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Impact of Perceived Inflation Growth and Persistance in Eurozone Countries on Consumer's (Saving's) Behaviour

In most of the eurozone countries there were significant slow-down in economic growth after the introduction of euro in 2002. A lot of studies are traying to identify and explain factors influencing economic slow-down in eurozone countries after euro change over. One of the possible ways to look on this problem is via the phenomen of perceived inflation[1]. There is significant empirical evidence, that introduction of euro led in most of the countries to significant increase of perceived inflation. At the same time there was no rapid increase in prices monitored by official price indexes like HICP (harmonized index of consumer prices). "Notwithstanding the accuracy of the HICP as a measure of consumer price inflation, protracted divergences in the evolution of measured perceived inflation warrant close examination, given that perceived inflation might have an impact on inflation expectations and other macroeconomic variables." *(ECB, 2007)*.

Based on above cited statement of ECB the hypothesis of this paper is stated as follows: There is significant correlation between growth in perceived inflation and changes in consumers (saving's) behavior in countries applying or already using common currency euro. There are many empirical studies trying to explain the motives for increase and persistence of perceived inflation before and after euro change over. The new approach to this phenomenon is applied *m* proposed paper. Authors will verify the hypothesis that the increase in perceived inflation has the same effect on consumption as the increase in inflation expectations. When the people expect the prices go up in the future, they adjust their consumer's (saving's)

[1] In the context of the European Commission's Consumer Survey, approximately 23,000 randomly selected consumers in the euro area are surveyed on a monthly basis by means of a harmonized questionnaire, mostly via telephone. Among other qualitative questions on how they perceive their household's financial situation or the overall economic situation for example, survey participants are asked the following question: "How do you think that consumer prices have developed over the last 12 months?" The possible response categories are: (1) "risen a lot", (2) "risen moderately", (3) "risen slightly", (4) "stayed about the same", (5) "fallen" and (6) "don't know".

behavior. The same assumption can be made for perceived inflation (the feeling that the prices were growing in past period).

The aim of the paper is to identify if there is any significant relation between increase in perceived inflation and consumption behavior. If the significant correlation between increase in perceived inflation and changes in consumer's (saving's) behavior is identified, it can help explain the slow-down of economic growth in most of the eurozone countries after euro introduction.

The paper is structured as follows: Section l provides an overview of the European Commission's survey of consumers' inflation perceptions: methodology and empirical evidence and briefly reviews the explanations which have been proposed in the literature for the existence of a perception gap in the aftermath of the euro cash changeover. Section 2 identifies the relationship between perceived inflation and consumption behavior. In section 3, we present our data set and the econometric framework used. In section 4, we discuss our results and interpret them against the background of some of the explanations money and inflation illusion. Finally, section 5 concludes and provides recommendation for economic policy.

1. Introduction

Before we start, let’s try to define and explain term perceived inflation. To clarify the term we have to grap for psychological terminology. In psychology and cognitive sciences, perception is defined as "the process of acquiring, interpreting, selecting and organizing sensory information" *(Federal Statistical Office of Germany, 2006).*

As we will mention later, above launched definition is in linę with the methodology of perceived inflation survey conducted by European Commission. The indicator of perceived inflation is not constructed with the use of empirical price monitoring. It surveys the feelings of consumers about the past price development. The next section explains the methodology of perceived inflation indicator calculation and provides some empirical evidence from eurozone countries.

Consumer opinions on inflation are collected through the Consumer Survey of the European Commission (Directorate General for Economic and Financial Affairs). As the indicator derived from this survey differs in nature from the HICP, it is not possible to make a

direct comparison between the two measures. In order to interpret its developments, it is important to gain a better understanding of the methodology used to calculate the European Commission indicator.

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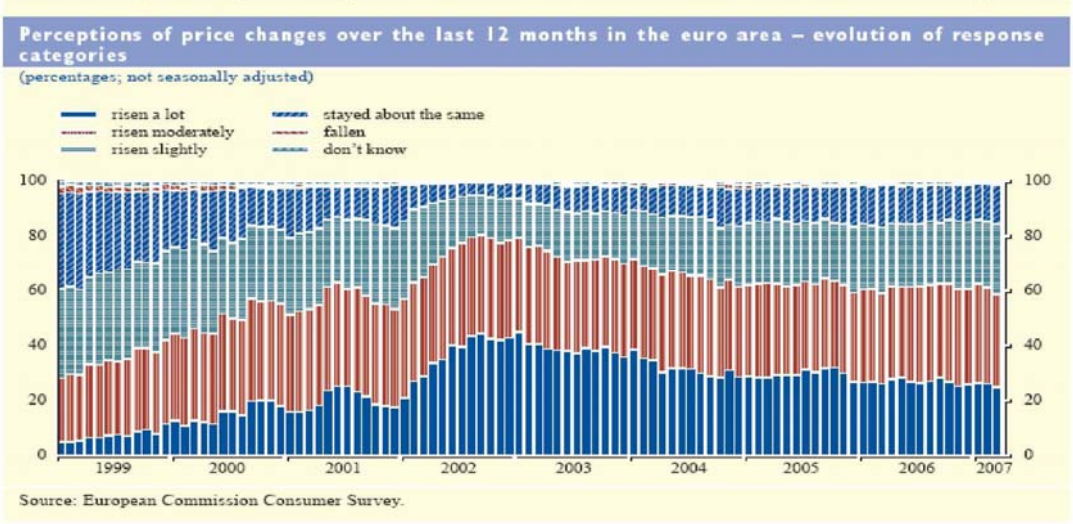
An aggregate measure of consumers' opinions - the "balance statistic" - is calculated as the difference between the proportion of respondents saying that consumer prices have either "risen a lot" or "risen moderately" and the proportion of respondents saying that consumer prices have "fallen" or "stayed about the same". In order to differentiate between the more "moderate" and more "extreme" answer categories, the European Commission attributes half the weight of the extreme answers (1) and (5) to responses (2) and (4); the middle response (3) and the "don't know" response (6) arę not explicitly taken into account.

The balance statistic is computed as P[l] + (0.5 P[2]) - (0.5 P[4]) - P[5], where P[l] is the percentage of respondents having answered (1) etc. The values for the balance statistic range between -100 and +100. The increase in the balance statistic during the period from 2002 to early 2003 was due mainly to an increase in the share of consumers replying that prices have "risen a lot" (see Chart l), which rose from an average of 14% during the period 1999-2001 to 38% during the period 2002-03. Since the euro cash changeover, this average has stood at 32%. The shift in this response category was mainly at the expense of the shares of the answers "risen slightly" and "stayed about the same". The distribution of answers across categories has remained almost stable since early 2005.

Chart 1: Perception of price changes over the last 12 months in the euro area – evaluation of response categories

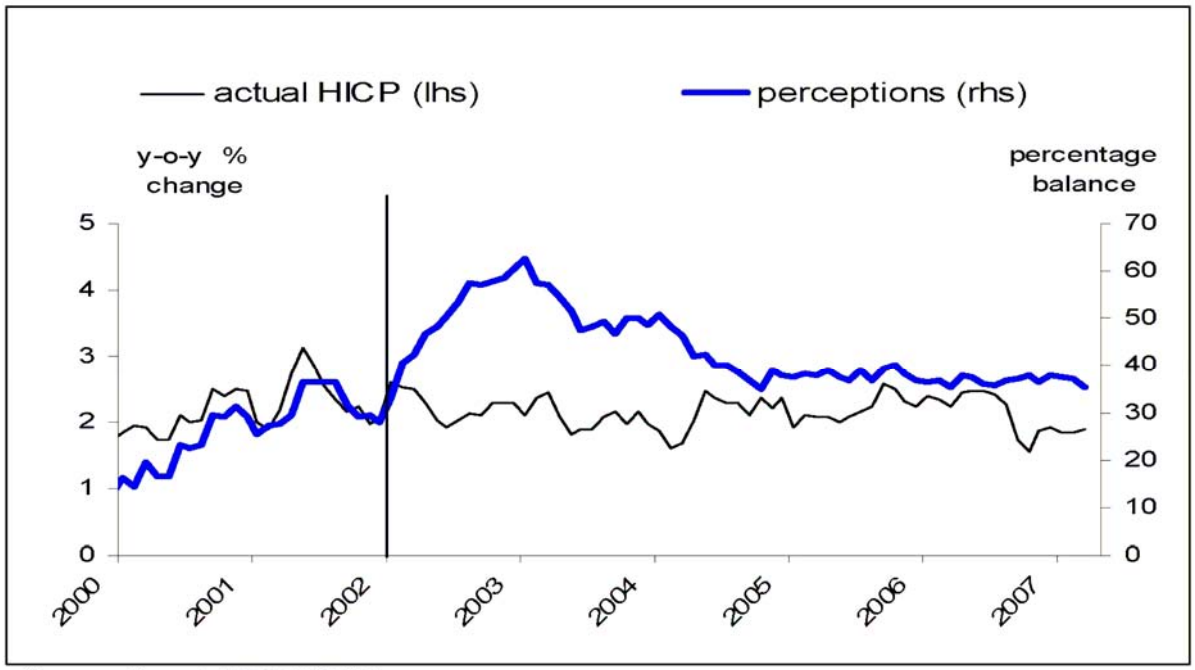


Source: ECB (2007)

In general, qualitative opinion surveys are subject to several methodological difficulties. First, the response categories used may be interpreted differently by respondents and their interpretation may vary over time. Second, the weighting scheme applied inevitably involves a certain degree of arbitrariness but determines the evolution of the balance statistic. For example, it remains unclear whether it is justified that the replies in the category "risen a lot" receive exactly double weight compared with those consumers saying that prices have "risen moderately". Moreover, consumers assessing that prices have "risen slightly" represent the third largest group of replies (24% on average over the period since January 1999) but are not explicitly taken into consideration for the compilation of the balances.

There are numerous empirical studies analyzing relation between official price indexes like HICP, expected inflation and indicator of perceived inflation in eurozone member countries. They all try to explain the observed divergence between official price indexes and perceived inflation during and after change over (see chart 2). Let us look on some of them.

Chart 2: HICP and perceived inflation evolution in eurozone (2000 – 2007)



Source: Eurostat/DG ECFIN

Heinemann and Ullrich (2006) based their analysis of the impact of EMU on inflation expectations on a representation of expectations formation suggested e.g. by *Carlson and Valev (2002)* and *Gerberding (2001).* It takes in account of the empirical fact that expectations formation can only partly be characterized to be fully rational and that backward looking and adaptive expectations play a role at least for a part of economic agents[2]. Furthermore, authors incorporate a term capturing the regressive part of expectations formation and the possibility that the expected inflation rate can change in reaction to a changing actual inflation ratę *(Pesaran 1985, p. 951).* They also stress that expectations tend to under predict inflation during periods of rising inflation and over predict it during periods of decreasing inflation. This finding is a frequent result of studies on inflation expectations (e.g. *Andolfatto et al, 2002).*

Traut-Mattausch et al. (2004) had highlighted the importance of psychological factors, and especially the role of a priori expectations. Based on an experiment, they show a bias towards a perception of price increases as a result of a previously held expectation, even when

[2] This argument support close relation between evaluation of past development of prices (indicator of perceived inflation) and expected inflation (future price development).

the latter was not confirmed by the evidence[3]. Completely different factor relates to the fact that consumers may have incorrectly interpreted the loss of purchasing power incurred at the time of the changeover as being caused by higher inflation rather than by the general slowdown in economic activity at that time. *Del Giovane and Sabbatini (2006)* have found some evidence in favor of this argument in the case of Italy, but in principle this argument should also have led to inflation misperceptions in other periods characterized by an economic downturn.

Linden, S. (2005) gives following opinion on the role of expectations and perceptions on price level: „Expectations about the future course of the price level are important to decision-makers in all markets: for goods, labour, money, financial assets and currencies. Decisions on these markets determine the actual rate of inflation, nominal wage rates, interest rates, exchange rates as well as real variables such as the rate of unemployment. Expectations actually determine all types of economic behavior, as human action is forward-looking. Such information, however, is difficult to compile for the simple reason that inflationary expectations are not directly measurable in a way similar to variables such as interest rates, monetary aggregates, rates of unemployment, consumer and producer prices etc. The expectations of the future behavior of prices are held by individuals in their minds. A straight forward way to measure the inflation expectations of the public is to ask people about their expectations, and in fact, a few surveys do exactly that. In November 2002, it was decided to introduce two new questions into the Harmonized Consumer Survey for the European Union, thus adding to the number of surveys that explicitly ask a selection of respondents (representing the public at large) about their inflation perceptions and expectations. The two new questions were introduced on a voluntary and experimental basis. They aimed at obtaining point estimates of the perception and expectation, using a quantitative formulation on past (perceived) and future (expected) inflation." ... .*and Linden, S. (2005)* continues: "One obvious problem with these surveys is that the questions asked concerns variables that are difficult to asses, or even understand. Inflation, for example, is a macro-variable measuring the aggregate price level, but as respondents' consumption baskets do not necessarily correspond to the one used for calculating the consumer price indices, the answers

[3] This exactly the case of pereceived inflation and its significant deviation form HICP.

obtained with the surveys can differ substantially from the official inflation rates. This is often the case; surveys do in general result in showing perceptions and expectations that are very different from the actual rates".

Studies *of Döhring, B., Mordonu, A. (2007)* and *Lacina (2008)* provides set of factors which trying to explain the existence and persistence of perceived inflation indicator and its deviation form HICP. The following part of the paper describes some of most frequently mentioned factors in both studies

In most of the euro area countries the prices of day to day purchases so called „out-of-the-pocket"(for example food, dinners in restaurants) were growing faster than prices of less frequently purchases (like cars, refrigerators, etc.). The prices of some products even declining while growing their utility (for example computers, electronic devices). Due to the fact that consumers are more „sensitive" to changes of day to day purchases than to the products with long term utility, they transfer their feelings about price increase in this group of products to their opinion about overall inflation (the whole consumer basket). At the same time psychological studies show that consumers are more sensitive to the price increases compared with price decreases. While evaluating the development of prices in the past the surveyed consumers giving significantly higher weight to the products with price increase compared with those with price decrease;

According the public opinion surveys (Eurobarometers) even 6 years after euro introduction (cash form) there still high percentage of respondents who convert the euro prices to former national currency. But doing this they are comparing current prices with prices which existed 6 years ago (at the end of the year 2001);

Important role are playing also expectations. While the consumers (due to media information, conversations with neighbors, declarations of europesimist politicians, etc.) acquire strong believe that introduction of euro will lead to price increases, they have a tendency increase their opinion about future development of inflation by their expectations and acquired information in the past. Once expectation about development of prices after euro introduction are set, they have the tendency to be transformed to the long term increase in perceived inflation compared to the inflation measured by standard price indexes like HICP;

Any household is an „ideal" consumer according the weighted structure of consumer basket. Logically the higher weight in consumption is given to the groups of products with higher increase of prices than average (during the euro change over - like food products) the

higher is then increase in the indicator of perception inflation;

One of the most frequented mentioned causes of significant opening of scissors between perceived inflation and inflation measured by HICP is an unawareness of consumers about the structure of consumer basket and calculation of consumer price index.

Important fact why consumer may feel that prices went significantly up after euro introduction is the statistically observed increase of houses prices after year 2001 (which has nothing to do with euro introduction). However the prices of houses are not included to the calculation of HICP, the people who do not know the structure of consumer basket which is used for HICP calculation, may feel the life cost are growing up. They then can wrongly transform their feelings about decrease in their purchasing power to the fact that prices went up;

The feeling that „living costs are increasing" may be influenced not just by increases of prices included (or excluded - real estate) to HICP but also by slower growth of wages compared with past development before euro introduction (due to attempt of national government control inflation growth during euro changeover like in Slovenia) or other factors which do not have any direct relation to euro introduction; again the people have tendency to transform their feeling about decline of purchasing power of their incomes due to slow down in nominal wages growth to introduction of euro;

Important role in constitution, growth and long term persistence of perceived inflation are played by information provided by mass media. In countries implementing euro in the past there was according the media monitoring significant increase of number of article covering the topic of inflation. As for media is due to the profit orientation more effective to choose „sensational" information (in contrast with rational arguments) in context of euro changeover they preferred to alert mainly price increases. The media also increased the number of articles pounce the problem of official price statistics credibility (as perceived inflation are significantly deviated from HICP before and after euro introduction) and thus creating the opinion that official statistics (like HICP) are providing wrong information about price development for decisions of consumers.

Following table describes development of HICP and perceived inflation indicator in individual eurozone member countries.

Table 1: Evolution of HICP and perceived inflation indicator in selected Eurozone member countries (1999 -2006)

Table HICP and inflation perceptions across euro area countries

	HICP inflation Average annual percentage changes			Perceptions of price changes over the last 12 months Percentage balances, seasonally adjusted		
	1999 -2001	2002 -2004	2005 -2006	1999 -2001	2002 -2004	2005 -2006
Belgium	2.1	1.6	2.4	29	44	53
Germany	1.3	1.4	1.9	23	48	27
Ireland	3.9	3.7	2.4	40	53	38
Greece	2.9	3.5	3.4	18	57	66
Spain	2.8	3.2	3.5	20	52	52
France	1.4	2.1	1.9	5	45	47
Italy	2.2	2.6	2.2	25	52	37
Luxembourg	2.4	2.6	3.4	-	38	41
Netherlands	3.2	2.5	1.6	28	61	25
Austria	1.6	1.6	1.9	-1	36	35
Portugal	3.1	3.1	2.6	29	46	42
Finland	2.3	1.2	1.0	-11	-5	-4

Sources: Eurostat and European Commission Consumer Survey.
Note: Data on inflation perceptions for Luxembourg are only available from January 2002 onwards.

Source: ECB (2007)

As we can see there was no significant increase in HICP in any observed country. The opposite is true for indicator of perceived inflation. In all countries except Finland there was significant increase in perceived inflation indicator value. What is interesting that in some countries after the dramatic increase of indicator after euro introduction in cash form (period 2002 - 2004) the value of indicator start decreasing. In some countries the indicator remind fixed at the high level. In any country did not come back to its former level until now. More precise comparison of HICP and perceived inflation indicator development can be found in Annex 1.

2. Relation between inflation (both perceived and expected) and consumption: literature survey

Boskin, M. (1978) specified a consumption function that includes both the expected real rate of interest and expected ratę of inflation. In particular, he cited *Mundell (1963)* to argue that since inflation destroys the value of accumulated wealth, consumers attempt to restore their wealth-income position by increasing their savings, which would result in a reduction of consumption. There is also uncertainty argument which leads to a similar result - consumer's hedge by

spreading the loss of income over more than one period. These influences may offset any indirect effects of the ratę of inflation acting through the real ratę of return. Researchers like *Blinder and Deaton (1985)* have also attempted to identify such an effect.

Stein and Song (1998) conclude that in the post 1973 period both variables - real interest rate and expected inflation - had larger negative effect on consumption of US economy compared with its influence before this period.

Gylfason, T. (1980) states following opinion: "It is interesting to note that while an increase in the expected ratę of inflation increases consumption by influencing intertemporal choice, an increase in the price level may at the same time reduce consumption through the Pigou effect. There is inconsistency between the argument that increased inflation stimulates consumption at the expanse of savings and the fact that in the recession of 1974 - 1975 high inflation rates and high savings coincided in many industrial countries. ".... and continues ....."Even thought increased inflation stimulates via increased consumption output and employment in the short run, it may still be detrimental to economic growth as time passes."

Kichler, E. (2006) provides following argumentation: „Dealing with the new currency essentially depends on the understanding of the nominal euro values, which can be derived from two different sources. On the one hand, euro amounts can be evaluated on the basis of an interaction of nominal and real representations, which leads to a bias toward nominal valuation *(Shafir, Diamond and Tversky, 1997)*. This bias is influenced, inter alia, by the salience of nominal values as well as simple and careful mental calculation processes and is referred to as money illusion *(Fisher, 1928; Patinkin, 1965)*. In the context of the influence of the respective former currencies and conversion factors on the perception of euro amounts also the term "euro illusion" was coined *(Burgoyne, Routh and Ellis, 1999; Gamble, Gärling, Västfjäll and Marell, 2003)*. On the other hand, the evaluation of euro amounts can be influenced by specific other values, such as the price one remembers in the former currency or random values. This influence of specific external values on the perception of euro amounts is referred to as anchoring effect *(Tversky and Kahneman, 1974)*. Anchoring effects are of a mere cognitive nature and may also lead to euro illusion. Euro illusion may be also driven by motivation *(Gamble, Gärling, Charlton and Ranyard, 2002)* and may occur if no or only insufficiently salient anchors are available. With the introduction of the euro, the nominal values on banknotes, salary slips and price tags fell in all EMU Member States, except for Ireland. The resulting lower nominal values (in most EMU Member States) may give rise to euro illusion and also prompt higher

spending, since low nominal values lead to prices being perceived as low *(Ferrari and Lozza, 2005; Fischer et al, (2002); Jonas, Greitemeyer, Frey and Schulz-Hardt, (2002); van Raaij and van Rijen, (2003))*. Euro illusion may facilitate spending and, eventually, the available money has been spent faster, creating the illusion that there is no longer enough money. Moreover, *van Raaij and van Rijen (2003)* presume that due to euro illusion the difference between cheap and expensive products seems smaller and, therefore, the more expensive product is chosen more easily. *Gamble et al. (2003)* found evidence for this phenomenon. Both apparently lower euro amounts and seemingly minor price differences between individual products may lead to a total of higher expenses. The fact that there is less money left at the end of the month is, however, not attributed to one's own spending habits but is externalized and blamed on the euro *(van Raaij and van Rijen, 2003)."*..... „Finally, it is questionable to which periods persons relate estimated inflation rates and to what extent time leads to distorted perceptions. *Kemp and Willetts (1996),* for example, showed that inflation rates tend to be overestimated by far for the more recent past, while subjective estimates for longer periods lead to a gross underestimation of inflation rates".

3. Methodical approach and used data

Standard approach for quantitative economic analysis of aggregate consumption and its influencing factors is consumption function. First time the consumption function was defined by *Keynes (1936)* as a direct dependency between real consumption and real income while consumption is growing more slowly than income:

$$C_i = \beta_1 + \beta_2 Y + u_i,\ i=1,2,...,n \qquad (1)$$

where C, is real consumption of *i=l,2,...,n* consumer (Household), 7, is real income of *i-l,2,...,n* consumer (Household), w, is linearly non correlated random unit with constant variance and /?/ is parameter, which can be interpreted as the autonomous level of consumption. /% is parameter, which represents marginal propensity to consume, while *0</3₂<1.*

Due to inertia of consumption habits and living standards of individual consumers we can observe situation that consumption is not decreasing at a same pace like income. In the periods of recession or depression thus highest level of income reached in the past significantly influence for certain time consumption of individual households independent on level of their sayings. This

reasoning however is not valid for consumers with lowest incomes. *Brown (1952)* on that account supplements Keynesian short term consumption function for a factor of inertia through autoregressive relation:

$$C_t = \beta_1 Y_1 + \beta_2 C_t\text{-}_1 + u_t,\ t = 1, 2,\ldots, T \qquad (2)$$

Application of lagged yariable C of the first order represents in the model the influence of uncertainty. Provided that consumption has a characteristic of random walk, its level is unpredictable and holds:

$$C_t = \beta_1 C_{t-1} + u_t,\ t = 1,2,\ldots, T \qquad (3)$$

For the purpose of this paper authors modified short term consumption function to following form:

$$C, = \beta_1 + \beta_2 C_{t-1} + \beta_3 Y_t + \beta_4 Y_{t-1} + \beta_5 S_t + \beta_6 S_{t-1} + \beta_7 P_t + \beta_8 P_{t-1} + u_t,\ t = 1, 2,\ldots, T \qquad (4)$$

where C_t is a real consumption per capita, , Y_t is real GDP per capita, *S,* represents real savings per capita , P_t is a harmonized index of consumer prices and u_t is random component.

While relations among real consumption, real income and real savings comes out from well known theoretical assumptions, variable of price level is included to the equation in connection with the aim of this paper. Provided that increase of prices will lead to equiproportional change of income and savings in nominal terms and consumption is not changing, than we can expect null parameters *fr* and /%. If the value of both parameters is positive, the consumers will be subject of money illusion (growth of prices will assign to increase of real income and savings, which would lead to increase in consumption). On the contrary, negative values of parameters β - and β - give evidence of consumer conviction about decreasing level of real incomes and savings, without existence of such an effect in reality.

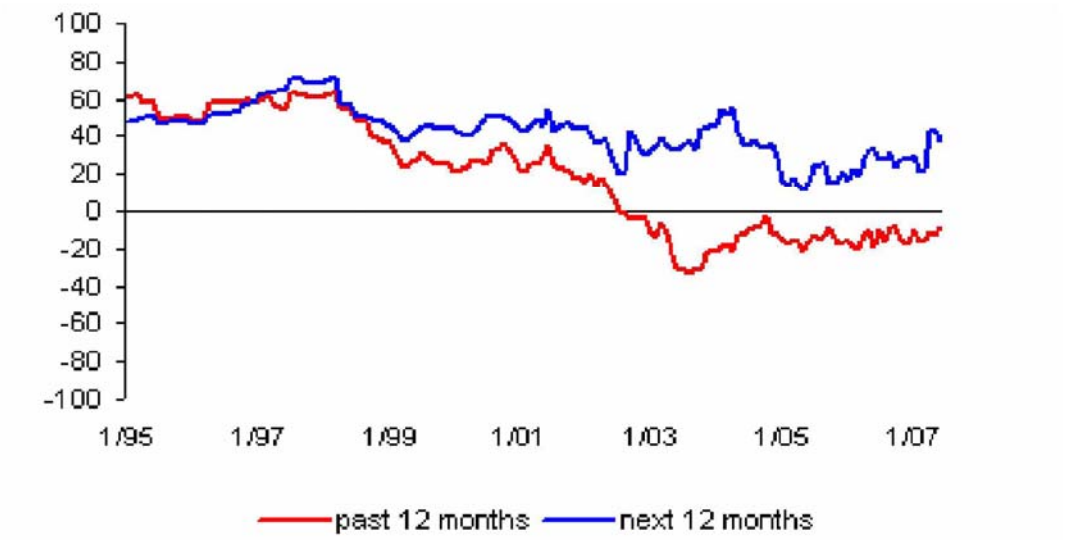
In connection with assumptions of perceived inflation impact on consumptions authors' modificated equation (3) to following form:

$$C, = \beta_1 + \beta_2 C_{t-1} + \beta_3 Y_t + \beta_4 Y_{t-1} + \beta_5 S_t + \beta_6 S_{t-1} + \beta_7 P_t + \beta_8 P_{t-1} + \beta_9 P^*_t + \beta_{10} P^*_{t-1} + u_t,\ t = 1, 2,\ldots, T \qquad (5)$$

where variable *P*t* represents perceived inflation. In case that the estimate of parameter β will be non zero value, than economic subjects arę not influenced to mąkę their decision to change their consumption not just by level of their real incomes, savings and prices, but also by its own subjective inflation perception, which can significantly deviate from real changes in price level.

For the purpose of regression analysis was with the respect to quarterly data and short term character of aggregate consumption function taking into account just max one level of lag. Data used in empirical analysis are year to year of quarterly changes Harmonized Index of Consumer Prices, GDP, Final Consumption Expenditure, Gross Savings, in real terms. Indicator of perceived inflation is taken from Eurostat survey Price trends over the last 12 months. Perceived inflation indicator was statistically normalized[4] for the multiple regression analysis application. The covered period is 1997/Q01 - 2007/Q04. Data are for the Czech Republic.

Chart 3: Time series of perceived and expected inflation for the Czech Republic (1995 – 2007)



Source: Czech National Bank (2007) and European Commission Business and Consumer Surveys

Chart 3 shows the entire time series of perceived and expected inflation for the Czech Republic. It can be seen that perceived inflation as measured by the European Commission index has been declining since 1998. According to this indicator, Czech consumers have on average tended to think since 2002 that prices are not increasing. *(CNB, 2007)*

[4] The data was deducted with its mean and the difference divided by the standard deviation.

4. Empirical analysis results

The results of empirical analysis derived from equation (4) are presented in table 2. Model l provides the results for original consumption function, model 2 is adjusted by superfluous variables (those which are from results of regression analysis insignificant), excluding inflation. Even the high statistical significance of the model the factor of inflation measured by year to year of quarterly changes of Harmonized Index of Consumer Prices in time *t* and *t-1* is statistically insignificant. Through the model 3 at 1% level of statistical significance was identifies positive relation between the consumption in time *t* and consumption in time *t-1*. Stated dependency follows of the assumption of consumption inertia, which was identified by *Brown (1952)*. Positive dependency between income and consumption is given by basic assumptions of short term aggregate Keynesian consumption function. To understand the negative correlation between income and consumption we have separate current income to permanent income and transitory income. Variable Y in regression analysis represents current income. While the correlation between permanent income and consumption is explained by hypothesis of permanent income elaborated by *Friedmanem (1957),* transitory income is given by life cycle of households, changes in employment etc. *(Romer, pp.349-352).* While the level of permanent income is stable and relatively constant in time, transitory income fluctuates with mean value zero, while this part of current income is uncorrelated with permanent income.

Authors assume that in time *t* are consumers more sensitive to changes in permanent income, because its impact on total income Y_t is prevailing. On contrary in time *t-1* consumers perceived above mentioned short term deviations from permanent income in terms of transitory income. Thus, to the extant that total income due to the short term deviation from permanent income decreasing, the economic subjects have in present time tendency to equalize their long term level of consumption by its increasing. Negative correlation between consumption and savings in time / is given by the definition of savings in terms of postponed consumption for future period. In accord with the aim of the paper it is necessary to point out insignificance of price level variable in regression model. The consumers in the Czech Republic thus are not subject to money illusion and the impact on short term aggregate consumption have only real income and savings.

Table 2: Multiple regression analysis results

	Estimate	Standard Error	T Statistic	F-Ratio	P-Value	DW Statistic	T
Model1				92,410	0,000	2,322	41
Constant	-0,549	0,373	-1,471		0,151		
C_{t-1}	0,573	0,145	3,966		0,000		
Y_t	1,083	0,094	11,508		0,000		
Y_{t-1}	-0,483	0,198	-2,443		0,020		
S_t	-0,097	0,032	-3,056		0,004		
S_{t-1}	0,008	0,035	0,239		0,813		
P_t	-0,245	0,220	-1,111		0,274		
P_{t-1}	0,334	0,227	1,468		0,151		
Model2				108,000	0,000	2,156	42
Constant	-0,645	0,350	-1,841		0,074		
C_{t-1}	0,552	0,111	4,967		0,000		
Y_t	1,082	0,094	11,524		0,000		
Y_{t-1}	-0,439	0,151	-2,913		0,006		
S_t	-0,100	0,032	-3,155		0,003		
P_t	-0,151	0,209	-0,724		0,474		
P_{t-1}	0,243	0,216	1,127		0,267		
Model3				156,780	0,000	1,956	43
C_{t-1}	0,599	0,110	5,425		0,000		
Y_t	1,130	0,090	12,617		0,000		
Y_{t-1}	-0,513	0,148	-3,471		0,001		
S_t	-0,100	0,032	-3,129		0,003		

Source: own calculation

Different results of price level changes on consumption were obtained when authors included to the regression model variable of perceived inflation. From table 3, model 7 and 8 is obvious, that perceived inflation was significant factor influencing real consumption in the Czech Republic during observed period. Let's assume that real incomes and real savings are constant as well as price level measured by harmonized index of consumer prices. Economic subjects while consumption is changing are not reflecting the changes in real variables and they are even succumbing to money illusion which is connected with process of increasing or decreasing of nominal incomes. For the purpose of argumentation used in this paper let's divert our attention also to term inflation illusion, because the consumers tend to think that the past development of prices in economy was increasing, even I reality the official indexes do not show any change. Such an inflation illusion in case of empirical evidence of euro change over is called in literature "euro illusion" as is it described in cited study from *Kichler, E. (2006)* in the section 2 of this paper.

Table 3: Multiple regression analysis results

	Estimate	Standard Error	T Statistic	F-Ratio	P-Value	DW Statistic	T
Model4				74,530	0,000	2,086	41
Constant	0,672	0,793	0,848		0,403		
C_{t-1}	0,475	0,157	3,019		0,005		
Y_t	1,070	0,094	11,412		0,000		
Y_{t-1}	-0,369	0,208	-1,775		0,085		
S_t	-0,080	0,033	-2,445		0,020		
S_{t-1}	0,012	0,035	0,355		0,725		
P_t	-0,377	0,245	-1,543		0,133		
P_{t-1}	0,173	0,245	0,704		0,487		
P^*_t	-0,081	0,971	-0,083		0,934		
P^*_{t-1}	0,334	0,227	1,468		0,327		
Model5				120,420	0,000	1,968	43
C_{t-1}	0,473	0,113	4,172		0,000		
Y_t	1,090	0,086	12,650		0,000		
Y_{t-1}	-0,334	0,153	-2,179		0,036		
S_t	-0,094	0,030	-3,141		0,003		
P_t	-0,088	0,052	-1,708		0,096		
P^*_{t-1}	0,619	0,233	2,651		0,012		
Model6				118,260	0,000	2,050	43
C_{t-1}	0,467	0,116	4,015		0,000		
Y_t	1,107	0,086	12,888		0,000		
Y_{t-1}	-0,334	0,156	-2,143		0,039		
S_t	-0,098	0,030	-3,257		0,002		
P_t	-0,098	0,054	-1,798		0,080		
P^*_t	0,599	0,239	2,505		0,017		
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S_t	-0,094	0,031	-3,055		0,004		
P^*_{t-1}	0,453	0,218	2,082		0,044		

Source: own calculation

Based on the results of model 6 (Table 3) authors of the paper assume that even in observed period the price level in the Czech Republic were increasing, it had no significant impact on real consumption.

The situation is appearing differently after including the factor (variable) of perceived inflation into the model. The results of empirical analysis in table 3 show the positive correlation between real consumption and the indicator of perceived inflation in both time period *t* and *t-1*. Economic agents in this case reacted on perceived inflation. Changes in their

nominal incomes and their nominal cash balances perceived as real changes. So, they were subject of both, money and inflation illusion.

Let's now assume that during the observed period there were changes in both variables: prices of goods and services and nominal incomes of households. Consumers in reality did not react to real changes in prices even to changes in nominal incomes.

Even assuming that nominal prices and nominal incomes were changing equiproportionally, the consumers have reacted more sensitively on changes in their nominal incomes compared with changes of prices. The consumers thus succumbing to illusion about real income increases and therefore also increased their real consumption.

5. Conclusions

Empirical analysis confirmed that the changes in price level in the Czech Republic have no impact on real consumption and hence the consumers in the Czech Republic were not subject to money illusion (they do not mix up growth of nominal incomes with the real one). On contrary, models in table 3 proved significant influence of perceived inflation on real consumption. Economic subject thus according those models were subjected to inflation illusion. If we assume that the prices in observed period did not change, the consumers reacted according their subjective perception of price and incomes development. The evolution of prices and incomes Czech consumers interpreted in favor of incomes increases, so they were subject to money illusion and they mix up growth of nominal incomes with the real one. Their perception at the end leads to increased consumption.

As we showed in chart 2 and table l, the euro introduction led in most of the countries to significant increase of perceived inflation. At the same time there was no rapid increase in prices monitored by official price indexes like HICP (harmonized index of consumer prices). According the regression results it can not be univocally state, if economic agents in the Czech Republic after euro introduction will be subject to money illusion or not. Let's now assume, that introduction of euro will have no effect on prices. If the consumers in the context of euro introduction will perceive the level of nominal incomes recalculated to euro as an increase in purchasing power and this perception will be stronger then perception about euro change over impact on prices, then we can expect increase of real consumption. On contrary if euro introduction and transformation of prices to euro will consumers perceive more sensitive

than recalculation of their incomes and they will interpret recalculation of prices to euro as the increase of prices, than we can assume that consumers will be subject to inflation illusion but also to inverse money illusion. The consequence of euro introduction will be negative perceptions about cash balances and the decrease in real consumption with potential negative impact on economic growth.

Policy recommendation can be stated as follows: The increase of perceived inflation indicator after euro introduction can be limited only partially. The growth in perceived inflation can be one of the factors explaining the economic slowdown in eurozone countries after year 2002. The experience from eurozone countries tell us, that once the indicator of perceived inflation increased, it takes a long time to fall down to its former values (level). Long-term deviation of perceived inflation from HICP can change the consumption behavior of the consumers and can lead to an increase in expected inflation, ... and vicariously negatively effect economic growth. Recommendations for economic policy are therefore following: make any effort that perceived inflation indicator not significantly increased or only in limited extent and thus limit potential negative impact on consumption and economic growth.

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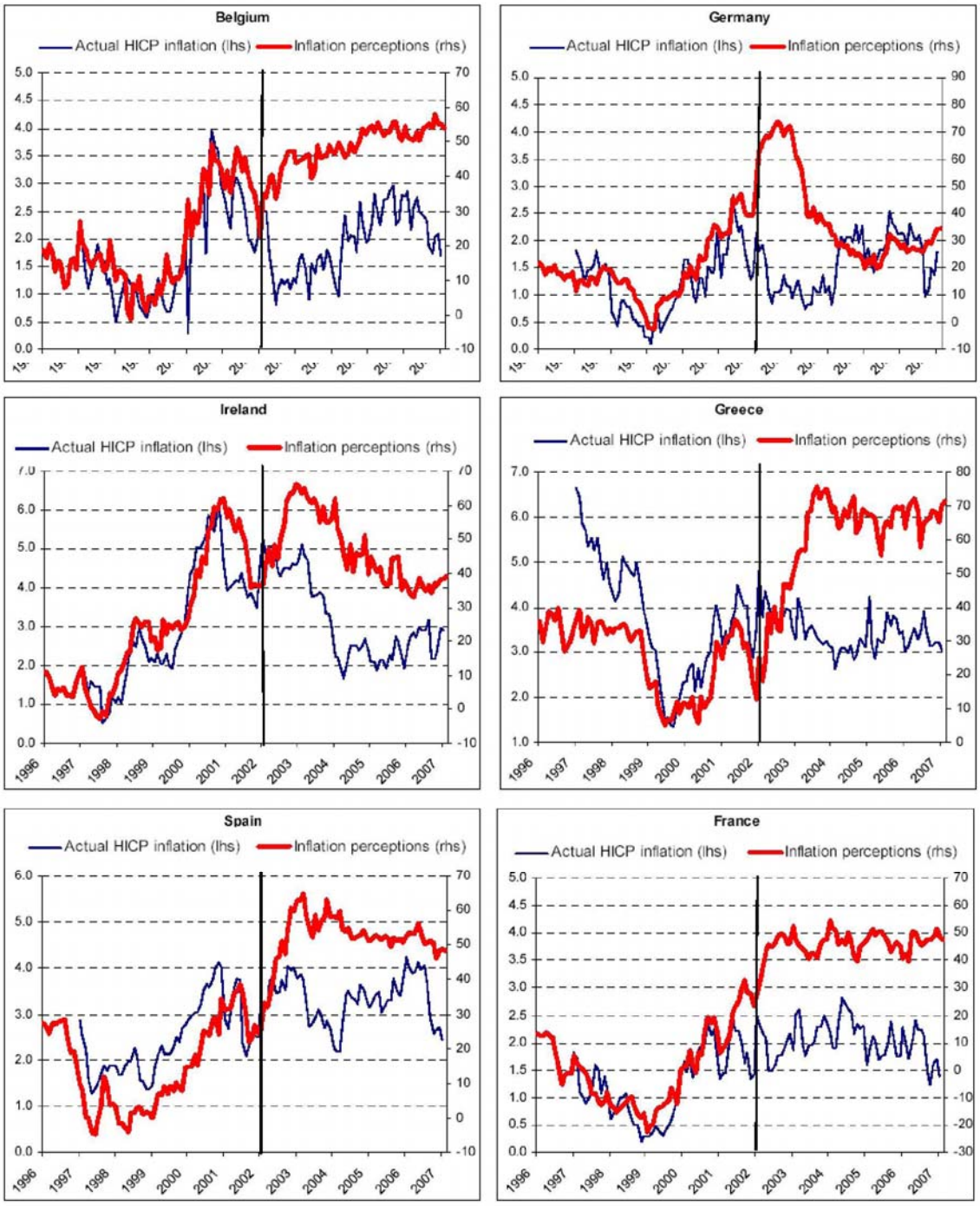
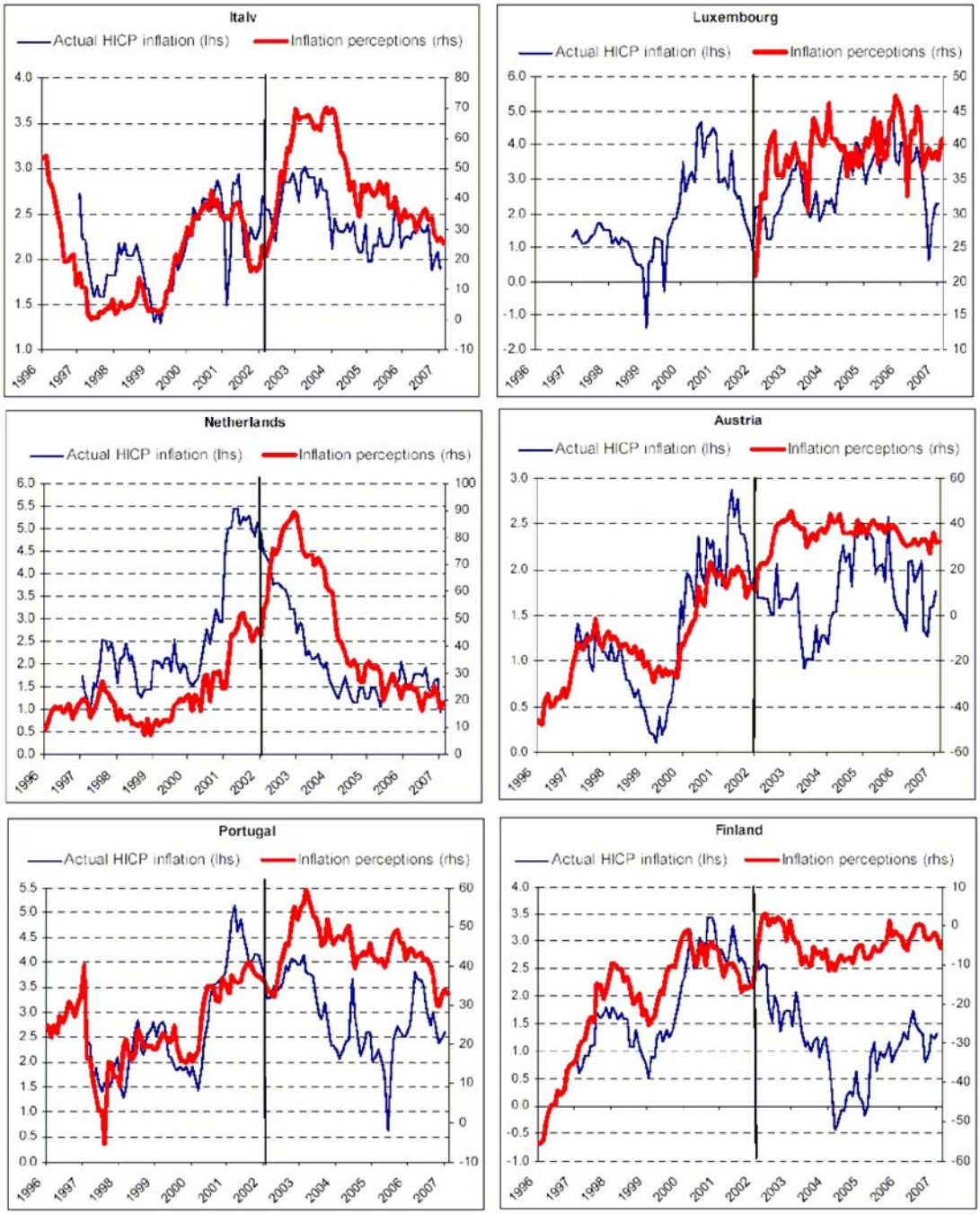
Annex 1: HICP and perceived inflation





Zdroj: Döhring, B., Mordonu, A. (2007)

„ Economic integration in the EU enlarged: from free trade towards monetary union “

Threat from one-off increase of prices after euro introduction: phenomena of euro perceived inflation

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Czech Republic

Wroclaw, April 17 – 18, 2008

Structure of the paper

- Aim of the paper
- Definition of perceived inflation
- Measurement (survey) of perceived inflation
- Limits of perceived inflation indicator
- Results for eurozone countries
- Recommendations for eurozone candidate countries

Motivation of the paper

- The aim of the paper is to identify factors influencing significant increase of perceived inflation in countries preparing for membership and later becoming the full members of eurozone. There is a lot of literature and empirical studies trying to explain the motives for increase and persistence of perceived inflation. The new approach to this phenomenon is applied in proposed paper. Authors will test the hypothesis that the increase in perceived inflation has the same effect on consumption as the increase in inflation expectations. When the people „feel“ that the prices went up in the past (indicator of perceived inflation) , they adjust their consumer's (saving's) behavior like if they expect the growth in inflation in the future (expected inflation). Consequently the change in their consumer's (saving's) behavior may have significant impact on GDP growth.

THE EUROPEAN COMMISSION'S SURVEY OF CONSUMERS' INFLATION PERCEPTIONS I.

- In the context of the European Commission's Consumer Survey, approximately 23,000 randomly selected consumers in the euro area are surveyed on a monthly basis by means of a harmonized questionnaire, mostly via telephone.
- Similar surveys are realized also in eurozone candidate countries.

THE EUROPEAN COMMISSION'S SURVEY OF CONSUMERS' INFLATION PERCEPTIONS II.

- Among other qualitative questions on how they perceive their household's financial situation or the overall economic situation for example, survey participants are asked the following question: "How do you think that consumer prices have developed over the last 12 months?" The possible response categories are: (1) "risen a lot", (2) "risen moderately", (3) "risen slightly", (4) "stayed about the same", (5) "fallen" and (6) "don't know".

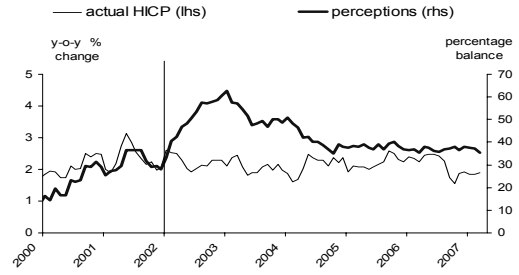
Perceived inflation - balance statistic – calculation (I.)

- The "balance statistic" – is calculated as the difference between the proportion of respondents saying that consumer prices have either "risen a lot" or "risen moderately" and the proportion of respondents saying that consumer prices have "fallen" or "stayed about the same". In order to differentiate between the more "moderate" and more "extreme" answer categories, the European Commission attributes half the weight of the extreme answers (1) and (5) to responses (2) and (4); the middle response (3) and the "don't know" response (6) are not explicitly taken into account.

Perceived inflation - balance statistic – calculation (II.)

- The balance statistic is thus computed as
- $P[1] + (0.5\ P[2]) - (0.5\ P[4]) - P[5]$,
- where $P[1]$ is the percentage of respondents having answered (1) etc. The values for the balance statistic range between -100 and +100.

Development of perceived inflation in euro area



Zdroj: Eurostat/DG ECFIN

Some methodological weaknesses of survey and calculation

- In general, qualitative opinion surveys are subject to several methodological difficulties:
- First, the response categories used may be interpreted differently by respondents and their interpretation may vary over time.
- Second, the weighting scheme applied inevitably involves a certain degree of arbitrariness but determines the evolution of the balance statistic. For example, it remains unclear whether it is justified that the replies in the category “risen a lot” receive exactly double weight compared with those consumers saying that prices have “risen moderately”.
- Moreover, consumers assessing that prices have “risen slightly” represent the third largest group of replies (24% on average over the period since January 1999) but are not explicitly taken into consideration for the compilation of the balances.
- **The comparison of perceived inflation and HICP in one picture is just illustrative and show just different path of development within the given time period.**

Most frequently mentioned factors influencing increase in perceived inflation in eurozone member countries (I.)

- In most of the euro area countries the prices of day to day purchases so called „out-of-the-pocket“ (for example food, dinners in restaurants) were growing faster than prices of less frequently purchases (like cars, refrigerators, etc.). The prices of some products even declining while growing their utility (for example computers, electronic devices). Due to the fact that consumers are more „sensitive“ to changes of day to day purchases than to the products with long term utility, they transfer their feelings about price increase in this group of products to their opinion about overall inflation (the whole consumer basket). At the same time psychological studies show that consumers are more sensitive to the price increases compared with price decreases. While evaluating the development of prices in the past the surveyed consumers giving significantly higher weight to the products with price increase compared with those with price decrease;

Most frequently mentioned factors influencing increase in perceived inflation in eurozone member countries(II.)

- According the public opinion surveys (Eurobarometers) even 6 years after euro introduction (cash form) there still high percentage of respondents who convert the euro prices to former national currency. But doing this they are comparing current prices with prices which existed 6 years ago (at the end of the year 2001);
- The important role playing also expectations. While the consumers (due to media, conversations with neighbors, declarations of europesimist politicians) acquire strong believe that introduction of euro will lead to price increases, they have a tendency increase their opinion about future development of inflation by their expectations and acquired information in the past. Once expectation about development of prices after euro introduction are set, they have the tendency to be transformed to the long term increase in perceived inflation compared to the inflation measured by standard price indexes like HICP;

Most frequently mentioned factors influencing increase in perceived inflation in eurozone member countries(III.)

- Any household is an „ideal“ consumer according the weighted structure of consumer basket. Logically the higher weight in consumption is given to the groups of products with higher increase of prices than average (during the euro change over – like food products) the higher is then increase in the indicator of perception inflation;

Most frequently mentioned factors influencing increase in perceived inflation in eurozone member countries(IV.)

- One of the most frequented mentioned causes of significant opening of scissors between perceived inflation and inflation measured by HICP is an unawareness of consumers about the structure of consumer basket and calculation of consumer price index.
- Important fact, why consumer may feel that prices went significantly up after euro introduction is the statistically observed increase of houses prices after year 2001 (which has nothing to do with euro introduction). However the prices of houses are not included to the calculation of HICP, the people who do not know the structure of consumer basket which is used for HICP calculation, may feel the life cost are growing up. They then can wrongly transform their feelings about decrease in their purchasing power to the fact that prices went up;

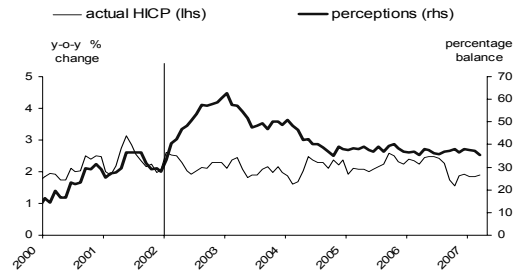
Most frequently mentioned factors influencing increase in perceived inflation in eurozone member countries(V.)

- The feeling that „living costs are increasing“ may be influenced not just by increases of prices included (or excluded – real estate) to HICP but also by slower growth of wages compared with past development before euro introduction (due to attempt of national government control inflation growth during euro changeover like in Slovenia) or other factors which do not have any direct relation to euro introduction; again the people have tendency to transform their feeling about decline of purchasing power of their incomes due to slow down in nominal wages growth to introduction of euro.

Most frequently mentioned factors influencing increase in perceived inflation in eurozone member countries(VI.)

- Important role in constitution, growth and long term persistence of perceived inflation are played by information provided by mass media. In countries implementing euro in the past there was according the media monitoring significant increase of number of article covering the topic of inflation. As for media is due to the profit orientation more effective to choose „sensational“ information (in contrast with rational arguments) in context of euro changeover they preferred to alert mainly price increases. The media also increased the number of articles pounce the problem of official price statistics credibility (as perceived inflation are significantly deviated from HICP before and after euro introduction) and thus creating the opinion that official statistics (like HICP) are providing wrong information about price development for decisions of consumers.

Development of HICP and perceived inflation in euro area



Zdroj: Eurostat/DG ECFIN

Development of HICP and perceived inflation in individual member countries of eurozone (1999 – 2006)

Table HICP and inflation perceptions across euro area countries

	HICP inflation Average annual percentage changes			Perceptions of price changes over the last 12 months Percentage balances, seasonally adjusted		
	1999-2001	2002-2004	2005-2006	1999-2001	2002-2004	2005-2006
Belgium	2.1	1.6	2.4	29	44	53
Germany	1.3	1.4	1.9	23	48	27
Ireland	3.9	3.7	2.4	40	53	38
Greece	2.9	3.5	3.4	18	57	66
Spain	2.8	3.2	3.5	20	52	52
France	1.4	2.1	1.9	5	45	47
Italy	2.2	2.6	2.2	25	52	37
Luxembourg	2.4	2.6	3.4	-	38	41
Netherlands	3.2	2.5	1.6	28	61	25
Austria	1.6	1.6	1.9	-1	36	35
Portugal	3.1	3.1	2.6	29	46	42
Finland	2.3	1.2	1.0	-11	-5	-4

Sources: Eurostat and European Commission Consumer Survey.
Note: Data on inflation perceptions for Luxembourg are only available from January 2002 onwards.

Empirical evidence of perceived inflation impact on consumption

$$C_t = \beta_1 + \beta_2 C_{t-1} + \beta_3 Y_t + \beta_4 Y_{t-1} + \beta_5 S_t + \beta_6 S_{t-1} + \beta_7 P_t + \beta_8 P_{t-1} + \beta_9 P^*_t + \beta_{10} P^*_{t-1} + u_t$$

t=1,2,...,T, where variable P^*_t represents perceived inflation

Table 1 (next slide): Multiple regression analysis results (data for Czech Republic)
Source: own calculation

	Estimate	Standard Error	T Statistic	F-Ratio	P-Value	DW Statistic	T
Model4				74,530	0,000	2,086	41
Constant	0,672	0,793	0,848		0,403		
C_{t-1}	0,475	0,157	3,019		0,005		
Y_t	1,070	0,094	11,412		0,000		
Y_{t-1}	-0,369	0,208	-1,775		0,085		
S_t	-0,080	0,033	-2,445		0,020		
S_{t-1}	0,012	0,035	0,355		0,725		
P_t	-0,377	0,245	-1,543		0,133		
P_{t-1}	0,173	0,245	0,704		0,487		
P^*_t	-0,081	0,971	-0,083		0,934		
P^*_{t-1}	0,334	0,227	1,468		0,327		
Model5				120,420	0,000	1,968	43
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P_t	-0,098	0,054	-1,798		0,080		
P^*_t	0,599	0,239	2,505		0,017		
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S_t	-0,097	0,031	-3,127		0,003		
P^*_{t-1}	0,389	0,215	1,813		0,078		
Model8				137,010	0,000	1,959	43
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S_t	-0,094	0,031	-3,055		0,004		
P^*_{t-1}	0,453	0,218	2,082		0,044		

Empirical evidence of perceived inflation impact on consumption: model results interpretation

- Results of empirical analysis – multiple regression (Table 1) shows positive relationship between real consumption and indicator of perceived inflation both in time t and also in time t-1
- If the introduction of euro will lead to the situation that consumers feel that after changeover prices went up more rapidly than nominal wages (incomes) then we can expect that consumers resign not just to inflation illusion but also money illusion.
- It will result in situation when consumers change their perception about real money balances and

Recommendations for candidate countries for membership in eurozone

- The experience from eurozone countries tell us, that once the indicator of perceived inflation increased , it takes a long time to fall down to its former values (level);
- Long-term deviation of perceived inflation from HICP can change the consumption behavior of the consumers, can lead to an increase in expected inflation, …… and vicariously negatively effect economic growth;
- Recommendations for economic policy are therefore following: make any effort that perceived inflation indicator not significantly increased or only in limited extent.

Conclusions

- The increase of perceived inflation indicator after euro introduction can be limited only partially;
- The growth in perceived inflation can be one of the factor explaining the economic slowdown in eurozone countries after year 2002.

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