NEW INSIGHTS INTO THE PRICE DYNAMICS OF PRESCRIPTION PHARMACEUTICALS IN SLOVENIA OVER THE PERIOD 2001–2014

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ABSTRACT: *The article investigates changes in the prices of Slovenian prescription pharmaceuticals in the period 2001–2014. A special emphasis is put on the pricing of innovative pharmaceuticals. The price structure of pharmaceuticals, annual price changes and alterations in the structure of consumption according to price are analysed and the Fisher price indices are also observed. The article shows that prices of pharmaceuticals started to decline notably after the onset of the economic crisis in 2008, with an average annual drop of 6.9 percent in the 2008–2014 period. Annual price changes and the altered structure of consumption explain why Slovenia was able to maintain a positive trend of pharmaceutical consumption, while cutting the total expenditures for prescription pharmaceuticals since 2010.*

INTRODUCTION

Ever since the 2008 economic crisis, health spending has slowed across Europe after years of continuous growth (OECD, 2014). This slowdown has affected all health spending categories but to varying degrees. Average spending growth has decreased significantly for both inpatient and outpatient care. Many countries have reduced or postponed their spending on prevention, public health services and administration, with a slight recovery in spending observed after 2011. The only spending category that has continued to shrink following the crisis is pharmaceutical spending (OECD, 2014). Health spending across the OECD edged up slightly in 2013 and data for 2014 indicate a continuation of this trend. However, many European countries continued to see growth below the OECD predictions (OECD, 2015a).

In Slovenia, the growth of current expenditures for health care has also slowed down following the 2008 crisis. The annual growth rates of current expenditures in current prices

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dropped from 7 percent in 2007 and 13 percent in 2008 to 4 percent in 2009 and below 1 percent in 2010 and 2011. Current expenditures for health care declined slightly in 2012 to €3.1 billion and remained stable in 2013 and 2014. Current health care expenditures for 2014 are estimated at €3.2 billion, which is 7.3 percent above the 2008 level (SURS, 2015a; OECD, 2015b). The same conclusions apply to the dynamics of current expenditures for health care in constant prices. Nearly 70 percent of current expenditures are funded through the compulsory health insurance provided by the Health Insurance Institute of Slovenia (hereafter HIIS) (SURS, 2015b). In 2012 and 2013, expenditures exceeded the revenues of the HIIS, yet its revenues continued to rise despite the crisis and began to fall later than expenditures. In 2014, both the revenues and expenditures increased and the HIIS enjoyed a surplus of €15.7 million (Ministry of Finance of Slovenia, 2015).

In Slovenia, pharmaceutical expenditures in current prices continued to grow following the 2008 crisis and they declined slightly only in 2014. It is, however, important to note that this rise was due to increasing expenditures for over-the-counter pharmaceuticals. Expenditures for prescription pharmaceuticals in both current and constant prices, on the other hand, were declining in the 2008–2014 period (OECD, 2015b). This paper provides new insights into pharmaceutical price dynamics in Slovenia, helping us to explain why Slovenia was able to maintain a positive trend of pharmaceutical consumption, while cutting total expenditures for prescription pharmaceuticals since 2010. Changes in the prices of prescription pharmaceuticals are observed over the 2001–2014 period. Both the price structure of prescription pharmaceuticals and the yearly price dynamics are studied. In addition, Fisher price indices are calculated and compared between different sub-periods. Second, given the Slovenian health care system's specific feature whereby compulsory health insurance is complemented with voluntary health insurance for full co-payment coverage (Albreht, et al., 2009), this paper separately observes changes in the full price of prescription pharmaceuticals and the price which is reimbursed by the HIIS. Further, the dynamics of prices of innovative prescription pharmaceuticals is investigated to explore whether the pressures to limit the growth of health expenditures influenced the rate and the time lag in which the prices of such pharmaceuticals decrease.

1   CURRENT HEALTH CARE AND PHARMACEUTICAL EXPENDITURES IN SLOVENIA

Figure 1 shows the increase in current health expenditures that exclude investment expenditures in the 2003–2014 period. Even though this paper investigates expenditures for prescription pharmaceuticals that are an important component of current health expenditures in the 2001–2014 period, *Figure* 1 refers to a shorter period because the Statistical Office of the Republic of Slovenia has been reporting detailed data on health care expenditures according to the internationally comparable System of Health Accounts since 2003. As shown in *Figure 1*, 2014 current health expenditures in current prices exceeded the 2003 level by 53.8 percent. The largest increase can be attributed to curative, rehabilitative and long-term nursing care, while expenditures for prescription pharmaceuticals contributed 7 percent (SURS, 2015b). As discussed by Mladovsky et al.

(2012), a range of measures such as the level of contributions for publicly financed care, the volume, quality and cost of publicly financed care etc. can be used to alter health expenditure levels. This paper investigates how cost-containment measures influenced the prices of prescription pharmaceuticals in Slovenia, given that the rise in pharmaceutical expenditures in Slovenia was influenced more by the expenditures for OTC medicines (without a prescription) than the expenditures for prescription medicines (see *Figure 1*).

Figure 1: *Contribution of expenditure categories (in million €) to the increase in current healthcare expenditures in current prices in Slovenia during the period 2003–2014*
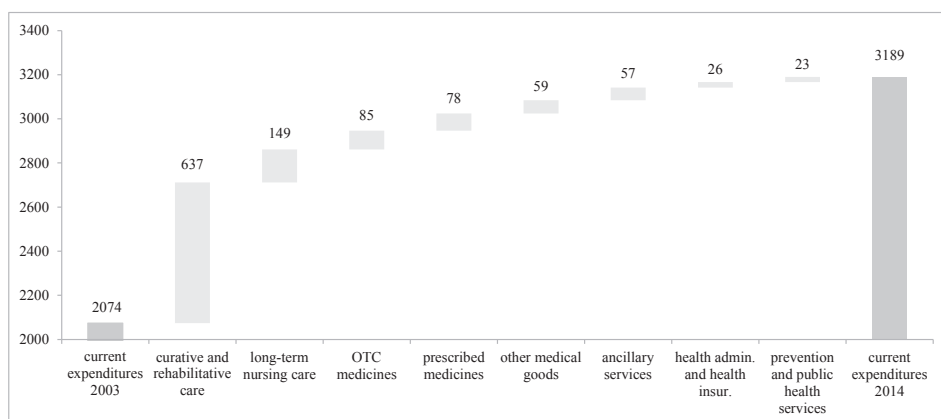

Source: Data on health expenditures by functions (SURS, Health and Health care, 2016b)

Between 2003 and 2008, current health expenditure in Slovenia comprised between 7.5 and 8.1 percent of GDP. Health expenditure as a share of GDP increased since the crisis, but expenditure levels in nominal terms have remained almost unchanged since 2009. In 2014, current health expenditure in Slovenia accounted for 8.5 percent of GDP (Cylus, 2015). The slowdown in health expenditure growth following the financial crisis was much more pronounced in Slovenia than in many other EU countries. In 2015, with 8.3 percent of GDP devoted to health care Slovenia thus continues to lag behind the EU-28 with 9.9 percent of GDP dedicated to heath care. Spending on inpatient and outpatient care represents the lion's share of health expenditures across EU countries. The second major category of spending is medical goods that include pharmaceuticals. This element of spending is also characterised by the largest variation between countries. Expenditures for pharmaceuticals in the EU have also experienced considerable cuts following the crisis. In the 2009–2014 period, per capita pharmaceutical expenditures in the EU fell by 1.1 percent annually on average in real terms, a decline comparable to Slovenia (OECD, 2016).

Cuts in pharmaceutical expenditures can be achieved by influencing the prices through price freezing, price cuts, the use of generic substitutes or by influencing the

consumption of pharmaceuticals (Arts, Habl, Rosian, & Vogler, 2006). An extensive body of empirical literature investigates how regulation of the pharmaceutical market affects the consumption of pharmaceuticals, their prices, expenditures and co-payments. The effects of pharmaceutical price regulation are probably the most emphasised area (see, for example, Puig-Junoy (2010), Galizzi, Ghislandi & Miraldo (2011) and Acosta et al. (2014)). Price drops due to reference pricing were also observed and analysed in Slovenia (Podnar, Molj, & Golob, 2007; Kajdiž & Bojnec, Učinek Sistema Referenčnih Cen na Oblikovanje Cen Zdravil, 2010). Papers published more recently for the case of Slovenia confirm that pharmaceutical prices declined substantially over the 2003–2010 period (Kajdiž & Bojnec, 2013; Kajdiž & Bojnec, 2010; Kajdiž & Bojnec, 2012). This paper adds to the existing available evidence for Slovenia by extending the studied period and observing expenditures for prescription pharmaceuticals in the entire 2001–2014 period and selected sub periods. We explore the changes in the consumption of prescription pharmaceuticals, measured in defined daily doses (DDD), and changes in total expenditures for all prescription pharmaceuticals combined and also separately for innovative pharmaceuticals.

Figure 2: *Consumption of prescription pharmaceuticals in million DDDs (left) and total expenditures in million € (right) over the period 2001–2014*
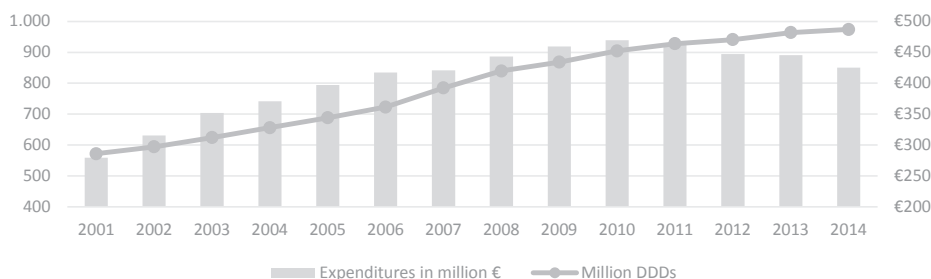
Note: DDD – defined daily dose

Figure 2 shows both the consumption of prescription pharmaceuticals and expenditures in nominal terms. The data indicate that Slovenia was able to maintain a positive consumption trend while cutting total expenditures for prescription pharmaceuticals since 2010. The share of expenditures for prescription pharmaceuticals in total current health expenditures also decreased from 15.3 percent in 2008 and 2009 to 13.7 percent in 2014 (OECD, 2015b). In the next chapter, we explain the reasons behind the observed pattern.

2   PRESCRIPTION PHARMACEUTICAL PRICE DYNAMICS IN SLOVENIA

Based on publicly available data on expenditures and consumption of prescription pharmaceuticals published by the HIIS, we explored price changes for 4,110 prescription pharmaceuticals between 2001 and 2014. Only 560 pharmaceuticals were on the market for the entire 13-year period. Other pharmaceuticals were gradually added to or

removed from the analysis as they entered or exited the market or the list of reimbursed pharmaceuticals. In this paper, the total dataset is used when determining annual price changes of individual pharmaceuticals and investigating how the price structure of pharmaceuticals changed during the analysed 2001–2014 period. Sub-sets of available data are used to calculate price indices for selected representative baskets of prescription pharmaceuticals and to assess price changes for innovative pharmaceuticals. In line with the relevant literature (Lou, Oliveira, Ramos, Maria, & Osorio-de-Castro, 2014; Hsieh & Sloan, 2008), we defined the price of a pharmaceutical as the price per defined daily dose (DDD), as shown in the next equation:

$$P_i = \frac{E_i}{Q_i}$$

where E_i indicates the current or nominal expenditure for the i_{th} pharmaceutical obtained from the HIIS data, Q_i indicates the consumption for the i_{th} pharmaceutical expressed in DDDs, and P_i represents the current price per DDD for the i_{th} pharmaceutical. Studies examining the impact of pharmaceutical price regulation (Puig-Junoy, 2010) analyse either the price paid by the insurer/patient (the consumer price) or the pharmacy purchase price. The HIIS database includes both information on the expenditures for prescription pharmaceuticals incurred by the HIIS and total expenditures with co-payments. This allows us to investigate both the total price changes and the fluctuations in pharmaceutical prices paid by the largest payer organisation in Slovenia, i.e. the HIIS. To evaluate the pharmaceutical price dynamics, we observe both the price changes of individual pharmaceuticals and price indices to measure aggregate price changes over time by comparing the cost of purchasing a specific basket of pharmaceuticals at different points in time. Considered superior to other measures (Diewert, 1992), the Fisher price index is a geometric average of the Laspeyres and the Paasche indices and thus more closely aligned with the composition of goods sold over time (Aizcorbe & Nestoriak, 2012):

$$I^F = \left(\frac{\sum_i P_{i,1} Q_{i,0}}{\sum_i P_{i,0} Q_{i,0}} \cdot \frac{\sum_i P_{i,1} Q_{i,1}}{\sum_i P_{i,0} Q_{i,1}} \right)^{1/2}$$

The first term in the Fisher equation is the Laspeyres index, which compares what would happen with expenditures if the same amount of pharmaceuticals, which was bought at time 0 at prices of time 0, were bought at the prices of time 1. On the other hand, the Paasche index (the second term) uses a different market basket to measure the price change. Instead of using the amount of pharmaceuticals bought at time 0, it uses the amount bought at time 1. Since the Laspeyres index tends to overstate the inflation while the Paasche index tends to understate it, the Fisher index compromises between both extremes. Considering that pricing for newly introduced pharmaceuticals can be quite different from that of more established ones, an index that analyses new pharmaceuticals only will likely show different price growth than one that includes all pharmaceuticals (Berndt, 2002). This is why a special section of this paper assesses the price changes of newly introduced and innovative pharmaceuticals. To determine whether the intensity and pace of price changes altered during the investigated 2001–2014 period, we compare

price changes between five sub-periods, i.e. 2002–2006, 2004–2008, 2006–2010, 2008–2012 and 2010–2014. This allows us to alter the baskets of observed pharmaceuticals and enables the new pharmaceuticals to be gradually included in the analysis.

The analysis is divided into three subsections. In *subsection 2.1,* we show the price structure and yearly price dynamics of prescription pharmaceuticals in Slovenia for the period 2001–2014. We calculate the Fisher price indices and average annual price changes for the entire investigated period and the period following the 2008 economic crisis. In *subsection 2.2,* we focus the analysis on new pharmaceuticals, giving special attention to the group of innovative medicines.

2.1 Price structure and price dynamics of prescription pharmaceuticals

Pharmaceuticals are first categorised in one of seven price groups (€0.0 – €0.2, €0.2 – €0.4, €0.4 – €0.60, €0.6 – €0.8, €0.8 – €1.0, €1.0 – €2.0, and above €2.0 per DDD). For each year of the analysis, the structure of all prescribed pharmaceuticals according to these price groups is shown in *Figure 3*. All pharmaceuticals prescribed within an individual year are included. The results thus show both changes in the current price and changes in the array of prescribed pharmaceuticals. The latter is the result of the introduction of innovative pharmaceuticals or modifications of pharmaceuticals that were already on the market. Up to 2009, the share of pharmaceuticals in higher price groups was slowly increasing, while after 2009 more expensive pharmaceuticals were replaced by more affordable counterparts. *Figure 4* shows the first (p25), second (p50) and third (p75) quartiles of prices over the analysed period. The median price, which was equal to €0.59 in 2001, increased by 2008 to €0.84, and then fell to €0.72 in 2014. Changes of the third quartile indicate that the variability of current prices importantly increased during the period 2001–2006 and remained constant in the subsequent years.

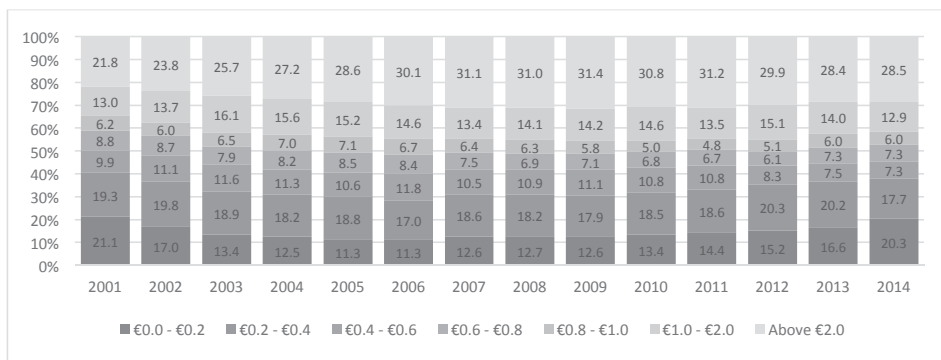Figure 3: *Price structure of prescribed pharmaceuticals in %, 2001–2014*

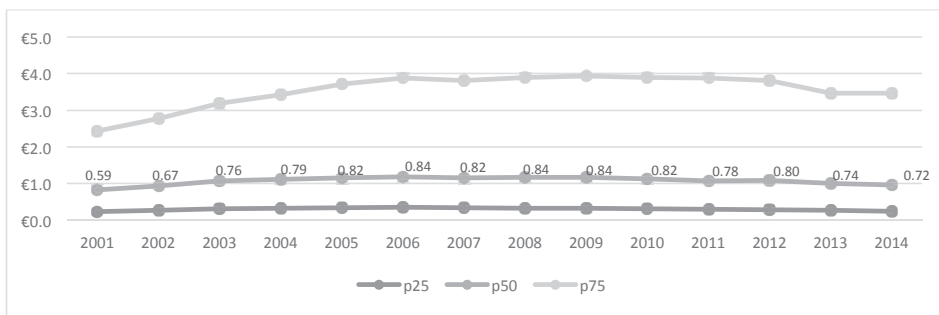Figure 4: *Quartile values of current prices in €, 2001–2014*

Figure 5 shows the structure of prescribed pharmaceuticals according to the relative annual changes. To identify the annual price changes in each year, pharmaceuticals that are prescribed in both year *t* and the preceding year *t-1* are included in the analysis. We categorised pharmaceuticals in five groups based on the percentage change in the current price over the 1-year period (up to -3, -3 to -1, -1 to 1, 1 to 3, 3 and more). Since 2003, there was a substantial drop in the share of pharmaceuticals with high price growth (3 percent and more per year). The share of such pharmaceuticals was the lowest in 2011 (5.4 percent). At the end of the analysed period, that share was considerably below the pre-crisis levels. The share of pharmaceuticals with a strong price fall started to grow after the crisis began. One significant price decrease happened in 2007, while the strongest decrease was in 2012 when more than 70 percent of all pharmaceuticals experienced an annual price fall. In 2012, 55 percent of all pharmaceuticals saw a price decline of 3 percent or more. Annual price changes are also shown in *Figure 6* with the help of the first, second and third quartiles. Up to 2005, the median price change of the pharmaceutical was above 1, meaning that its price was rising. After 2005, that value drops below 1, meaning that more than 50 percent of all prescription pharmaceuticals experienced a price decline. In 2012, the median price of the pharmaceutical fell by almost 4 percent.

Figure 5: *The structure of prescription pharmaceuticals in % according to annual price changes, 2001–2014*
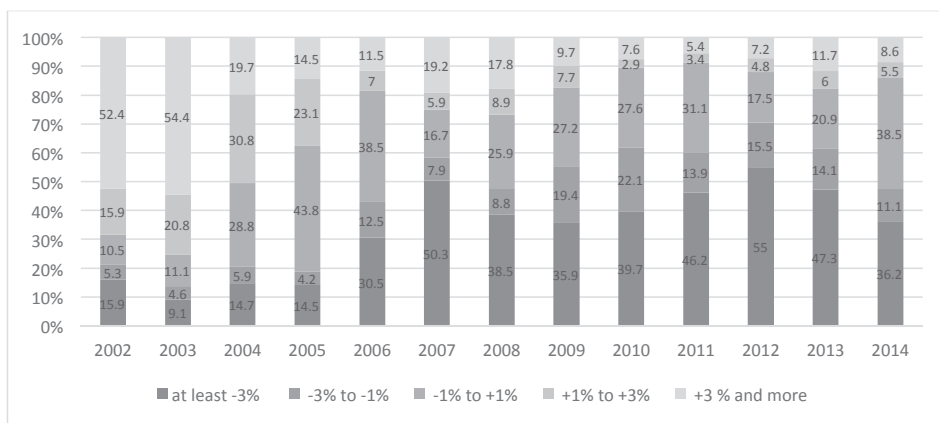
Figure 6: *Quartile values of annual price changes of prescription pharmaceuticals (ratio of two subsequent years), 2001–2014*
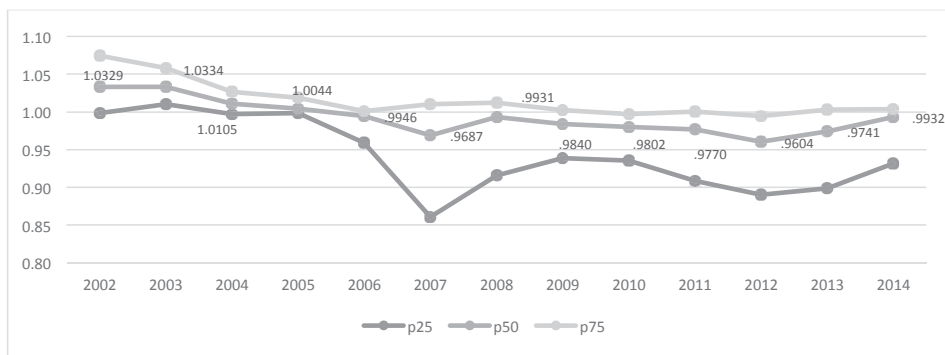

Figure 7 displays the changing structure of the consumption of prescription pharmaceuticals. While *Figure 3* shows the share of pharmaceuticals grouped in the individual price groups, *Figure 7* illustrates the consumed amount of DDDs of pharmaceuticals grouped into one of the seven price groups. The consumption of relatively more expensive pharmaceuticals was steadily decreasing. The consumption of relatively cheaper pharmaceuticals saw a growing share after 2005. In 2005, 70 percent of all consumed pharmaceuticals had a current price below €0.6 per DDD, while in 2014 the share of pharmaceuticals in this price range rose to 86.3 percent, an increase of over 23 percent. In the last decade, the structure of consumption has thus changed notably in favour of lower-priced pharmaceuticals.

Figure 7: *Structure of the consumption of pharmaceuticals in DDDs in % according to selected price groups, 2001–2014*
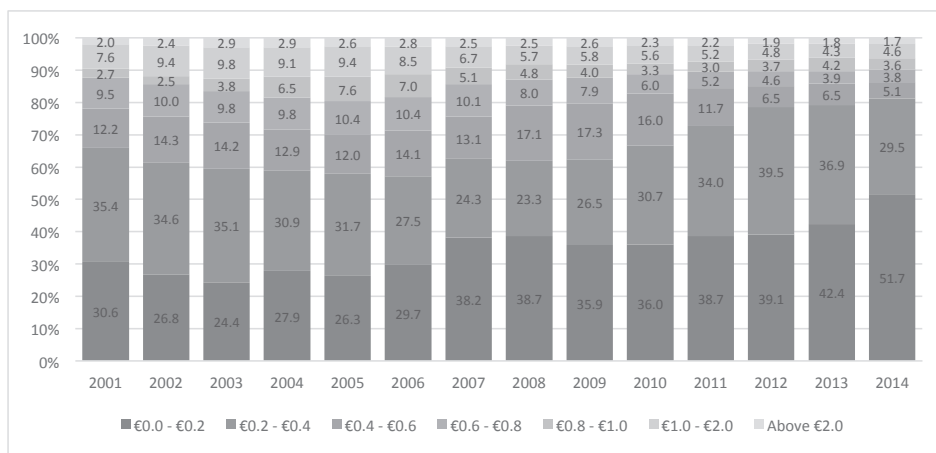
The expenditures for prescription pharmaceuticals available on the market during the entire period 2001–2014 represent 39.2 percent of total expenditures for prescription pharmaceuticals over the entire analysed period (see *Table 1*). For these pharmaceuticals,

the Fisher price index is shown in Table 1. The Fisher price index shows the price change over the full analysed period. Based on the values of the Fisher index, we calculated the average annual price change for the studied period (current prices were used). In addition, we separated the change in the full price and the price reimbursed by the HIIS (CHI price). During the period 2001–2014, the average annual decrease of the total price was 3 percent, while the CHI price was declining faster by 1.4 percentage points. In the same period, average annual inflation was positive and slightly exceeded 3 percent. Annual inflation measured by the consumer price index ranged between 2.5 and 7.5 percent in the pre-crisis period with the inflation rate reaching 5.7 percent in 2008 and then dropping to between 1 and 2 percent after 2009, reaching the highest level of 2.6 percent in 2012 and then nearing 0 in 2014 (SURS, 2016a).

Table 1: *Fischer price index and average annual price change for two time periods*

Prescription pharmaceuticals included in the index	Share of pharmaceuticals included in the index in total expenditures over the analysed period in %		Fischer index	Average annual price change in %
2001–2014 n = 560	39.2	Total price	66.9	-3.0
		CHI price	55.5	-4.4
2008–2014 n = 1,249	80.4	Total price	65.2	-6.9
		CHI price	58.1	-8.7

Note: Current prices were used

Given that the pharmaceuticals included in the 2001–2014 results do not represent a large enough share of total expenditures, the analysis was narrowed to the 2008–2014 period to assure a more representative sample of pharmaceuticals and to investigate the post-crisis price trends, especially considering the low level of general inflation. As shown by *Table 1*, the average annual price change calculated for a shorter time period (2008–2014) includes 1,249 prescription pharmaceuticals, representing 80.4 percent of total expenditures over the entire analysed period. In this more recent period, the price of prescription pharmaceuticals fell considerably faster, resulting in an average annual total price drop of 6.9 percent. The average annual decrease of the CHI price was notably higher, i.e. 8.7 percent. In this post-crisis period, the average annual inflation measured by the consumer price index remained positive at the level of 1.5 percent (SURS, 2016a), thus notably deviating from the price dynamics characterising prescription pharmaceuticals.

2.2 Price structure and price dynamics of new and innovative prescription pharmaceuticals

In this subsection, we investigate the pricing of new pharmaceuticals and explore whether the pressures to slow the growth of pharmaceutical expenditures impacted the rate and the time lag of changes of current prices for innovative pharmaceuticals. New

pharmaceuticals, as used in this study, are classified as either innovative pharmaceuticals entering the market or as previously available pharmaceuticals that were introduced in a different form (e.g. new packaging). In the first part, we analyse both types of new pharmaceuticals together, and later we investigate the price dynamics for a group of innovative pharmaceuticals only.

To explore whether the intensity and speed of the current price changes altered during the investigated 2001–2014 period, we compared the price dynamics over five sub-periods. For every initial year of a selected sub-period we identified new pharmaceuticals which were added to the list of pharmaceuticals reimbursed by HIIS in that year. The number of new pharmaceuticals and their share in expenditures are shown in *Table 2*. The results show that while during the first sub-period the price of pharmaceuticals fell on average yearly by only 2.5 percent (2.3 percent in case of the CHI price), this average annual decrease was considerably stronger over the last sub-period, i.e. 8.3 percent (8.7 percent for the CHI price). An interesting shift is characteristic for 2008, which can be related to the stronger pressures to limit health expenditure growth in the crisis period. Before that year, the total price was on average falling faster than the CHI price. After 2008, however, there was a stronger decrease in the CHI price reimbursed by the HIIS that was achieved by shifting some of the burden of funding pharmaceuticals to voluntary health insurance by increasing the co-payment rate.

Table 2: *Fischer price indices and average annual price changes of new pharmaceuticals for five time periods*

New prescription pharmaceuticals included in the index	Share of pharmaceuticals included in the index in total expenditures over the analysed period in %		Fischer index	Average annual price change in %
2002–2006 n = 115	7.8	Total price	90.4	-2.5
		CHI price	91.1	-2.3
2004–2008 n = 118	8.8	Total price	81.4	-5.0
		CHI price	83.3	-4.5
2006–2010 n = 140	4.9	Total price	81.3	-5.1
		CHI price	71.6	-8.0
2008–2012 n = 125	3.8	Total price	81.8	-4.9
		CHI price	72.9	-7.6
2010–2014 n = 192	2.3	Total price	70.6	-8.3
		CHI price	69.4	-8.7

Note: Current prices were used

Given that some newly introduced pharmaceuticals are actually only minor modifications of existing pharmaceuticals, we can expect that the price dynamics of new innovative

pharmaceuticals is different. To analyse the price changes of innovative pharmaceuticals, we first categorised every pharmaceutical in either the group of innovative pharmaceuticals (in the case of a new molecule or a new combination of molecules, or if the pharmaceutical was introduced to the market prior to patent expiration) or in the group of non-innovative pharmaceuticals (i.e. other pharmaceuticals). For every initial year of the studied sub-periods, median prices in € per DDD for innovative and other pharmaceuticals are shown in *Figure 8*. Innovative pharmaceuticals were more expensive, with the difference considerably widening in 2010. The average median price per DDD in the selected years shown in *Figure 8* was €3.8 for the innovative pharmaceuticals and €0.8 for the other pharmaceuticals.

Figure 8: *Median prices in € for innovative and other pharmaceuticals*
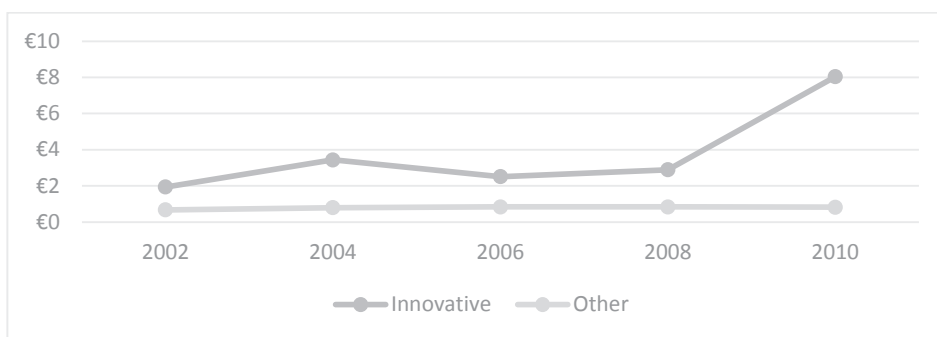
As shown in *Table 3*, the price of innovative pharmaceuticals dropped considerably slower than the price of other new pharmaceuticals. However, even though the average annual decline of prices of innovative pharmaceuticals was fairly low in the first three time periods, after the 2008 crisis prices started to also significantly decline for this group of pharmaceuticals. In the last sub-period, the average annual price decline for innovative pharmaceuticals was -3.6 percent compared to -7.7 percent for other new pharmaceuticals.

Table 3: *Fischer price indices and average annual price changes for innovative and other new pharmaceuticals for five time periods*

Time period		Innovative	Fischer index	Average annual price change in %
2002–2006	Total price	YES, n = 50	99.2	-0.2
		NO, n = 1,116	95.5	-1.1
	CHI price	YES, n = 50	105.9	1.5
		NO, n = 1116	94.9	-1.1
2004–2008	Total price	YES, n = 50	98.1	-0.5
		NO, n = 1,160	79.6	-5.5
	CHI price	YES, n = 50	100.6	0.2
		NO, n = 1,160	79.7	-5.5
2006–2010	Total price	YES, n = 44	97.5	-0.6
		NO, n = 1,296	74.6	-7,1
	CHI price	YES, n = 44	88.9	-2.9
		NO, n = 1,296	71.0	-8.2
2008–2012	Total price	YES, n = 38	90.3	-2.5
		NO, n = 1,406	74.3	-7.2
	CHI price	YES, n = 38	81.0	-5.1
		NO, n = 1,406	67.4	-9.4
2010–2014	Total price	YES, n = 36	86.2	-3.6
		NO, n = 1,553	72.5	-7.7
	CHI price	YES, n = 36	85.9	-3.7
		NO, n = 1,553	69.0	-8.9

Note: Current prices were used

Since *Table 3* only reveals the price dynamics of pharmaceuticals introduced to the list of pharmaceuticals reimbursed by the HIIS in 2010 or in selected prior years, we have only limited insight into the pricing and dynamics of current prices of the most recently introduced pharmaceuticals. This is why we additionally investigated how the newly introduced innovative pharmaceuticals were priced over the period 2011–2014. *Table 4* compares the median current price in € per DDD for all pharmaceuticals with the median current price of innovative pharmaceuticals. The difference between the median prices per DDD of new innovative pharmaceuticals and all pharmaceuticals also continued to grow in the most recent years, reaching nearly €6 in 2014.

Table 4: *Median prices in € for all and innovative pharmaceuticals, 2011–2014*

Pharmaceuticals	2011	2012	2013	2014
Innovative	4.60	4.71	6.49	6.63
All	0.78	0.80	0.74	0.72

Note: Current prices were used

Table 5: *Quartile percentage price changes in % within one year after the introduction of an innovative pharmaceutical*

	Group	2011–2012	2012–2013	2013–2014
p25	Innovative	-9.9	-1.3	-0.2
	All	-11.0	-10.1	-6.9
Median	Innovative	-3.6	0.0	0.0
	All	-4.0	-2.6	-0.7
p75	Innovative	-1.1	0.4	0.1
	All	-0.6	0.3	0.4
Share of pharmaceuticals with a price decrease	Innovative	94.0	49.0	46.0
	All	86.0	74.0	62.0

Note: Current prices were used

Table 5 shows quartile values of price changes between 2011 and 2014. In 2012, 50 percent of innovative pharmaceuticals had a price decline of at least 3.6 percent compared to the previous year, which is slightly less than the 4.0 percent level characteristic of the case of all pharmaceuticals together. In 2013 and 2014, annual price decreases slowed down and the prices of half of innovative pharmaceuticals, introduced in the preceding year, remained unchanged. Recent slower price decreases of new innovative pharmaceuticals are also revealed by the first quartile and the shares of those pharmaceuticals that experienced a current price decrease. While in 2012 25 percent of new innovative pharmaceuticals experienced an annual price decline of at least -9.9 percent, the value of the first quartile fell to only -0.2 percent in 2014. The share of innovative pharmaceuticals with a price decrease fell from 94 percent in 2012 to 46 percent in 2014. Quartile values of the annual price changes indicate that the prices of innovative pharmaceuticals remained more stable than the prices of other pharmaceuticals, although the pace of the price decreases of all prescription pharmaceuticals in Slovenia slowed significantly in 2013 and 2014.

CONCLUSIONS AND DISCUSSION

Decreases in current prices and the altered structure of the consumption of prescription pharmaceuticals in favour of relatively less expensive counterparts explain well why Slovenia was able to increase its consumption while cutting its nominal expenditures for prescription pharmaceuticals after 2010. The paper shows that up to 2009 the share of pharmaceuticals in the highest price groups was slowly increasing, while after that year the share started to decline. The structure of pharmaceuticals, according to the relative price changes, also altered. Since 2003, there has been a substantial decrease in the share of pharmaceuticals with high current price growth exceeding 3 percent per year. The share of such pharmaceuticals was lowest in 2011. The strongest price decreases occurred in 2012 when more than 70 percent of all pharmaceuticals experienced an annual price decline. In

2012, 55 percent of all pharmaceuticals had at least a 3 percent price cut. The structure of the consumption of pharmaceuticals, measured in DDDs, also changed in the investigated time period in favour of pharmaceuticals from the two lowest price groups. In 2005, 70 percent of prescribed pharmaceuticals had a price below €0.6 per DDD, while in 2014 the share of pharmaceuticals in this price range rose to 86.3 percent.

Fisher price indices were utilised to summarise changes in the current prices of individual pharmaceuticals. The results reveal notable declines in prices, especially after the economic crisis. During the period 2008–2014, the prices of a large share of pharmaceuticals, representing over 80 percent of total expenditures for prescription pharmaceuticals over the analysed period, dropped considerably, resulting in an average annual price decrease of 6.9 percent. The average annual decrease of the CHI price was even stronger, totalling 8.7 percent. In this post-crisis period, average annual inflation remained positive at the level of 1.5 percent, thus notably deviating from the price dynamics characterising the prescription pharmaceuticals. The analysis presented in this paper also reveals that, before 2008, the total prices of prescription pharmaceuticals fell faster than the CHI prices reimbursed by the HIIS. In the post-crisis period, the CHI price decreases became stronger than the total price decreases.

To show whether the intensity and pace of the price changes also altered for new innovative pharmaceuticals during the investigated 2001–2014 period, we compared five sub-periods. We found that the innovative pharmaceuticals exhibited higher prices compared to the other pharmaceuticals, and that the price reduction for the innovative group was less pronounced. However, even though the average annual decline in prices of innovative pharmaceuticals was low in the first three sub-periods, prices started to fall faster after the 2008 crisis. Over the 2008–2012 period, the average annual price decrease of innovative pharmaceuticals introduced in 2008 equalled 2.5 percent (7.2 percent for all pharmaceuticals), and over the latest analysed sub-period of 2010–2014 the average annual price decline for innovative pharmaceuticals introduced in 2010 was 3.6 percent (7.7 percent for all pharmaceuticals). A more detailed analysis of the most recent four years including 2011, 2012, 2013 and 2014 reveals, however, that the price difference between innovative pharmaceuticals and other pharmaceuticals has been widening. Annual price changes characteristic for this period indicate that the prices for the majority of newly introduced innovative pharmaceuticals in 2013 and 2014 remained stable within 1 year of their inclusion on the list of pharmaceuticals reimbursed by the HIIS. Further, the pace of the price decreases of all prescription pharmaceuticals in Slovenia significantly slowed in 2013 and 2014.

The results presented in this paper reveal the price changes for prescription pharmaceuticals in Slovenia in the 2001–2014 period and selected sub-periods. The sub-periods were selected to account for the impact of the 2008 economic crisis. However, it is important to note that a more detailed investigation of the determinants of price changes was not the primary goal of this paper. This lies beyond the scope of this paper given that numerous changes to both the macroeconomic environment (EU entry, adoption of the euro, severe economic crisis) and the health care system level were adopted in Slovenia to control the

growth of pharmaceutical expenditure. The latter include the supervision of prescription practices in 2002, new rules on the formation of prices from 2005 and their amendments in subsequent years, changes in co-payment rates for pharmaceuticals on intermediary lists in 2009, negotiations for mandatory discounts by innovative pharmaceutical companies in the 2010–2012 period, introduction of therapeutic reference pricing in 2013 etc. (Fürst, 2015). Since the listed measures impact different groups of pharmaceuticals and take effect with different time lags, a closer investigation of the determinants of price and expenditure changes is both a possibility and a challenge for further research. Another area that is a limitation of this paper and also a further research possibility is a more detailed decomposition of the dynamics of expenditures for prescription pharmaceuticals. This paper primarily focused on price changes but price changes need to be coupled with changes in consumption and changes in the mix of pharmaceuticals to fully explain how the price cuts contributed to the growth of consumption and accessibility to new innovative pharmaceuticals. Even though this paper provides some clear insights into the structural changes that emerged in the investigated period, further research and more detailed data which are currently unavailable in publically published datasets particularly for innovative pharmaceuticals is needed to investigate how the change in the mix and pricing of new innovative pharmaceuticals has impacted the overall expenditures for prescription pharmaceuticals in Slovenia.

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