors have had managed entry agreements and the relative price levels are primarily influenced by the currency exchange rate. For pharmaceuticals with active managed entry agreements, this really means that the price levels shown in Figure 13 are lower. This applies to the classes Cholesterol-Lowering, JAK inhibitors, Hepatitis C, and the oncology classes (including protein kinase inhibitors, Endocrine therapy and Other Oncology).

In summary, prices for pharmaceuticals without competition have been stable in relation to the average prices in Europe over the past year compared with the corresponding analysis in the 2020 report (TLV 2020b). Measured in Swedish kronor, list prices do not change much until generic competition arises in the PV system, or when competition is stimulated by TLV conducting reviews. Without interventions or rule-based price reductions, spontaneous price competition between pharmaceuticals rarely arises on the Swedish market.

3.3 Pharmaceuticals with competition

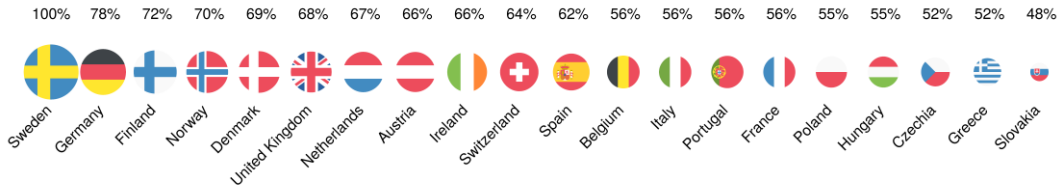
In this report, Pharmaceuticals with competition are defined as the pharmaceuticals within the Swedish PV system, i.e. pharmaceuticals that the Swedish Medical Products Agency has classified as substitutable and where generic competition has arisen. These are older pharmaceuticals no longer under patent protection, 15 years after market introduction roughly corresponds to the expiration of patents. However, far from all pharmaceuticals older than 15 years lack competition. For example, there are pharmaceuticals that are not classified as substitutable. In the Swedish PV system, substitutable pharmaceuticals are divided into substitution groups based on substance, dosage form, strength, and package size group. Then, the NPL pack ID with the lowest price in a group and whose company has confirmed that it can be made available to the Swedish market as the product-of-the-month is chosen. As it is the packaging with the lowest price that is designated as the product of the month, price competition is created between companies. Furthermore, Sweden has a system for ceiling prices on pharmaceuticals with competition, which means that when the price per unit in a substitution group has fallen below 30 percent of the original price, a ceiling price of 35 percent of the highest price in the group when generic competition arose is determined (TLV 2020c). Ceiling prices mean that the price within a group can be raised freely up to the ceiling price. This allows for a price dynamic that, for example, is reflected in the

fact that pharmaceuticals with and without generic competition have been affected by exchange rate fluctuations to varying degrees.

3.3.1 Matching rate

In Sweden, there are a total of 623 pharmaceuticals in the selection of pharmaceuticals with competition. These pharmaceuticals form the basis of the bilateral price comparison with other countries. For pharmaceuticals with competition, the average matching rate is significantly higher than for pharmaceuticals without competition. Figure 14 also shows that the matching rate differs greatly between countries. Germany has the highest matching rate with Sweden (78 percent) and Slovakia has the lowest matching rate (48 percent).

Figure 14. Swedish matching rate for pharmaceuticals with competition

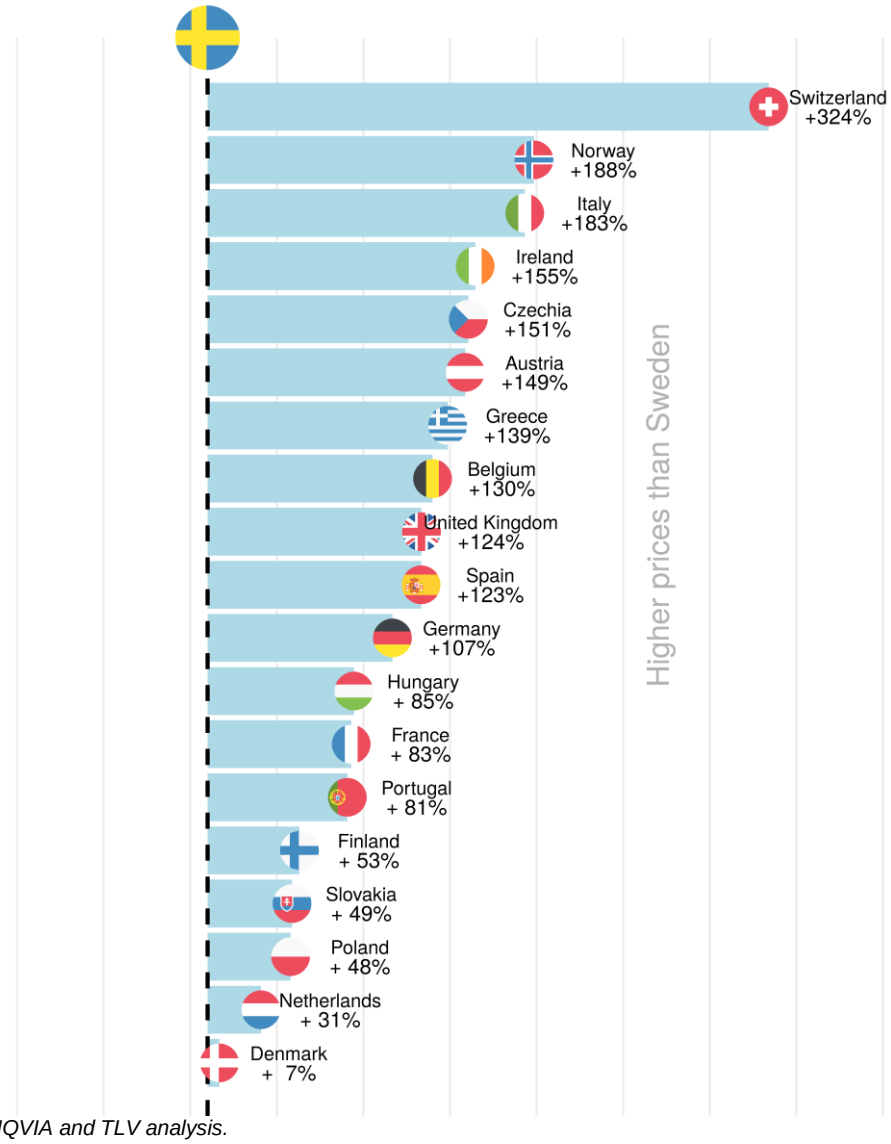


Source: IQVIA and TLV analysis.

3.3.2 Bilateral price comparison 2021 for pharmaceuticals with competition

In Figure 15 it is illustrated that relative prices in relation to Sweden differ considerably. In the figure the prices of pharmaceuticals available in Sweden and the comparable country are compared, weighted by Swedish sales volumes in 2021. As different pharmaceuticals are used in different countries, it is not possible to make comparisons between the different countries as different pharmaceuticals may be compared.

Figure 15. Bilateral price comparison for pharmaceuticals with competition, 2021



Source: IQVIA and TLV analysis.
Note: Prices Q1 2021. Volumes running 12 months up to and including March 2021. 3-year average exchange rate.

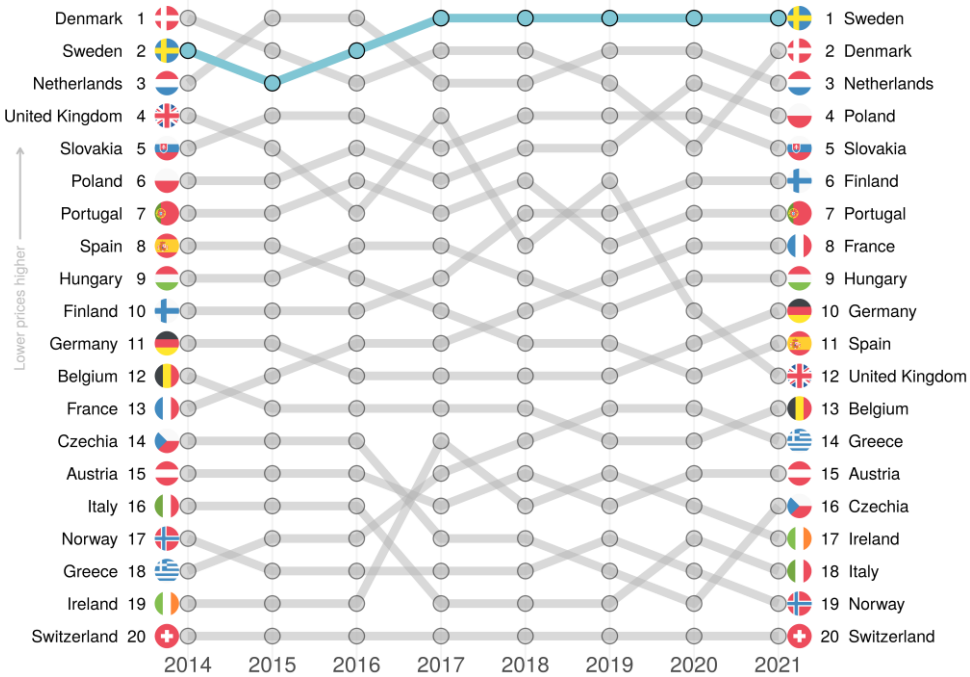
In Figure 15 is shown that Switzerland has more than three times higher list prices for pharmaceuticals with competition available in both Sweden and Switzerland. Denmark only has 7 percent higher prices. Denmark has a similar system to the Swedish PV system for pharmaceuticals with competition. The difference is that they use sales periods of two weeks - compared to the full calendar month used in the Swedish PV system (COWI 2014, p. 9). Also in this segment, other countries may have different types of repayments not shown in the official list prices.

3.3.3 Historical development

In Figure 16 the development of the bilateral price comparison over time for pharmaceuticals with competition is illustrated. As volumes are weighted based on sales in Sweden, comparisons between countries other than Sweden should be

avoided. Throughout the period 2014–2021, Sweden's prices have been among the lowest.

Figure 16. Development of the bilateral price comparison over time, 2014 - 2021. Pharmaceuticals with competition

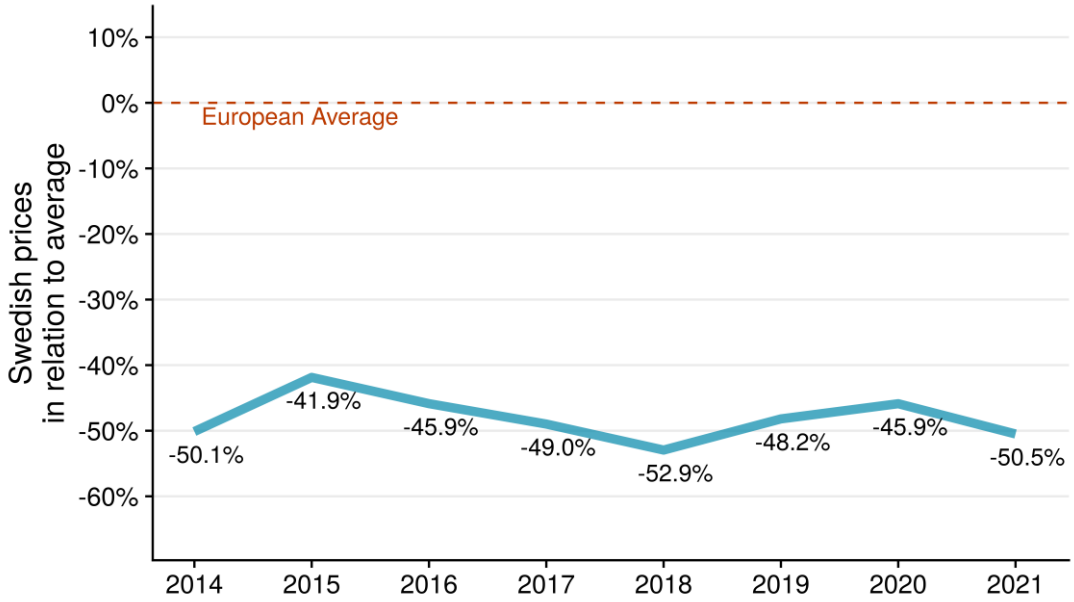


Source: IQVIA and TLV analysis.
Note 1: Rank 1 means that the country has the lowest prices. Running 3-year average exchange rates per year.
Note 2: As the bilateral comparison uses Sweden's volume weights, interpretations between countries other than Sweden shall not be made.
Note: Some countries have general discount systems not shown in list prices and may give a potentially different picture than the one shown here.

Figure 16 shows that Denmark was the closest to Swedish prices for large parts of the period, but fell to fifth place in 2020. In 2021, Denmark has once again taken second place. Finland has gone from tenth place to sixth place. At the same time, Switzerland has had the highest prices of all 20 countries during the period. In the segment with competition, the Swedish exchange rate has a smaller impact than for pharmaceuticals without competition, but the competitive situation within the PV system has a significant impact (see Figure 18 for drivers).

Figure 17 presents where Sweden's prices for pharmaceuticals with competition are, percentage-wise, compared with the average of all countries in the report.

Figure 17. Sweden's relative prices compared with the average per year, calculated as a cross-section. Pharmaceuticals with competition



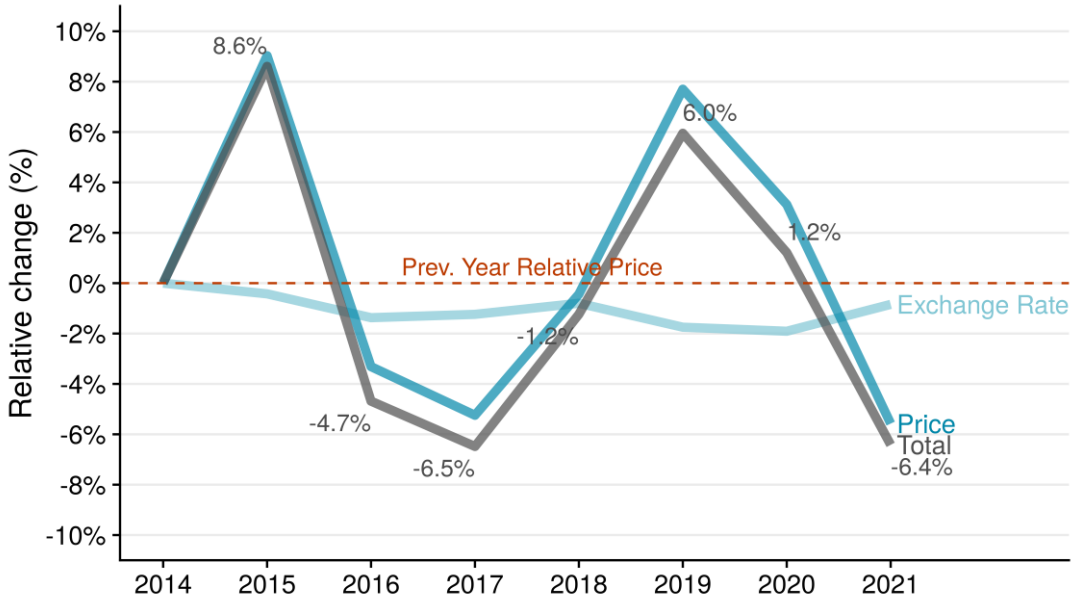
Source: IQVIA and TLV analysis.
Note: Calculation as a cross-section. Exchange rate 3-year running average each year.

In 2021, Sweden's prices for pharmaceuticals with competition were approximately 50 percent lower than the average for the other 19 countries. This is around the same level as in 2014. During the period, the exchange rate has changed and the competitive situation is also constantly changing, where more companies tend to offer increased price competition while fewer companies in a substitution group reduces competition.

3.3.4 Price and currency effects

In Figure 18 a decomposition of how much of the relative price change is due to currency changes and price changes between 2014 and 2021 is shown. Price changes are changes to the relative price due to actual price changes on pharmaceuticals, for example as a result of increased competition in a substitution group.

Figure 18. The change effects of the relative price divided into price and currency changes. Pharmaceuticals without competition weighted based on the use in Sweden in 2014.



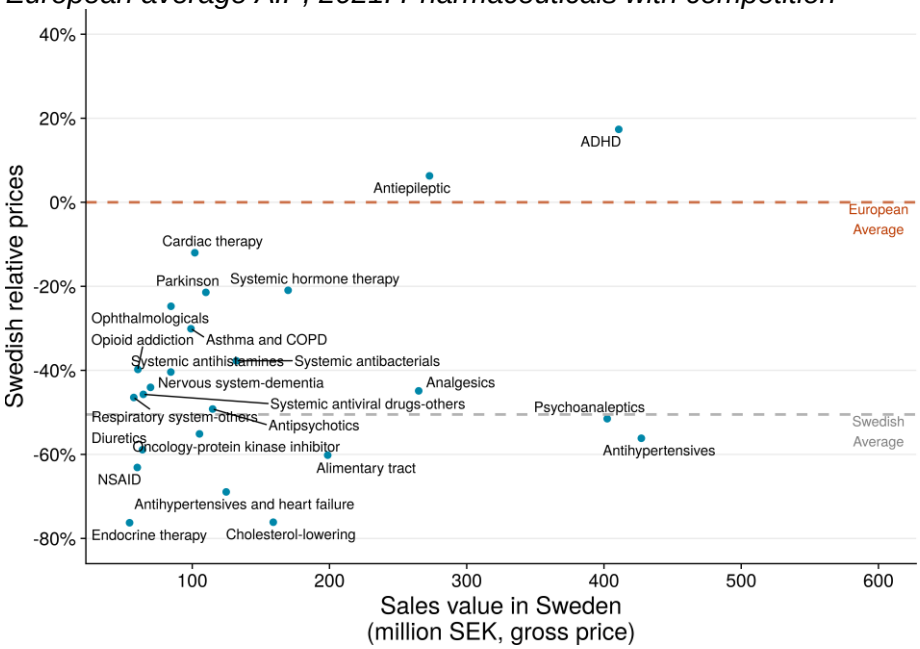
Source: IQVIA and TLV analysis.

The currency effect is smaller than for pharmaceuticals without competition, which is also reasonable given that there is some room for pharmaceuticals with competition to adjust prices based on a changed exchange rate. For pharmaceuticals within the PV system, the price can be raised up to a ceiling price without requiring any special exemption or price application procedure. The exchange rate effect that influences the prices on pharmaceuticals without competition can thus be compensated in this segment by raising prices, which is one of the reasons why the exchange rate effect is not as great in the segment with generic competition, while the price effect is all the greater. The price changes can also be explained by the competition within the PV system.

3.3.5 Pharmaceutical classes

As previously shown, Swedish prices for pharmaceuticals exposed to generic competition are generally lower than in other European countries. Figure 19 shows Sweden's prices in comparison with Europe, as well as sales in Sweden in 2021 divided into different pharmaceutical classes.

Figure 19. Swedish prices for pharmaceutical classes in comparison with the European average AIP, 2021. Pharmaceuticals with competition



Source: IQVIA and TLV analysis.
Note: Note that pharmaceutical classes with sales in AIP of less than SEK 50 million are excluded to be able to show classes. 10 SEK ≈ 1 EUR.

Swedish prices for pharmaceuticals exposed to generic competition are generally lower than in other European countries. Figure 19 shows that all pharmaceuticals with competition are below the European average, except for antiepileptics and ADHD medicines, which are above the European average. The Swedish Medical Products Agency assesses that pharmaceuticals for the treatment of epilepsy are not substitutable with other pharmaceuticals with the same substance, even though these are bioequivalent (Läkemedelsverket 2019). Only certain strengths of some substances that also have another indication than epilepsy are substitutable. However, in the case of new use, generic pharmaceuticals may be recommended for the treatment of epilepsy. The substitution of ADHD medicines is also limited for, for example, methylphenidate, where prescribers in around 40 percent of all filled prescriptions have marked that the prescribed pharmaceutical should not be substituted at pharmacies. In addition, patients reject substitution in around 14 percent of all filled prescriptions for methylphenidate.

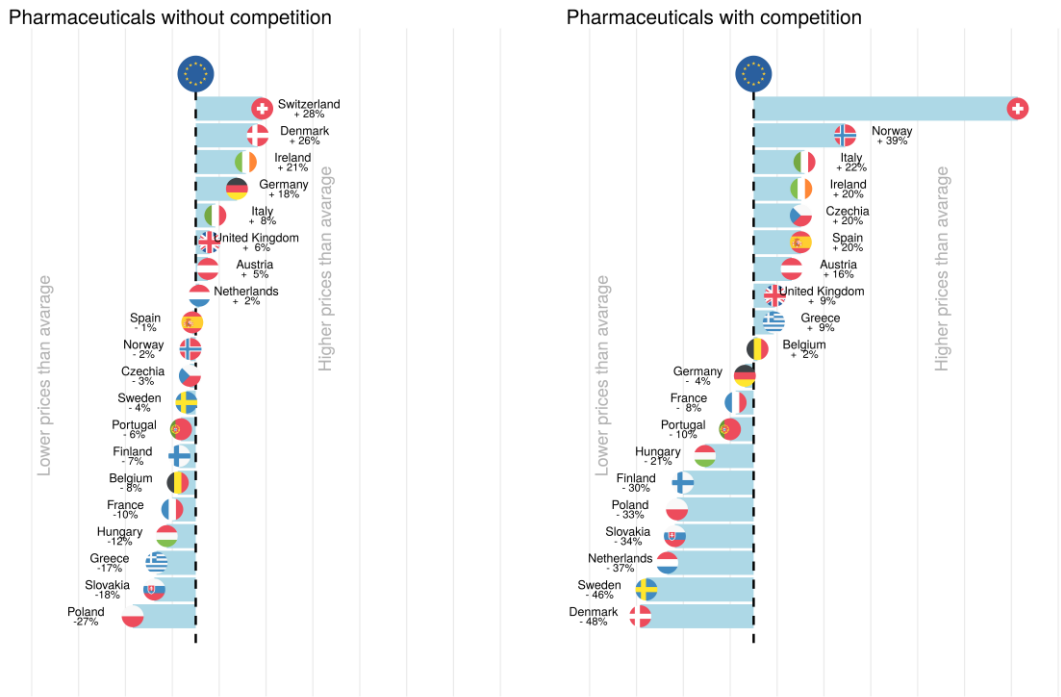
Similar patterns exist in other pharmaceutical classes, where substitution does not occur because either the patient or the prescriber opposes the substitution. The clearest example is patients with ADHD where more than 50 percent of the prescriptions have been marked as non-substitutable by the prescriber. The relationship between the proportion of marks and the relative prices indicates that limitations on substitution impacts the effectiveness of price competition within individual pharmaceutical classes.

3.4 Bilateral average - price comparison considering other countries' volumes

The analyses presented in previous chapters are mainly based on Swedish conditions and prices for pharmaceuticals that are used to a great extent in Sweden are given greater weight in the analysis than prices for pharmaceuticals that have low Swedish use, even if the use in other countries is high. This means that Swedish prices may appear low, as Sweden may have lower prices on pharmaceuticals that are used a lot here. The relationship can also be reversed, i.e. Swedish healthcare tends to prescribe pharmaceuticals with a low price over pharmaceuticals with a high price.

Figure 20 presents an alternative analysis where the bilateral index is calculated based on the use of pharmaceuticals in all countries. Bilateral indices have been created based on usage in each individual country. An average of these indices has then been calculated. See Appendix 1 for a further description of the methodology.

Figure 20. Price comparison with bilateral average for pharmaceuticals without competition, 2021. Exchange rate is 3-year moving average.



Source: IQVIA and TLV analysis.

For pharmaceuticals without competition, Sweden's prices are four percentage points lower than the average. This lands Sweden in ninth place on the list of the lowest prices of all 20 countries. This can be compared with the bilateral index with Swedish pharmaceuticals as a starting point in Figure 8. According to this index,

Sweden has the fifth lowest prices. Thus, Sweden's price level appears slightly higher when considering pharmaceutical use in other countries than when considering pharmaceutical prices based on use in Sweden. Meaning, this indicates that pharmaceuticals used a lot in Sweden also tend to have lower prices.

For pharmaceuticals with competition, Sweden has the second lowest prices in 2021, after Denmark. This differs from the bilateral index in Figure 15, where Sweden has the lowest price in the comparison, if the starting point is Swedish pharmaceutical use.

4 Discussion

In this report, analyses of Swedish pharmaceutical prices have been carried out and been compared with prices in 19 other European countries. In the analyses, TLV mainly focuses on prices on prescription pharmaceuticals dispensed in outpatient pharmacies, as these are included in the pharmaceutical benefits handled by TLV.

The results show that Sweden has relatively low prices on pharmaceuticals in relation to other countries included in the survey, especially for pharmaceuticals with competition - where Swedish prices are among the absolute lowest. For pharmaceuticals without competition, Sweden has the sixth lowest prices in the survey. The results also show that Swedish prices have fallen in relation to other countries compared with previous years.

The development with falling prices is largely explained by the falling Swedish krona. If the effect of the changed currency exchange rate is removed, Swedish prices are only marginally lower over time in relation to other countries. The fact that the analysis is largely affected by exchange rate changes means that the low relative price level presented in this year's report, and which has also been identified in previous annual reports (TLV 2020b; TLV 2019), may change in the future. Since 2020, the value of the Swedish krona has increased in relation to the euro. If the value of the krona were to continue to strengthen in the future, it is likely that pharmaceutical prices in Sweden will increase in relation to other European countries. This break in trend leads to a continued need for monitoring how Swedish pharmaceutical prices relate to the price level in other European countries in the future.

Based on the life cycle analyses presented, it is evident that Sweden's relative pharmaceutical prices are in line with other countries during the early period of a pharmaceutical after market introduction. For pharmaceuticals 5 to 15 years after market introduction, Swedish prices are higher than the average. This is explained by the fact that the absolute price level in other countries decreases in the years after introduction, while Sweden's absolute prices usually remain unchanged. After about 15 years on the market, the patent protection of the pharmaceuticals expires and the original pharmaceuticals can, if available, be replaced by generic alternatives. The Swedish product-of-the-month system (TLV 2021a), with generic substitutability at pharmacies, creates significant price pressure that leads to Swedish prices, as a rule, falling sharply after 15 years, including in relation to other countries.

For some older pharmaceuticals, no generic competition arises. There may be several reasons for this. Certain pharmaceuticals with the same substance, dosage form, and strength, for example biological pharmaceuticals, are not considered to be substitutable by the Swedish Medical Products Agency, as substituting different products could be associated with certain risks. For this segment of older, non-substitutable pharmaceuticals, Swedish list prices are relatively close to the European average.

The prices analysed in this report do not take into account any discount agreements (managed entry agreements) countries may have for certain pharmaceuticals and that

affect what the countries ultimately pay for these. The total value of managed entry agreements in Sweden in 2020 was equivalent to SEK 2.8 billion (TLV 2021b). At present, we lack information on potential discount agreements in other countries, which makes it difficult to fully control the effect of these agreements on the findings in the analyses. While this is a shortcoming in the analytical result, it is likely that the findings presented in the report will at least give an indication of the actual price level between countries. In cases where Sweden does not have a Managed Entry Agreement for a pharmaceutical, but has a higher list price than other countries, we know that Swedish prices are higher than in other countries. If the other countries have discount agreements for these pharmaceuticals, the price difference is even greater than what we see from the list prices, but it is impossible to show exactly how much.

The type of comparisons made here should be interpreted in light of the pharmaceutical pricing systems applied in the different countries. Sweden uses a value-based pricing system (TLV 2020d), where the price accepted for a pharmaceutical must be reasonable in relation to the health benefit of the pharmaceutical. TLV's assignment is to ensure cost-effective use throughout the pharmaceutical's life cycle. Thus, Sweden differs from most other European countries, which instead use different systems of IRP. In order to make correct assessments of the value-based price of a pharmaceutical, unlike with a rule-based IRP system, access to data on the pharmaceutical's effect and clinical use is required. For obvious reasons, such data is not always available until a pharmaceutical starts to be used and has been on the market for some time. As a result of this uncertainty, it can be difficult to estimate the cost-effectiveness of a pharmaceutical with the price TLV accepts.

The price considered reasonable when a pharmaceutical is first introduced in the benefits does not necessarily need to remain so throughout the entire life cycle of the pharmaceutical. There may be many reasons for the uncertainty, for example that the pharmaceutical market changes as new treatment options are added or that pharmaceuticals are exposed to competition. To ensure the value-based pricing, TLV monitors the pharmaceuticals that have been granted a subsidy and, if necessary, adjusts the prices and the benefit status. The monitoring of specific pharmaceuticals can lead to reviews of previous decisions where the current price and cost-effectiveness are evaluated. TLV also adjusts prices using regular price adjustments via the 15-year rule and the ceiling price system.

Managed entry agreements regions and pharmaceutical companies are important to ensure a reasonable cost, especially for pharmaceuticals that have been on the market for less than 15 years. As new pharmaceuticals enter the market and existing pharmaceuticals get older, TLV needs to develop its tools for pricing and subsidy. The high relative prices of pharmaceuticals 5-15 years old is one of the reasons why the Government has commissioned TLV to generate savings on costs of preferential pharmaceuticals. As in TLV's international price comparisons in previous years, this year's report also shows the importance of continuously reviewing and evaluating previous price and subsidy decisions regarding pharmaceuticals. TLV needs to find forms of additional savings, which requires TLV to collaborate with other market players - regions, pharmaceutical companies, and other public authorities - to achieve a system that ensures a long-term and sustainable pharmaceutical pricing model.

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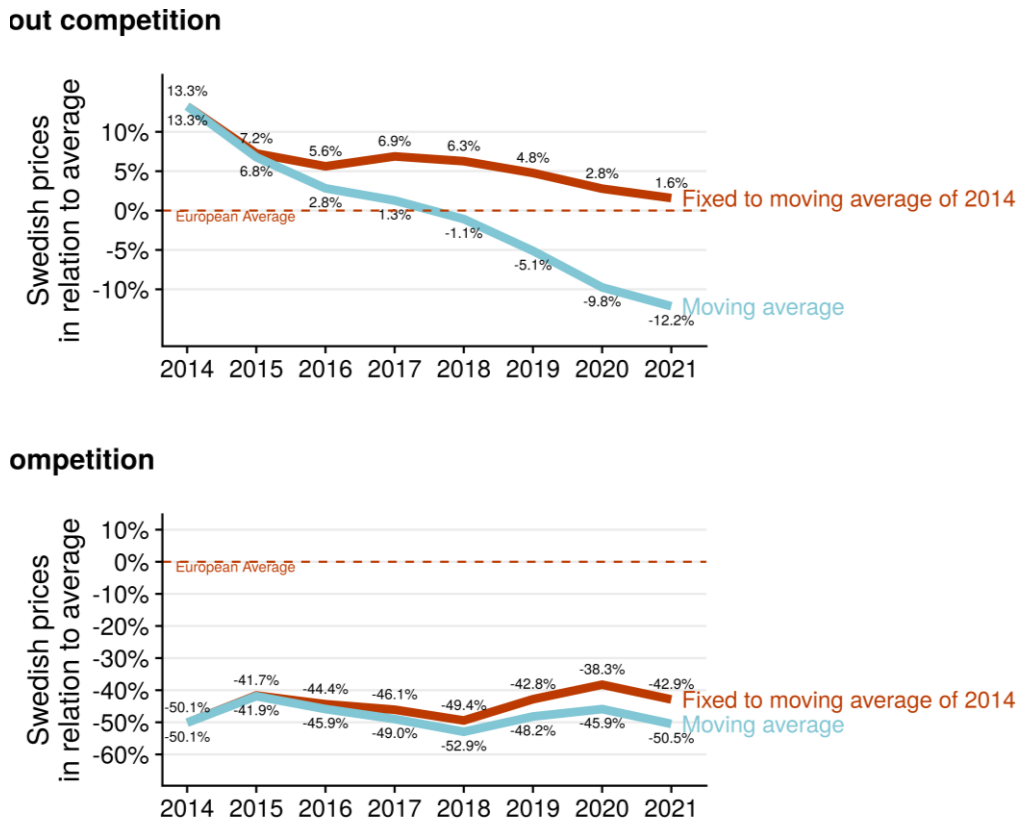
Appendix 1: Sensitivity analyses

1 Currency exchange rate

The currency exchange rate has a major impact on prices in Sweden. When a new pharmaceutical is launched for sale on the Swedish market at a fixed price, the cost of this pharmaceutical in relation to countries with other currencies will decrease if the Swedish krona weakens.

In recent years, the Swedish krona has weakened in relation to the euro. As the 3-year average is used throughout the report, 2021 has also been affected by a falling Swedish krona. One way of measuring the impact of the exchange rate is to fix the exchange rate between, for example, SEK and EUR to the exchange rate at a certain point in time and then compare prices.

Figure 21. Sweden's relative prices compared with the average per year, calculated as a cross-section. Pharmaceuticals without and with competition



Note: Exchange rate divided into 3-year moving averages each year and fixed 3-year moving average of 2014.

Figure 21 above shows how Sweden's pharmaceutical prices developed between 2014 and 2021 using a rolling (floating) exchange rate and a fixed exchange rate (fixed to the rate applicable in 2014). Fixing the currency at the 2014 exchange rate means that all years are exchanged at the exchange rate that the Swedish krona had against the respective European currencies in 2014. For pharmaceuticals without

competition with a moving exchange rate, Sweden's relative prices have gone from about thirteen percent above the 2014 average to about 12 percent below the 2021 average. If, instead, the currency is fixed at the 2014 rolling (floating) exchange rate, Sweden's relative prices drop to just over one percent above the average.

If the exchange rate were to return to the 2014 level, all other things being equal, Swedish prices would be just over one percent above the average for all countries.

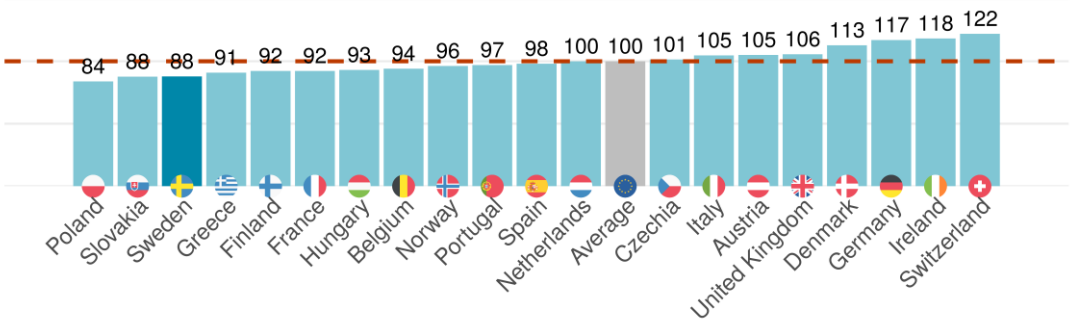
2 Alternative price measures

Comparing list prices for pharmaceuticals is complex as the type of pharmaceuticals and the quantity of a pharmaceutical used differ between countries. Throughout the report thus far, bilateral price comparisons and bilateral averages have been used to compare prices between Sweden and the 19 other European countries included in the analyses.

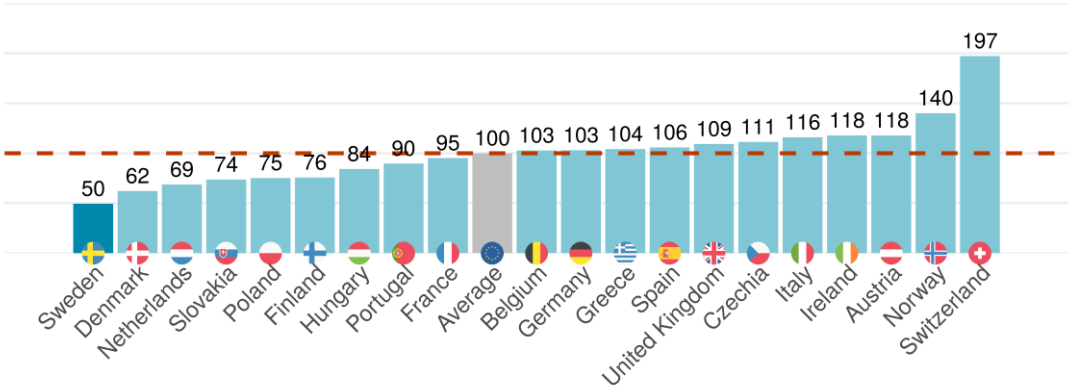
The selection of pharmaceuticals still includes those used in Sweden. However, the pharmaceuticals with low use in Sweden but a higher use in other countries are also included. The base is the average price level in Europe, with an index of 100. An index higher than 100 indicates a higher pharmaceutical price than the European average price. A pharmaceutical must be available in at least eight countries to be included in the comparison.

An alternative way of comparing pharmaceutical prices is by using a cross-section index. If a country lacks a pharmaceutical, the average for all other countries will be imputed instead. This means that the spread in prices in relation to the average is compressed against the average, especially for countries lacking many of the pharmaceuticals available in other countries.

Figure 22. Cross-section index, 2021. 3-year rolling (floating) exchange rate.
Pharmaceuticals without competition



Pharmaceuticals with competition

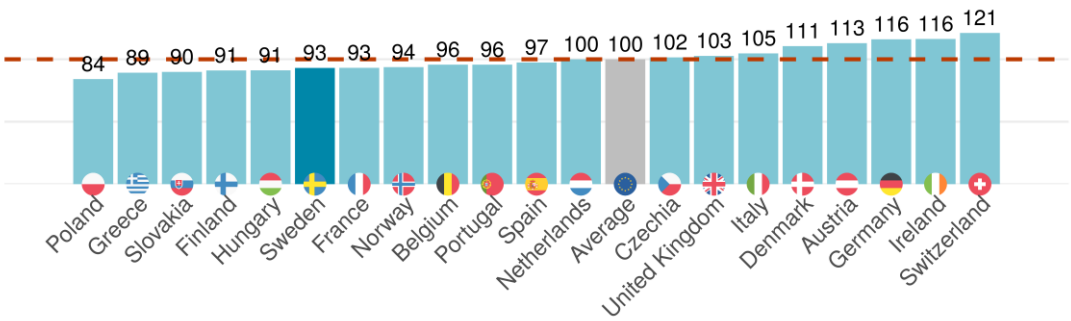


According to Figure 22, Sweden has 12 percent lower prices for pharmaceuticals without competition than the average for all countries. For pharmaceuticals with competition, Sweden has 50 percent lower prices than the average.

The effect of Managed Entry Agreements

In order to consider the effect of managed entry agreements, i.e. where the pharmaceutical companies make a repayment to the regions for part of the pharmaceutical costs, these pharmaceuticals are excluded in Figure 23. Repayment levels are confidential and can therefore not be compared or reported.

Figure 23. Cross-section index for pharmaceuticals without competition and without managed entry agreement, 2021. 3-year rolling (floating) exchange rate.



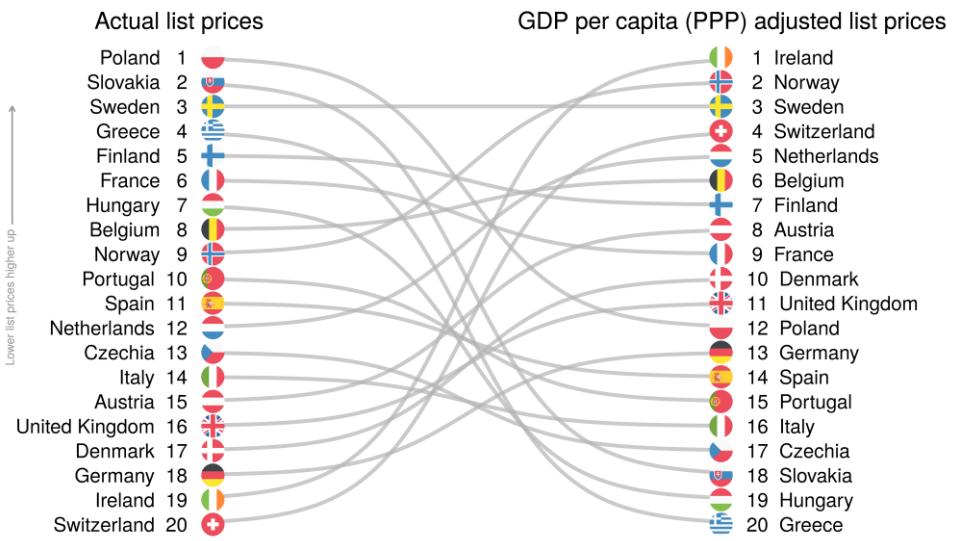
Source: IQVIA and TLV analysis.
Note: Prices Q1 2021. Volumes running 12 months up to and including March 2021. 3-year average exchange rate. Excluding pharmaceuticals with managed entry agreements in Sweden. European average = index 100.

After excluding pharmaceuticals with managed entry agreements in Sweden, Sweden ends up in the sixth lowest place compared to the previous third lowest place. This suggests that pharmaceuticals with managed entry agreements also tend to have lower list prices. One reason for this could be that companies want to avoid parallel imports of products subject to repayment agreements as this repayment could be triggered both in Sweden and in the country from which the pharmaceutical is parallel imported.

Purchasing Power Parity benchmark

As a country's GDP (PPP) per capita can be assumed to impact the population's perception of a pharmaceutical's cost in relation to its disposable income or the cost of other types of goods, the analysis is made with PPP-adjusted prices.

Figure 24. Change of the price comparison in case of nominal pharmaceutical prices and adjusted pharmaceutical prices based on Purchasing Power Parity (PPP) GDP per capita. Pharmaceuticals without competition, 2021.



Source: IQVIA, IMF and TLV analysis.
Note: Rank 1 means that the country has the lowest prices. Running 3-year average exchange rates per year.

When PPP adjusted prices are used, some countries move a lot in relation to Sweden. The reason is that GDP (PPP) per capita differs greatly between countries. For example, Poland moves from first to twelfth place, while Ireland moves from nineteenth to first place. However, Sweden remains in the same place, i.e. third place even with PPP adjusted prices.

Appendix 2: Methodology and data

1 Segmentation depending on competition status

The pharmaceuticals have been divided into segments based on the conditions for competition in Sweden. Pharmaceuticals that can be substituted by generic products are considered exposed to competition. These segments are:

- Pharmaceuticals without competition (outside the product-of-the-month system)
- Pharmaceuticals with competition (within the product-of-the-month system)

The segment Pharmaceuticals without competition includes pharmaceuticals where there has been no competition between at least two different substitutable pharmaceuticals in Sweden. The segment includes both patented pharmaceuticals and pharmaceuticals whose patent protection has expired, but where competition between two substitutable pharmaceuticals has not arisen. This segment usually also includes biosimilars as these are not directly substitutable with the reference product. The reason why these pharmaceuticals are included in the same segment is that the Swedish Medical Products Agency considers these pharmaceuticals as branded pharmaceuticals and that pricing conditions will then be the same as for branded pharmaceuticals. However, competitive conditions may differ between the countries included in the comparison. The segment Pharmaceuticals with competition (within the PV system) includes all pharmaceuticals included in the generic substitution within the PV system in March of each year up to and including 2021.

2 The data set and selection of pharmaceuticals

The starting point in the analysis is the prescription pharmaceuticals in Sweden with the highest sales covered by the benefits. In this year's dataset, the data has been supplemented with pharmaceuticals with the highest sales in Europe and new pharmaceuticals between 2015 and 2017 that were included in EFPIA's WAIT survey on time-to-market in different countries.

Before TLV's first report in 2014, IQVIA[10] was commissioned to deliver data for 200 substances in the Patent-protected pharmaceuticals segment, 180 substances in the Off-patent branded pharmaceuticals without competition segment, and 200 substances in the Off-patent pharmaceuticals with competition segment with the highest sales. Since then, the data has been updated each year and supplemented with new pharmaceuticals with high sales numbers.

Price indices presented in the study are based on list prices and on the pharmacies' wholesale price (AIP) or equivalent. The reason why AIP is used as a price measure is

[10] Before November 2017, IQVIA was called IMS Health.

that it does not include the pharmacies' trade margin, which may vary between countries depending on how the remuneration to the pharmacies is designed in each country.

Portugal, Germany, and Spain are countries with general discount systems that are not visible in list prices. Lack of complete information on potential discounts is a weakness in all price surveys. However, analyses of change over time, and specifically in this report - a comparison of the development of the same products during the period 2014 to 2021 - have a clear advantage. Assuming that any discounts are at a similar level from one year to the next, it provides a good comparison of the relative price development between different countries.

The table below shows how much of Sweden's sales are covered by the data on which the analysis is based. The input data for this report comes from IQVIA.

Table 2. Contribution margin ratio (of total sales)

Year	Total AIP IQVIA	Total AIP EHM	Contribution margin
2014	3.81	4.54	84%
2015	4.45	4.78	93%
2016	4.78	5.04	95%
2017	5.02	5.35	94%
2018	5.36	5.72	94%
2019	5.73	6.16	93%
2020	6.65	7.26	92%
2021	6.29	7.05	89%

Note 1: Data from IQVIA in relation to data from EHM. Sales of pharmaceuticals during Q1 between 2014 and 2021. AIP (wholesale price) level totals.
Note 2: Pharmacy preparations are not included in the comparison.

The sales value does not cover all sales of prescription pharmaceuticals in the outpatient care market in Sweden, as only the best-selling substances in Sweden and Europe are included.

In the price comparison, reconciled prices for different baskets of pharmaceuticals are analysed. The definition of a pharmaceutical may vary. Pharmaceuticals can be matched in different ways with different consequences for precision and in how many countries a pharmaceutical is included in the comparison.

In this analysis, a pharmaceutical is defined as a pharmaceutical with the same substance, dosage form, and strength. The definition does not include package size, as the choice of package sizes vary by country.

In Sweden, pharmaceuticals are normally collected at the pharmacy for a period of three months, while in southern Europe, it is normally a period of one month. This means that larger packages are normally sold in Sweden, compared with countries where collection takes place at more frequent intervals. If the package sizes frequently sold have a lower price than those with lower sales, this would mean that large packages would be given greater weight, which would benefit Sweden in a price index. To correct for this, the price has been calculated as cost per unit for a certain substance, dosage form, and strength. This means that different package sizes can be compared, and the price indices become more accurate. This approach increases the matching rate with other countries, even if the precision of the comparison is slightly lower than when matching at the packaging level.

One alternative would be to match at the packaging level, meaning the exact same package in terms of substance, dosage, strength, and size needs to be available in both Sweden and the comparison country to be included. This method has a high degree of precision as the pharmaceuticals match in terms of packaging. At the same time, the risk is greater that a certain specific packaging is not available in many countries. Package size can often be linked to shipping frequency. The longer time between filling prescriptions, the greater probability that larger packages are being used, and vice versa.

Another alternative would be to measure the costs that each country has for a particular therapy group, regardless of which pharmaceuticals are used, and then weighting these costs together to see how much a country pays to treat different diagnoses. The problem with such a price comparison is difficulties in qualifying which pharmaceuticals belong to a particular therapy group and that treatment traditions may differ between countries.

3 Pharmaceuticals with a very low volume in a country are excluded

Some countries with a matching pharmaceutical in Sweden may have significantly lower sales volumes than Sweden. If the volume per capita is lower than 0.5 percent of that in Sweden, the pharmaceutical has been excluded from the calculation of bilateral indices that year. This is to avoid attributing a pharmaceutical with very little use in the comparison country disproportionate weight in the price comparison and thus potentially overestimating the relative price level. Volume information for the rolling 12 months up to and including March 2021 is used in the calculation.

4 Sales volumes and weighting

It is common practice to weight the prices of different pharmaceuticals in a price index by volume. Price differences on pharmaceuticals with high sales are then attached greater significance than pharmaceuticals with low sales and vice versa.

A price index is a weighted average of a number of pharmaceuticals, usually calculated over time. If we have two periods (period 0 and period t) and n pharmaceuticals, a general price index can be formulated as:

$$I_p = \frac{p_1^t w_1 + p_2^t w_2 + \cdots + p_n^t w_n}{p_1^0 w_1^0 + p_2^0 w_2 + \cdots + p_n^0 w_n} \times 100$$

Where p_i^t represents the price of pharmaceutical i at the time t and w_i represents the weight of pharmaceutical i. To calculate the relative importance of a pharmaceutical's price, sales volume q is usually used as a weight for a pharmaceutical. In this analysis, the index is calculated for one time period at a time, meaning period 0 and period t are the same. Time is replaced by country, abroad U and Sweden S.

The weight can either be sales volume abroad or sales volume in Sweden. The choice determines whether the price index shall be interpreted from a Swedish perspective or not. The standard for price analyses in the pharmaceutical field is to calculate the Laspeyres price index, i.e. with the country as a base from which price differences shall be measured, in this case Sweden's:

$$L_p = \frac{p_1^U q_1^S + p_2^U q_2^S + \cdots + p_n^U q_n^S}{p_1^S q_1^S + p_2^S q_2^S + \cdots + p_n^S q_n^S} \times 100$$

Where p^U refers to price abroad and q^S quantity in Sweden. If the price is the same in Sweden and abroad, the index value is 100. If the index is <100 (or >100), this means that the pharmaceutical has a lower (or higher) price abroad than in Sweden. In several figures in the report, percentages are used instead of indices, for example, to show that a country has a price that is a number of percentage points above the average. Then, an average of the index for all countries is calculated and a country's index is divided by the average index. For example, if Sweden has an index of 100 and the average of the countries is 107, Sweden has just under seven percent lower prices than the average.

A price index lower (or higher) than 100 means a theoretical cost increase (savings) that can be achieved if Swedish prices change in relation to foreign prices, provided that Swedish consumption is assumed to be unchanged. This is a strong and unlikely assumption that requires perfectly inelastic demand. If demand is not inelastic, a change in demand will either strengthen or weaken a theoretical cost increase, or savings. The supply of pharmaceuticals, i.e. the entry of competing pharmaceuticals and improvements to existing ones, is also important.

The price index provides a good idea of the price level in comparable countries in relation to Sweden's price level during the period in question. Absolute price index numbers must be interpreted with caution, as they are influenced by both volume and currency effects. This study consistently uses a rolling (floating) exchange rate for the past three years. The same applies to the index data reported for 2014, 2015, 2016, 2018, 2019, 2020, and 2021.

If another country's volume weight is used as a base instead of the volume weight in the country itself, the absolute level of the price index is adjusted, but not necessarily in ranking order between countries.

5 Definition of price baskets

To calculate a price index, regardless of whether it is a bilateral or a cross-sectional index, a price basket needs to be defined. A bilateral price index requires that the pharmaceutical is available in Sweden and in the comparison country in order to be included in the price comparison with that country.

The analyses based on cross-sectional indices require that the pharmaceuticals included in the comparison basket are used in at least 40 percent of the countries being compared. In addition, the pharmaceutical must have sales in the base country, which is Sweden in all figures for cross-sections outside the appendices. The price basket forming the base for the cross-section index is more limited compared with the bilateral basket, which is due to the fact that a price for the same basket needs to be determined in all countries. For those countries that do not use a particular pharmaceutical, the European average price is imputed. This average price risks not being representative if the basket is not strictly defined.

To see how different choices of baskets (based on other countries than Sweden) affect the price comparison, information is available in *Appendix 1* in the 2018 report.

6 Drivers of relative price

Swedish pharmaceutical prices relative to the rest of Europe are influenced by several different factors. In order to determine which effects have the greatest impact on the relative price level, the total relative price change presented in sections 3.2.3 and 3.3.4 is divided into effects of price and currency changes, respectively.

The analysis is based on the average price level for pharmaceuticals used in Sweden throughout the period 2014–2021, weighted by the use of each pharmaceutical in 2014. This way, a weighted average price for each year's basket of pharmaceuticals is calculated:

Let the relative cost of pharmaceutical b at the time t between country i and country j, at the exchange rate $\frac{c_i}{c_j}$ be calculated:

$$\frac{p_{bit}v_{bit}c_{it}}{p_{bjt}v_{bjt}c_{jt}} = \frac{p_{bit}}{p_{bjt}} \cdot \frac{v_{bit}}{v_{bjt}} \cdot \frac{c_{it}}{c_{jt}}$$

The relative cost change between the time $(t-1)$ and t is then calculated:

$$\text{Relativ kostnadsdifferens} = \frac{p_{bit}v_{bit}c_{it}}{p_{bjt}v_{bjt}c_{jt}} - \frac{p_{bi(t-1)}v_{bi(t-1)}c_{i(t-1)}}{p_{bj(t-1)}v_{bj(t-1)}c_{j(t-1)}}$$

In the present analysis, Swedish volumes are used throughout to calculate costs in different countries. This way, the relative *cost* is converted into a relative *price*, weighted according to Swedish use:

$$v_{bjt} = v_{bit} \quad \forall t \in T, \forall b \in B, \forall j \in I \quad \Rightarrow$$

$$\frac{p_{bit}v_{bit}c_{it}}{p_{bjt}v_{bjt}c_{jt}} - \frac{p_{bi(t-1)}v_{bi(t-1)}c_{i(t-1)}}{p_{bj(t-1)}v_{bj(t-1)}c_{j(t-1)}} = \frac{p_{bit}}{p_{bjt}} \cdot \frac{c_{it}}{c_{jt}} - \frac{p_{bi(t-1)}}{p_{bj(t-1)}} \cdot \frac{c_{i(t-1)}}{c_{j(t-1)}}$$

Factoring of price and currency components results in:

$$\begin{aligned} \text{Relativ kostnadsdifferens} &= \frac{p_{bit}}{p_{bjt}} \cdot \frac{c_{it}}{c_{jt}} - \frac{p_{bi(t-1)}}{p_{bj(t-1)}} \cdot \frac{c_{i(t-1)}}{c_{j(t-1)}} \\ &= \left(\frac{p_{bit}}{p_{bjt}} - \frac{p_{bi(t-1)}}{p_{bj(t-1)}}\right)\frac{c_{i(t-1)}}{c_{j(t-1)}} + && \text{priskomponent} \\ &\quad \left(\frac{c_{it}}{c_{jt}} - \frac{c_{i(t-1)}}{c_{j(t-1)}}\right)\frac{p_{bit}}{p_{bjt}} && \text{valutakomponent} \end{aligned}$$

The above example describes how the relative cost difference is calculated for a particular pharmaceutical $b \in B$. Where B represents a basket of various pharmaceuticals. The total cost difference for the entire basket B at the time t is calculated as a weighted average of all differences, weighted according to the use v_{b2014} for pharmaceutical b in 2014:

$$\overline{Relativ\ kostnadsdifferens} = \frac{\sum_{b \in B}\left[\left(\frac{p_{bit}}{p_{bjt}} - \frac{p_{bi(t-1)}}{p_{bj(t-1)}}\right)\frac{c_{i(t-1)}}{c_{j(t-1)}} + \left(\frac{c_{it}}{c_{jt}} - \frac{c_{i(t-1)}}{c_{j(t-1)}}\right)\frac{p_{bit}}{p_{bjt}}\right] v_{b2014}}{\sum_{b \in B} v_{b2014}}$$

7 Life cycle analysis

The life cycle figures in section 3.1 use a different methodology, based on a cross-sectional index. Each country's pharmaceuticals for each year are calculated in relation to the average for that pharmaceutical that year. Then these relative price levels are aggregated per pharmaceutical age in the base country only, weighted by sales amount. Thus, the input data for the figures only includes the weighted average of the base country's relative price divided by pharmaceutical age.

This means that a pharmaceutical is usually included in several data points, one for each age that pharmaceutical had for the entire period. Note that this uses multiple exchange rates for the same pharmaceutical. The price of each age is converted at the exchange rate applicable when that pharmaceutical was that age.

8 Pharmaceutical classes

Below is a summary of the defined pharmaceutical classes and which substances fall into each class. The compilation is based on the classification made by the National Board of Health and Welfare in connection with the forecast of pharmaceutical costs. TLV has since revised the classification and mainly categorised more pharmaceuticals.

Table 3. Definition of pharmaceutical classes

Pharmaceutical class	Substances
ADHD	atomoxetine, dexamphetamine, guanfacine, lisdexamphetamine, methylphenidate
Alternative TNF inhibitors	abatacept, apremilast, belimumab, vedolizumab
Metabolism	orlistat, prasterone
Analgesics	codeine, morphine, noscapine, papaverine, phenobarbital, scopolamine methyl hydroxide, codeine, paracetamol, dihydroergotamine, dihydroergotamine, etilefrine, fentanyl, ibuprofen, paracetamol, naloxone, oxycodone, oxycodone, rizatriptan, sumatriptan, tapentadol, tramadol, zolmitriptan
Analgesics-CGRP	erenumab, fremanezumab, galcanezumab
Other Respiratory	acetylcysteine, azelastine, fluticasone, budesonide, dornase alfa, fluticasone, ivacaftor, ivacaftor, lumacaftor, ivacaftor, tezacaftor, levocabastine, mometasone, phenylpropanolamine
Anaemia	darbepoetin alfa, epoetin alfa, epoetin beta, epoetin theta, epoetin zeta, methoxy polyethylene glycol-epoetin beta
Anaesthetics	esketamine, fentanyl, lidocaine, lidocaine, prilocaine
Antibiotics and Chemo, Dermat.	fusidic acid, imiquimod, metronidazole, mupirocin, penciclovir
Antidepressants, psychostimulants	amitriptyline, bupropion, bupropion, naltrexone, citalopram, clomipramine, duloxetine, escitalopram, fluoxetine, idebenone, mirtazapine, moclobemide, modafinil, nortriptyline, paroxetine, piracetam, reboxetine, sertraline, venlafaxine, vortioxetine
Antiepileptics	brivaracetam, cannabidiol, carbamazepine, clonazepam, eslicarbazepine acetate, felbamate, gabapentin, lacosamide, lamotrigine, levetiracetam, oxcarbazepine, perampanel, phenobarbital, pregabalin, retigabine, rufinamide, stiripentol, topiramate, valproic acid, vigabatrin, zonisamide
Anti-inflammatory and Antirheumatics	benzydamine, penicillin v
Contraceptives	desogestrel, dienogest, estradiol, drospirenone, ethinylestradiol, ethinylestradiol, levonorgestrel, etonogestrel, levonorgestrel, medroxyprogesterone, norethisterone

Antiparasitics	artemether, lumefantrine, atovaquone, clioquinol, flumetasone, hydroxychloroquine, mebendazole, mefloquine, metronidazole, pentamidine, tinidazole
Antipsychotics	aripiprazole, brexpiprazole, cariprazine, chlorprothixene, clozapine, haloperidol, lurasidone, melperone, olanzapine, paliperidone palmitate, perphenazine, quetiapine, risperidone, sertindole, zuclopenthixol
Obstructive Airway Diseases	aclidinium bromide, aclidinium bromide, formoterol, beclometasone, formoterol, beclometasone, formoterol, glycopyrronium, benralizumab, budesonide, budesonide, formoterol, ciclesonide, fluticasone, fluticasone furoate, umeclidinium bromide, vilanterol, fluticasone furoate, vilanterol, fluticasone, formoterol, fluticasone, salmeterol, formoterol, formoterol, glycopyrronium, glycopyrronium, indacaterol, glycopyrronium, indacaterol, mometasone, indacaterol, indacaterol, mometasone, mepolizumab, mometasone, montelukast, olodaterol, olodaterol, tiotropium bromide, omalizumab, reslizumab, salbutamol, salmeterol, terbutaline, tiotropium bromide, umeclidinium bromide, umeclidinium bromide, vilanterol
Anticoagulants	cangrelor, caplacizumab, clopidogrel, dalteparin sodium, enoxaparin sodium, fondaparinux sodium, heparin, iloprost, selexipag, ticagrelor, ticlopidine, tinzaparin, treprostinil, warfarin
Antihypertensives	amlodipine, atenolol, candesartan cilexetil, candesartan cilexetil, hydrochlorothiazide, diltiazem, doxazosin, enalapril, hydrochlorothiazide, eprosartan, felodipine, felodipine, metoprolol, hydralazine, hydrochlorothiazide, losartan, hydrochlorothiazide, valsartan, irbesartan, lercanidipine, metoprolol, nifedipine, nimodipine, propranolol, valsartan
Antihypertensives-PAH	ambrisentan, bosentan, macitentan, riociguat
Antihypertensives and CHF	bisoprolol, enalapril, enalapril, hydrochlorothiazide, losartan, ramipril, sacubitril, valsartan
Diabetes - Non-Insulin	acarbose, alogliptin, canagliflozin, canagliflozin, metformin, dapagliflozin, dapagliflozin, metformin, dapagliflozin, saxagliptin, dulaglutide, empagliflozin, empagliflozin, linagliptin, empagliflozin, metformin, ertugliflozin, metformin, ertugliflozin, sitagliptin, exenatide, glibenclamide, glipizide, linagliptin, linagliptin, metformin, liraglutide, lixisenatide, metformin, metformin, pioglitazone, metformin, saxagliptin, metformin, sitagliptin, metformin, vildagliptin, saxagliptin, semaglutide, sitagliptin, vildagliptin
Diabetes - Insulin	insulin aspart, insulin aspart, insulin aspart protamine, insulin aspart, insulin aspart protamine crystalline, insulin degludec, insulin degludec, liraglutide, insulin detemir, insulin glargine, insulin glargine, lixisenatide, insulin glulisine, insulin human base, insulin human base, insulin human isophane, insulin human isophane, insulin lispro, insulin lispro, insulin lispro protamine
Diuretics	bendroflumethiazide, bumetanide, eplerenone, furosemide, hydrochlorothiazide, quinapril, spironolactone, tolvaptan
Endocrine therapy	abiraterone acetate, anastrozole, bicalutamide, buserelin, degarelix, enzalutamide, fulvestrant, goserelin, letrozole, leuprorelin, medroxyprogesterone, toremifene, triptorelin
Gynaecological Agents	bromocriptine, clindamycin, metronidazole, quinagolide
Other Haematological	c1 inhibitor (human), conestat alfa, icatibant, lanadelumab
Other Antihemorrhagics	avatrombopag, eltrombopag, lusutrombopag, romiplostim, tranexamic acid
Hepatitis C	dasabuvir, elbasvir, grazoprevir, glecaprevir, pibrentasvir, ledipasvir, sofosbuvir, ombitasvir, paritaprevir, ritonavir, ribavirin, sofosbuvir, velpatasvir, sofosbuvir, velpatasvir, voxilaprevir
HIV	abacavir, abacavir, dolutegravir, lamivudine, abacavir, lamivudine, abacavir, lamivudine, zidovudine, bictegravir, emtricitabine, tenofovir alafenamide, cobicistat, darunavir, cobicistat, darunavir, emtricitabine, tenofovir alafenamide, cobicistat, elvitegravir, emtricitabine, tenofovir alafenamide, dolutegravir, dolutegravir, lamivudine, dolutegravir, rilpivirine, doravirine, lamivudine, tenofovir disoproxil, emtricitabine, emtricitabine,rilpivirine, tenofovir disoproxil, emtricitabine, tenofovir alafenamide, emtricitabine, tenofovir disoproxil, letermovir, raltegravir, zidovudine
Cardiac Therapy	alprostadil, amiodarone, angiotensin 2 (human), dronedarone, etilefrine, flecainide, ibuprofen, paracetamol, isosorbide mononitrate, lidocaine,

	lidocaine, methylprednisolone, mexiletine, midodrine, nitroglycerin, propafenone, ranolazine
Other Dermatologicals	adapalene, adapalene,benzoyl peroxide, afamelanotide, alitretinoin, azelaic acid, brimonidine, brimonidine, brinzolamide, clindamycin, clindamycin, tretinoin, diclofenac, dupilumab, econazole, econazole, triamcinolone acetonide, finasteride, hydrocortisone, miconazole, isotretinoin, ivermectin, pimecrolimus, tacrolimus
Interleukin Inhibitors	anakinra, brodalumab, canakinumab, guselkumab, ixekizumab, risankizumab, sarilumab, secukinumab, siltuximab, tildrakizumab, tocilizumab, ustekinumab
Immunoglobulins	bezlotoxumab
Immunostimulants	filgrastim, interferon beta-1a, interferon beta-1b, lenograstim, lipegfilgrastim, pegfilgrastim, peginterferon alfa-2a, peginterferon alfa-2b, peginterferon beta-1a, ropeginterferon alfa 2b
Immunosuppressants	azathioprine, ciclosporin, darvadstrocel, dimethyl fumarate, eculizumab, lenalidomide, methotrexate, mycophenolate mofetil, pirfenidone, pomalidomide, ravulizumab, sirolimus, tacrolimus, thalidomide, vemurafenib
Incontinence	darifenacin, fesoterodine, mirabegron, oxybutynin, tolterodine
JAK Inhibitors	baricitinib, tofacitinib, upadacitinib
Blood Coagulation Factors	albutrepenonacog alfa, damoctocog alfa pegol, efmoroctocog alfa, eftrenonacog alfa, emicizumab, eptacog alfa (activated), factor x, lonoctocog alfa, moroctocog alfa, nonacog beta pegol, nonacog gamma, octocog alfa, rurioctocog alfa pegol, simoctocog alfa, susoctocog alfa, turoctocog alfa, turoctocog alfa pegol, vonicog alfa
Cholesterol-Lowering	alirocumab, atorvastatin, atorvastatin,ezetimibe, bezafibrate, colesevelam, colestipol, colestyramine, evolocumab, ezetimibe, fenofibrate, gemfibrozil, rosuvastatin, simvastatin
Sex Hormones	choriogonadotropin alfa, corifollitropin alfa, cyproterone, ethinylestradiol, levonorgestrel, follitropin alfa, follitropin beta, follitropin delta, medroxyprogesterone, ospemifene, progesterone, testosterone, ulipristal acetate, urofollitropin
Sex Hormones-Oestrogen	conjugated, bazedoxifene, estrogenic substances, estradiol, estradiol, medroxyprogesterone, estradiol, norethisterone
Corticosteroids, Dermat.	betamethasone, betamethasone, calcipotriol, betamethasone, clioquinol, betamethasone, salicylic acid, clobetasol, clobetasone, fluticasone, fusidic acid, hydrocortisone, hydrocortisone, hydrocortisone, oxytetracycline, mometasone
Digestion	agalsidase alfa, agalsidase beta, amphotericin b, asfotase alfa, balsalazide, bisacodyl, budesonide, budesonide, formoterol, carglumic acid, cerliponase alfa, chenodeoxycholic acid, domperidone, eliglustat, elosulfase alfa, eluxadoline, esomeprazole, fidaxomicin, fosnetupitant, palonosetron, galsulfase, glycerol phenylbutyrate, glycopyrronium, granisetron, hydrocortisone, lansoprazole, laronidase, linaclotide, loperamide, mercaptamine, mesalazine, methylnaltrexone bromide, migalastat, misoprostol, naldemedine, naloxegol, netupitant, palonosetron, nitisinone, nystatin, obeticholic acid, olsalazine, omeprazole, ondansetron, pantoprazole, pegvaliase, prednisolone, prucalopride, rifaximin, sapropterin, sebelipase alfa, sulfasalazine, teduglutide, telotristat etiprate, trientine, velmanase alfa, vestronidase alfa
MS	cladribine, fampridine, fingolimod, glatiramer acetate, interferon beta-1b, natalizumab, ocrelizumab, peginterferon beta-1a, siponimod, teriflunomide
Muscle Relaxants	caffeine, orphenadrine, propyphenazone, chlorzoxazone
Other Musculoskeletal	allopurinol, ataluren, chondrocyte, febuxostat, nusinersen, onasemnogene abeparvovec, probenecid
Nervous System-Dementia	donepezil, galantamine, memantine, rivastigmine
Other Nervous System	acamprosate, ambenonium, buprenorphine, naloxone, cinnarizine, dimenhydrinate, disulfiram, inotersen, levomethadone, levosulpiride, patisiran, pilocarpine, pitolisant, pyridostigmine, tafamidis, tasimelteon, varenicline
NOAC	apixaban, dabigatran etexilate, edoxaban, rivaroxaban

NSAID	dexibuprofen, diclofenac, diclofenac, misoprostol, etoricoxib, ketoprofen, nabumetone, naproxen, piroxicam betadex, tenoxicam
Ophthalmologicals	acetazolamide, apraclonidine, betaxolol, bimatoprost, bimatoprost, timolol, brimonidine, brinzolamide, brimonidine, timolol, brinzolamide, brinzolamide, timolol, cenegermin, dexamethasone, diclofenac, dorzolamide, dorzolamide, timolol, emedastine, fusidic acid, hydrocortisone, latanoprost, latanoprost, timolol, nepafenac, olopatadine, pilocarpine, ranibizumab, tafluprost, tafluprost, timolol, timolol, timolol, travoprost, verteporfin, voretigene neparvovec
Other Oncology	aflibercept, apalutamide, asparaginase, asparaginase escherichia coli, atezolizumab, avelumab, axicabtagene ciloleucel, bexarotene, blinatumomab, brentuximab vedotin, busulfan, cabazitaxel, carboplatin, carfilzomib, cemiplimab, chlorambucil, chlormethine, cytarabine, cytarabine, daunorubicin, daratumumab, durvalumab, elotuzumab, epirubicin, eribulin, estramustine, etoposide, fludarabine, fluorouracil,salicylic acid, gemtuzumab ozogamicin, gimeracil, oteracil, tegafur, inotuzumab ozogamicin, ipilimumab, irinotecan, ixazomib, melphalan, mercaptopurine, methotrexate, methyl-5-aminolevulinic acid, mitotane, mogamulizumab, necitumumab, niraparib, nivolumab, obinutuzumab, olaparib, paclitaxel, padeliporfin, panitumumab, panobinostat, pegaspargase, pembrolizumab, pertuzumab, ramucirumab, rituximab, rucaparib, sonidegib, talazoparib, talimogene laherparepvec, temozolomide, tioguanine, tipiracil, trifluridine, tisagenlecleucel, topotecan, trabectedin, trastuzumab, trastuzumab emtansine, treosulfan, venetoclax
Oncology-Protein Kinase Inhibitors	abemaciclib, alectinib, axitinib, binimetinib, bosutinib, brigatinib, cabozantinib, ceritinib, cobimetinib, dabrafenib, dacomitinib, dasatinib, encorafenib, erlotinib, everolimus, gilteritinib, ibrutinib, imatinib, larotrectinib, lenvatinib, lorlatinib, midostaurin, neratinib, nilotinib, osimertinib, palbociclib, pazopanib, ponatinib, regorafenib, ribociclib, ruxolitinib, sorafenib, sunitinib, tivozanib, trametinib, vandetanib
Opioid Addiction	buprenorphine, buprenorphine, naloxone, methadone
Otologicals	ciprofloxacin, hydrocortisone, oxytetracycline, polymyxin b
Osteoporosis	alendronic acid, alendronic acid,calcium, colecalciferol, burosumab, clodronic acid, denosumab, dibotermin alfa, pamidronic acid, romosozumab, teriparatide
Other	acetylsalicylic acid, caffeine, citric acid, codeine, sodium, acetylsalicylic acid, caffeine, codeine, afatinib, agalsidase beta, alectinib, alendronic acid, calcium, colecalciferol, atazanavir, cobicistat, autologous limbal stem cells, benzydamine, betibeglogene autotemcel, brigatinib, bromocriptine, chlorprothixene, ciclosporin, ciprofloxacin, ciprofloxacin, fluocinolone acetonide, clioquinol, flumetasone, crizotinib, dacomitinib, dapagliflozin, saxagliptin, deferasirox, deferiprone, deferoxamine, delafloxacin, delamanid, dienogest, ethinylestradiol, dulaglutide, elexacaftor, ivacaftor, tezacaftor, emtricitabine, rilpivirine, tenofovir alafenamide, emtricitabine, tenofovir disoproxil, eprosartan, hydrochlorothiazide, ertugliflozin, estradiol, medroxyprogesterone, estradiol, norethisterone, everolimus, fluorouracil, salicylic acid, fluticasone furoate, fulvestrant, glycopyrronium, glycopyrronium, indacaterol, mometasone, heparin, hydrochlorothiazide, quinapril, hydrocortisone, idelalisib, indacaterol, mometasone, inhaler device, iron ferric, ketoconazole, lapatinib, ledipasvir, sofosbuvir, levocabastine, lidocaine, linagliptin, metformin, loperamide, macitentan, metformin, saxagliptin, methyl-5-aminolevulinic acid, na, naloxone, naloxone, oxycodone, nintedanib, nitroglycerin, norethisterone, norfloxacin, olaparib, orphenadrine, paracetamol, patiromer calcium, polystyrene sulfonate, prednisolone, propylthiouracil, remdesivir, retigabine, rilpivirine, rituximab, romosozumab, sevelamer, sofosbuvir, sucroferric oxyhydroxide, sugammadex, teicoplanin, turoctocog alfa pegol, upadacitinib, vedolizumab, volanesorsen, zirconium cyclosilicate
Parkinson's	apomorphine, benserazide, levodopa, biperiden, carbidopa, entacapone, levodopa, carbidopa, levodopa, opicapone, pramipexole, rotigotine, safinamide, selegiline, tolcapone
Antipsoriatics	betamethasone, calcipotriol
Hypothyroidism	levothyroxine sodium, thiamazole

Neuroleptics	buspirone, clomethiazole, diazepam, hydroxyzine, midazolam, nitrazepam, oxazepam, propiomazine, zolpidem, zopiclone
Systemic Antibacterials	ampicillin, avibactam, ceftazidime, aztreonam, ceftazidime, ceftolozane, tazobactam, ceftriaxone, ciprofloxacin, ciprofloxacin, fluocinolone acetonide, clindamycin, colistin, dalbavancin, flucloxacillin, fusidic acid, levofloxacin, lymecycline, mecillinam, meropenem, vaborbactam, methenamine, norfloxacin, oritavancin, penicillin v, pivmecillinam, tedizolid, teicoplanin, tobramycin
Systemic Antihistamines	alimemazine, clemastine, desloratadine, ebastine, meclozine, promethazine
Other Systemic Anti-infectives	aminosalicylic acid, amphotericin b, bedaquiline, ethambutol, fluconazole, isavuconazole, isavuconazonium, isoniazid, posaconazole, rifabutin, rifampicin
Other Systemic Antivirals	adefovir dipivoxil, doravirine, etravirine, famciclovir, ibalizumab, rilpivirine, tenofovir alafenamide, valaciclovir, valganciclovir, zanamivir
Systemic Hormonal Preparations	betamethasone, cetrorelix, cinacalcet, desmopressin, dexamethasone, etelcalcetide, fludrocortisone, ganirelix, glucagon, hydrocortisone, lanreotide, lidocaine, methylprednisolone, mecasermin, nafarelin, octreotide, parathyroid hormone, pasireotide, pegvisomant, prednisolone, somatropin
TNF Inhibitors	adalimumab, certolizumab pegol, etanercept, golimumab, infliximab
Urologicals	alfuzosin, alprostadil, aviptadil, phentolamine, finasteride, sildenafil, terazosin