GAINERS AND LOSERS OF EURO ADOPTION: THE CASE OF THE BALTIC STATES

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Abstract. In this paper we analyse the effects of the adoption of euro on the economies of the three Baltic countries. We employ the difference-in-differences approach to estimate the impact of the currency changeover on the product prices in the Baltic states. We also examine which specific demographic groups of consumers (by their age, education and income levels) were the most sensitive for the currency changeover. Our results suggest that the greatest euro-related price increase in the Baltic countries was related to the products belonging to the 4th and the 5th price quantiles, especially services. We also find that in the Baltic countries consumers groups which reacted to the adoption of euro the most sensitively were better educated people between 30 and 49 years. However, the impact of currency changeover for the consumers seems to be country specific.

Keywords: euro, currency changeover, inflation, perceptions.

JEL Classification: D84, E31, I31.

Introduction

According to a popular myth, supported among others by the findings of Del Giovane and Sabbatini (2005), Hobijn et al. (2004), Aalto-Setala (2005), Degler and Staehr (2019) and Halka and Leszczynska-Paczesna (2019), after joining the eurozone, prices go up and the well-being of the country's residents goes down. Moreover, common currency ensures higher convergence rates (Nguyen & Rondeau, 2019). Still, other economists (e.g. Hegerty, 2020; Schulz, 2016; Golob et al., 2009; Heller et al., 2019) argue that there are no objective reasons for the euro-related inflation.

Therefore, the aim of this research is to find the impact of the currency changeover towards the actual and the perceived prices of different product groups and for different social groups in the three Baltic states: Estonia, Latvia and Lithuania. These countries were selected because although they are economically very similar, their currency changeover happened in different years (2011 in Estonia, 2014 in Latvia and 2015 in Lithuania). Hence, we could minimise the influence of any global shocks on the perceived inflation.

The research questions are the following:

What triggered the divergence of the perceived inflation from the actual inflation rate after the adoption of the euro in the Baltic countries?

How currency changeover effected different social groups in the Baltic states?

Following Del Giovane and Sabbatini (2005), Pufnik (2017) and Dziuda and Mastrobuoni (2009), we hypothesize that perceived inflation after the currency changeover increased mainly because of the increase in prices of the low-priced goods. Following Anttila (2004) and Otrachshenko et al. (2016), we hypothesize that wider gap between the actual and the perceived inflation is typical for the older, less educated and smaller income consumers.

The research gives insight in the possible consequences of euro adoption and the means to overcome them. It could be useful for the countries still preparing for the currency changeover.

Our results show that the greatest euro-related price increase in the Baltic countries was related to the products belonging to the 4th and the 5th price quantile, especially services. We also find no evidence that the greatest

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negative impact of the currency changeover was for the oldest, less educated, and lower income consumers.

The setup of the paper is as follows: in Section 1 we review the literature, Section 2 gives basic inflation statistics for the Baltic countries, in Section 3 we describe methodology and data, Sections 4 and 5 present our main results and Section 6 concludes.

1. Literature review

The paper contributes to the literature on the impact of the adoption of the euro on the consumers by expanding the span of countries and analysing the differences between the actual and the perceived inflation.

Economists find diverse impacts of the currency changeover. Some researchers agree that currency changeover causes at least some price increases. Del Giovane and Sabbatini (2005) found out that after adoption of euro in Italy greater price increases were noted for more frequently bought goods. Hobijn et al. (2004) claims that the increase of the restaurant prices that happened after the adoption of euro in the first eurozone members, could be attributed to menu costs. Aalto-Setala (2005) suggests that currency changeover has a very slow (sometimes even more than two years) effect on the price endings, as prices are made to look attractive.

Other researchers claim that there are no objective reasons for the emergence of the euro-related inflation. Hegerty (2020) claims that there were no structural breaks in the inflation in the Baltic states after the adoption of euro. Schulze (2016) reveals that after the adoption of euro both market concentration and the profitability of the firms decreased, leading to the increased competition and possibly lower prices in many European countries. Golob et al. (2009) concludes that most Slovenian firms were transparent and socially responsible during the currency changeover process. Kotlinski (2020) argues that after the adoption of the euro restaurants, hotels, alcoholic beverages and tobacco were the only sectors that registered excessive inflation in the CEE countries, and after the currency changeover inflation even decreased. Moreover, Moessner (2022) finds out, that inflation expectations in the euro area mostly depends on the currency exchange rate.

Still, most economists agree that currency changeover usually magnifies customers perception of the inflation rate and has different impact on various social groups. Dziuda and Mastrobuoni (2009) argue that the currency changeover decreased price transparency and resulted in price increases for cheaper goods. Hence, after the currency changeover in the first 12 euro-area countries perceived inflation was higher than the actual inflation. Anttila (2004) claims that the currency changeover in Finland resulted in much worse price perception for older consumers, as well as the ones with the lower income and the ones with less shopping experience. Otrachshenko et al. (2016) argues that the perceived effect of the adoption of the euro in Slovakia was the most negative

for the old, the unemployed, the poorly educated and the families with children. Pufnik (2017) claims, that one of the main reasons for the increase of the perceived inflation could be the increase of the prices of the frequently bought goods.

Since current findings are controversial, this paper examines the effects of the currency changeover on the actual and the perceived prices in Latvia, Lithuania and Estonia.

2. Inflation in the Baltic countries

After 2010 the three Baltic countries were characterised by moderate and low inflation rates, not exceeding 5% and sometimes even turning to small deflation. The average inflation rate during the period since 2008 till 2018 was 3.14% for Estonia, 2.77% for Latvia and 2.87% for Lithuania. According to the European Commission (2011, 2014, 2015), adoption of euro had a very short-term positive impact on inflation in the three Baltic states. Inflation in Estonia increased by 0,2–0,3 pp in Dec 2010 – Mar 2011, inflation in Latvia rose by 0,12–0,21 in Jan 2014, and inflation in Lithuania rose by 0.04–0.11 pp in Jan 2015.

Another inflation related measure is the perceived inflation, calculated by the European Commission. It is based on a survey data and represents the qualitative opinions of the consumers on inflation developments in the EU countries (Arioli et al., 2016). Comparison of the statistics of the actual and the perceived inflation for the three Baltic countries for the period 2008–2018 (three years before Estonia and three years after Lithuania adopted the euro) is given in Figure 1. Vertical red lines in the graphs indicate the dates of joining the eurozone (01-01-2011 for Estonia, 01-01-2014 for Latvia and 01-01-2015 for Lithuania).

Figure 1 shows that in all the three countries perceived inflation fluctuated together with the actual inflation, however, on a different scale. After the currency changeover, the actual inflation in Estonia increased to app. 5%, in Latvia it remained negligible and in Lithuania
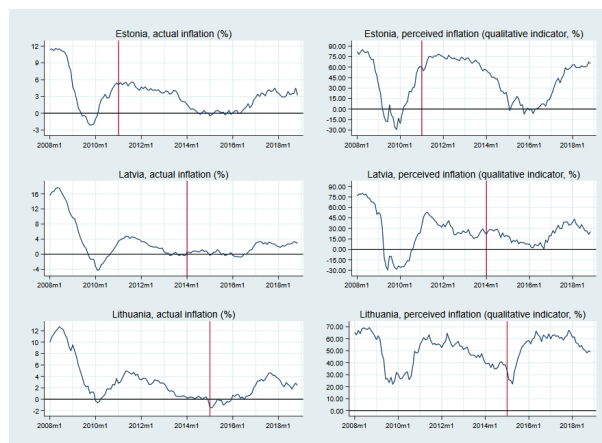

Figure 1. Actual and perceived inflation in the Baltic states, 2008–2018

it even became deflation (which lasted for the whole 2015). Although the actual inflation in the three Baltic states remained stable and consumers did not suffer from any large negative effects of the currency changeover, perceived inflation fluctuated much more. Estonian and Lithuanian residents perceived inflation to almost reach the level of 2008–2009 (the years of economic crises).

Motivated by the differences in the actual and the perceived inflation and the findings of Dziuda and Mastrobuoni (2009) and Pufnik (2017), we hypothesize that the perceived inflation after the currency changeover in Estonia, Latvia and Lithuania increased mainly because of the increase in prices of the low-price goods. Following Anttila (2004), Otrachshenko et al. (2016), we hypothesize that wider gap between the actual and the perceived inflation is typical for the older, less educated and having smaller income consumers.

3. Methodology and data

To estimate euro-related inflation for different product groups we employ difference-in-differences analysis method. Baltic countries are defined as a "treatment group" and three other EU countries which did not use euro as their currency between 2006 and 2015 are defined as a "control group". Seeking to create the best possible control groups our analysis covers the period of 6 years for each country: 5 years before the adoption of euro and 1 year after it (i.e. 2006–2011 for Estonia, 2010–2014 for Latvia and 2011–2015 for Lithuania).

Following the model of Dziuda and Mastrobuoni (2009), we assume that inflation in our treatment (T) group countries ($\pi_{i,t}^T$) depends on demand and supply of products and introduction of euro. We control for demand and supply of products using information taken from the control (C) group countries, which did not adopt euro in the analysed period and assume that inflation in the control group countries ($\pi_{i,t}^C$) depends only on the demand and supply in these countries for product i and time t. We also assume that product i's inflation in period t in each of the Baltic countries depends on this product's inflation in period t in the control group countries:

$$\pi_{i,t}^T = a_i + \sum_C b_i^C \pi_{i,t}^C + \varepsilon_{i,t}, \qquad (1)$$

here, $\pi_{i,t}^T$ represents **actual inflation** rate in any of the Baltic countries and $\pi_{i,t}^C$ is inflation rate in each of the control group countries.

We estimate Eq. (1) for each Baltic country and each product group taking only the period before the currency changeover. We do not include the data after the currency changeover seeking to isolate the possible effect of the adoption of euro. Estimating Eq. (1) gives us coefficients "b" which are used to calculate **predicted inflation** ($\pi_{i,t}^{T*}$) for each product group in each of the Baltic countries. Next, we calculate **unpredicted inflation** ($\pi_{i,t}^{T**}$) for each product i and each Baltic country at

time t as a difference between the predicted and actual inflation.

Finally, we construct the following regression:

$$\pi_{i,t}^{T**}(p_{i,t}, d_t) = \gamma_i + \alpha_i p_{i,t} + \beta_i d_t + \varepsilon_{i,t}, \qquad (2)$$

here, $\pi_{i,t}^{T**}$ stands for the unpredicted inflation rate in any of the Baltic countries for product i and time t, $p_{i,t}$ is the price level of product i at time t, and d_t is the dummy variable equal to 1 if euro was used at time t and 0 if not. Our aim is to estimate coefficient β which stands for **euro-related inflation**.

In order to check which social groups were affected the most by the currency changeover, for each Baltic country and each demographic group j we estimate the following regression:

$$\pi_{j,t}^P = a_j + b_j \pi_t^T + c_j d_t + \varepsilon_{j,t}, \qquad (3)$$

here, $\pi_{j,t}^P$ stands for perceived inflation by the group j in period t in one of the Baltic countries, π_t^T shows actual inflation at time t in one of the Baltic countries and d_t is the dummy variable (equal to 1 if euro was used at time t and 0 if not). The estimate of coefficient c_j shows the average increase of the perceived inflation after the currency changeover as perceived by the demographic group j.

The following monthly data was used for the research:

Harmonised Consumer Price Indexes (HCPI) were retrieved from Eurostat database. HCPI data represents annual changes of consumer prices (in %) of different product groups (i). HCPI is calculated monthly as $100(p_{t,i}/p_{t-12,i} - 1)$. Since we use monthly data of annual HCPI changes, seasonality is eliminated. To avoid annual correlation of the residuals, we apply Newey-West procedure, which allows to estimate covariation in the presence of autocorrelation and heteroskedasticity under the assumption of no autocorrelation between far away observations (Newey & West, 1987).

Average price levels (in euros) of the product groups classified by COICOP were retrieved from Eurostat database. As each of those product groups contain many different products some of which are "expensive" and some of which are "cheap", we selected 31 product groups containing average yearly price data for each of their subgroups. Then we calculated the average yearly price levels in all the treatment and control group countries for each subgroup and group and classified them to five quantiles according to their average price levels.

Consumer survey data on the perceived inflation classified according to the main demographic characteristics (age, education and income) was retrieved from the Business and Consumer Surveys of European Commission (European Commission, 2018).

All the models are specified under the Linear Probability (OLS) specification.

4. The impact of euro adoption on prices

We follow three major steps. First, we select the "control group" countries and examine their suitability by analysing the results of Eq. (1). Second, we calculate unpredicted inflation for each product group in each of the Baltic countries. It gives us the total of 93 equations to estimate – one for each of the 31 product groups in each Baltic country. Third, we estimate Eq. (2) to evaluate the euro-based inflation for each product group in the Baltic states.

The control group countries are selected from the other Eastern European countries based on their similarity to the treatment group by their inflation dynamic patterns.

Figure 2 shows the dynamics of the actual inflation rate in the three Baltic states and the other EU countries which still did not use euro in 2015, but had the obligation to adopt it (i.e. Bulgaria, Croatia, Czech Republic, Hungary, Poland and Romania) between 2006 and 2015. We find that the most similar inflation patterns are with the countries depicted in the upper panel of Figure 2: Czech Republic, Croatia and Bulgaria.
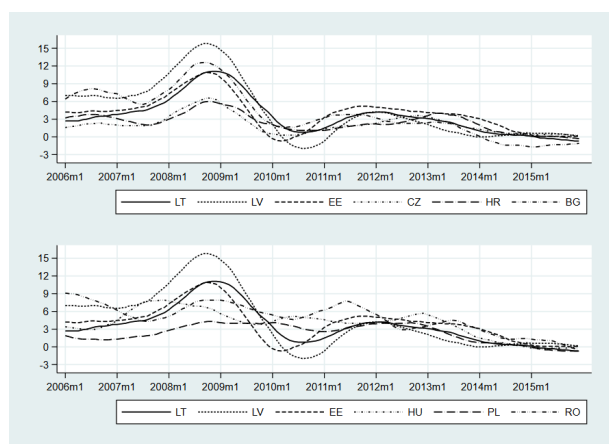

Figure 2. Dynamics of the inflation rate in the Baltic states and the other countries, %

Taking Czech Republic, Croatia and Bulgaria for control group countries, we calculate unpredicted inflation for the period of 5 years before the adoption of euro for each of the Baltic states. The average rate of unpredicted inflation for the 31 above mentioned product groups amounted to –0.11% for Estonia, –0.35% for Latvia and –0.06% for Lithuania. Estimating Eq. (2) we find coefficient β, which shows the estimate of euro-related inflation (positive values stand for inflation and negative values stand for deflation). Product groups for which β is significant are presented in Tables 1, 2 and 3 respectively.

Table 1 shows product groups which experienced significant euro-related price increases in Estonia (there were no product groups which experienced price decreases). Notice that three out of six such product groups are services: cultural services, hairdressing and grooming and restaurants and cafes. The highest euro-related inflation in Estonia was related to the increase of the prices of cinema tickets.

Table 1. Estimates of significant euro-related inflation in Estonia

Quan-tile	Product group	β	s. e.*	t-value
II	09.4.2 Cultural services	10.14**	0.67	14.14
IV	12.1.1 Hairdressing salons and personal grooming establishments	8.56**	0.73	11.74
I	11.1.1 Restaurants, cafes and the like	6.59**	0.30	22.02
IV	04.3.1 Materials for the maintenance and repair of the dwelling	5.12***	0.13	36.63
II	02.1.3 Beer	2.81**	0.13	21.44
II	05.6.1 Non-durable household goods	2.56***	0.04	67.59

Note: Newey-West standard errors, *** p.0.01, ** p < 0.05.

However, there is no evidence that in Estonia euro-related inflation was higher in the sector of low-priced goods. On the contrary, out of six product groups which experienced euro-related price increase only one product group is from the 1st quantile (visiting restaurants and cafés).

In Latvia the effect of the currency changeover is more varied (see Table 2). The highest euro-related price increase was noticed for hairdressing, medical and cultural services, household appliances, shoes, drinks, bread, meat and sweet items. Euro-related inflation of recording media is the largest and amounts to more than 9%, however, some of such a high price change could be attributed to the legislative changes in the EU regulating the payment for author's rights. Notice that the highest inflation was in the sectors of more expensive products. Four out of five products having the highest euro-related inflation belong to the 4th and the 5th quantiles.

Table 2. Estimates of significant euro-related inflation in Latvia

Quan-tile	Product group	β	s. e.*	t-value
III	09.1.4 Recording media	9.24***	0.55	16.78
IV	12.1.1 Hairdressing salons and personal grooming establishments	7.55***	0.96	7.91
V	03.2.1 Shoes and other footwear	5.03**	1.28	3.94
V	06.2.1, 06.2.3 Medical and paramedical services	5.01**	0.17	29.97
V	05.3.1, 05.3.2 Major household appliances whether electric or not and Small electric household appliances	4.72**	1.30	3.64
III	05.6.1 Non-durable household goods	3.86***	0.33	11.73
I	01.2.2 Mineralwaters, soft drinks, fruit and vegetable juices	3.53**	0.83	4.25

End of Table 2

Quan-tile	Product group	β	s. e.*	t-value
I	01.1.1 Bread and cereals	3.44**	0.74	4.66
II	09.4.2 Cultural services	3.30***	0.58	5.65
I	11.1.1 Restaurants, cafes and the like	2.72**	0.60	4.57
III	01.1.2 Meat	2.11***	0.39	5.47
III	01.1.8 Sugar, jam, honey, chocolate and confectionery	1.80***	0.07	26.55
V	03.1.2 Garments	−2.42***	0.14	−17.79
III	01.2.1 Coffee, tea and cocoa	−4.40***	0.71	−6.22

Note: Newey-West standard errors, *** p.0.01, ** p < 0.05.

In Lithuania euro-related price changes are the most varied. Table 3 shows that in Lithuania the greatest price increase was for periodicals, household appliances and recording media (due to the change of the EU legislation). Lithuania also experienced significant euro-related price increases forcleaning and repair of clothes, medical services, hairdressing, cultural services and restaurants and cafes. Still, many products became cheaper because of the euro adoption, i.e. pharmaceutical products, shoes and a couple of food items.

Table 3. Estimates of significant euro-related inflation in Lithuania

Quan-tile	Product group	β	s. e.*	t-value
I	09.5.2 Newspapers and periodicals	4.67***	0.09	51.21
V	05.3.1, 05.3.2 Major household appliances whether electric or not and Small electric household appliances	4.39***	0.20	21.93
III	09.1.4 Recording media	3.90***	0.15	25.58
III	03.1.4 Cleaning, repair and hire of clothing	3.61***	0.25	14.37
V	06.2.1, 06.2.3 Medical and paramedical services	3.58***	0.04	79.69
IV	12.1.1 Hairdressing salons and personal grooming establishments	3.19***	0.59	5.38
II	09.4.2 Cultural services	2.65***	0.31	8.65
I	11.1.1 Restaurants, cafes and the like	2.29***	0.30	7.56
IV	02.1.1 Spirits	1.22**	0.40	3.07
IV	06.1.1 Pharmaceutical products	−0.69**	0.02	−29.23
V	03.2.1 Shoes and other footwear	−0.91**	0.28	−3.22
III	01.1.2 Meat	−1.18***	0.17	−6.91
IV	01.1.3 Fish and seafood	−1.94***	0.22	−8.75

End of Table 3

Quan-tile	Product group	β	s. e.*	t-value
I	01.1.1 Bread and cereals	−1.96**	0.40	−4.92
III	01.1.8 Sugar, jam, honey, chocolate and confectionery	−4.24***	0.24	−17.72
III	01.2.1 Coffee, tea and cocoa	−7.51***	1.19	−6.29
II	02.1.3 Beer	−8.83***	0.43	−20.52

Note: Newey-West standard errors, *** p.0.01, ** p < 0.05.

The results for Lithuania also do not support the hypothesis that euro-related inflation is higher for low-priced goods, as the majority of products which became more expensive due to the currency changeover belong to the 4th and 5th quantiles.

Overall, in all three Baltic countries currency changeover led to the increase of prices in cultural services, hairdressing and restaurants and cafes. In Estonia euro-related price increase happened in only a few sectors, however, inflation rates were the highest. Lithuania seems to experience the most diverse effects of the currency changeover, still, inflation and/or deflation rates in Lithuania were the lowest among the Baltic countries.

As the products specified by the highest price increases belong to different, and most often not the cheapest quantiles, we claim that the cause of the increase of the perceived inflation in the Baltic countries after the currency changeover cannot be based on the increase of prices of the low-priced goods.

4. The impact of euro adoption on different social groups

Based on Anttila (2004) and Otrachshenko et al. (2016), the older, less educated and lower revenue consumers should experience more difficulties in understanding the new prices after the currency changeover, hence, the gap between their perceived and actual inflation rates should be wider. Therefore, this section examines if the perceived inflation is higher for older, less well-off, and less educated consumers.

In order to examine the impact of euro-related inflation on different social groups, we estimated separate Eq. (3) relating the perceived and actual inflation for different age, education and income levels. Then we compared the estimates of the coefficients, which show the average increase of the perceived inflation after the currency changeover as perceived by the specific group.

The findings show that in Latvia after the adoption of the euro, perceived inflation was the highest among the people having 60–64 and 30–49 years of age. However, in Estonia and Lithuania, the average increase of the perceived inflation was the highest among the people of 30–49 years.

Results for education was contradictory for all three Baltic countries. In Estonia and in Latvia the most educated people also had the highest increase of the

perceived inflation. However, in Lithuania the highest increase of the perceived inflation was among the high-school graduates, and the lowest was among the ones having the basic education.

High-income holders were the ones, characterised by the highest increase of the perceived inflation after the adoption of euro in Estonia and in Lithuania. Still, in Latvia higher inflation perceptions were common for the low-income holders.

Overall, our findings reveal that the perceived inflation had no common pattern between different social groups in the Baltic states. Moreover, in most cases perceived inflation was even lower for older, less well-off, and less educated consumers.

Conclusions

Results suggest that the greatest euro-related price increases in the Baltic countries were related to the products belonging to the 4th and the 5th price quantiles. Moreover, the dominant groups of products specified by the largest euro-related inflation were services (hairdressers, cultural services, restaurants and the like). Hence, we claim that in the Baltic countries the increase of the perceived inflation after the introduction of euro was not related to the increase of prices of the low-price products.

Moreover, the analysis provides no evidence that the greatest negative impact of the currency changeover is for the oldest, less educated, and low-income holders. The findings suggest that in the Baltic countries the group of consumers which reacted to the adoption of euro the most sensitively were better educated people between 30 and 49 years.

The findings of this analysis could be useful for the countries still planning the changeover of their currencies and developing their communication, information and economic strategies.

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