

# Computing real income at NUTS 3 regions<sup>1</sup>

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## Abstract:

General analyses of household income at expenditure side as well as comparison of wage differences and mean net equalized income are mostly based on nominal comparisons. Regional indexes at regional level are not available at most European countries, so there is problem to estimate real wages and real income. At this paper we will try to estimate price indexes at regional level (NUTS 3) in Slovakia. These indexes will be based on alternative source of information, household accounts - the only homogenous source of data so far and continuously characterize the housekeeping of given social groups published by Slovak Statistical Office and structure of basket of consumer goods. Estimated consumption baskets of Slovak regions serve as the basis for calculation of regional price indices. There will be compared several methods of estimating price indexes based on structure of expenditures and results will be compared and analyzed. According to nominal comparisons, there are huge regional income disparities at Slovak regions (more than 33 % at income side), but we expect significantly lower level of disparities in real terms caused by price differences on both sides.

## Introduction

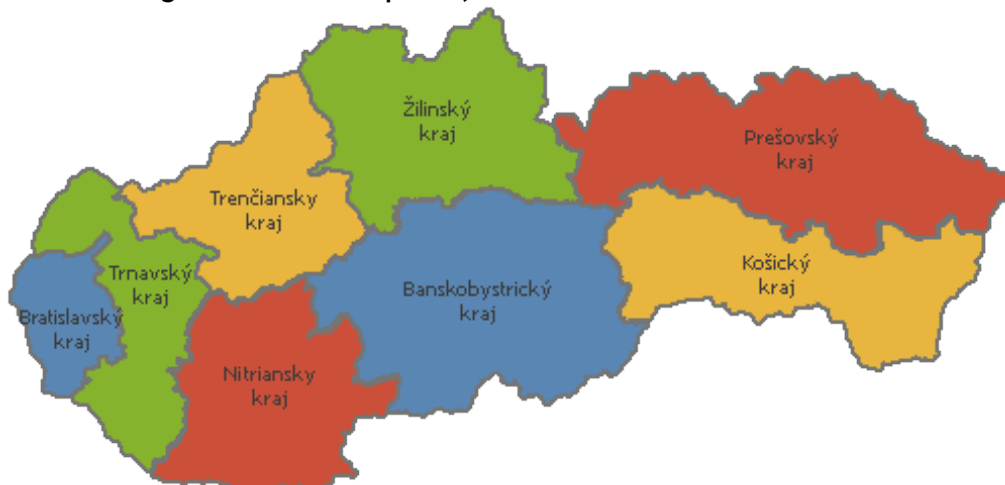
Almost all regional analysis (on NUTS 2 level and lower) across Europe are provided at nominal level. Basically it is a problem of availability of regional prices. We will try to estimate regional indexes at the example of Slovakia on NUTS 3 level. This analysis will be based on data from family accounts (family budget statistics), which are available for most of the European countries. There are 8 NUTS3 regions at Slovakia. Generally from more than 2 million households (5 mil. inhabitants) there are statistically selected 4703 households, 588 for each region (around 15 thousand heads). This statistics is also used to create national consumption basket to estimate national price index. Size of the sample is limited on regional level, by we will try to prove, that there is worth to estimating regional price index, which is necessary to better focus regional and cohesion policy across country and Europe. For better example, there is shown map of Slovak regions at Picture 1.

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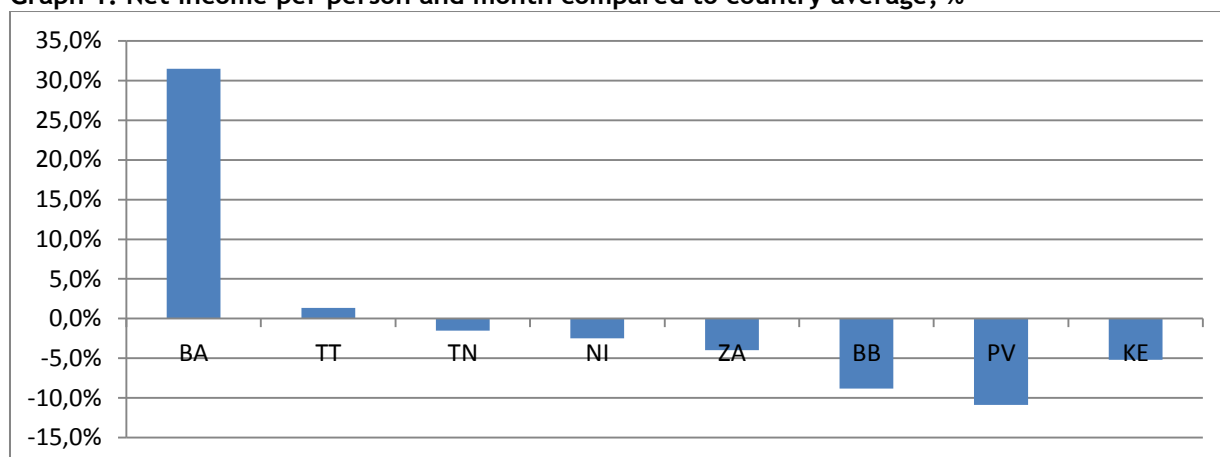
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Picture 1. NUTS 3 regions at Slovak Republic, source: www.slovakia.travel



According nominal comparisons of personal income, most wealthy is Bratislava region (BA) on the very west of the country, which is basically region of capital city. In generally there is decreasing income size from west to the east (border with Ukraine), via Trnava region (TT), Trenčín region (TN), Nitra region (NI), Žilina region (ZA) and most lagged regions Banská Bystrica (BB) and Prešov (PV). Košice region (KE) is very east, but it has second biggest city in Slovakia with income lower than average (Graph 1).

Graph 1. Net income per person and month compared to country average, %



Source: Calculations of authors based on Slovak Statistical Office data

Deeper characteristics of family accounts sample is shown at Table 1. There can be observed differences in net income, but also increasing size of household towards east, which makes differences of net income per head of households even bigger.

Table 1. Basic characteristic of household income at NUTS 3 level

|                                    | BA     | TT    | TN    | NI    | ZA     | BB    | PV    | KE    | SR    |
|------------------------------------|--------|-------|-------|-------|--------|-------|-------|-------|-------|
| Average net income                 | 1083,6 | 993,6 | 962,0 | 912,9 | 1007,4 | 835,6 | 977,8 | 937,4 | 963,8 |
| Median of avg. net income          | 915,7  | 926,0 | 880,9 | 783,6 | 958,8  | 756,2 | 920,4 | 843,9 | 873,3 |
| Average household size             | 2,35   | 2,80  | 2,79  | 2,67  | 3,00   | 2,62  | 3,13  | 2,82  | 2,77  |
| Avg. net income per head of h-hold | 460,4  | 354,9 | 344,9 | 341,5 | 336,2  | 319,3 | 312,1 | 332,1 | 350,2 |

Source: Calculations of authors based on Slovak Statistical Office data

Income inequalities could be shown by two simple indicators, inequalities within regions are shown by average / median ratio and ratio between upper and lower decil. Table 2 shows, that inequalities raising by increasing of average income and biggest are at Bratislava region. This could indicate, that in rich regions is substantial amount of inhabitants with generally lower life standard than in other regions (this issue is not a scope of this paper).

**Table 2. Income inequalities at household income at NUTS 3 level**

|   | BA    | TT    | TN    | NI    | ZA    | BB    | PV    | KE    | SR    |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| <b>average/median</b>                       | 1,183 | 1,073 | 1,092 | 1,165 | 1,051 | 1,105 | 1,011 | 1,111 | 1,104 |
| <b>percentile ratio up 90% vs. low 10 %</b> | 5,5   | 4,45  | 4,26  | 4,53  | 4,21  | 4,13  | 3,93  | 4,18  | 4,37  |

Source: Calculations of authors

Table 3 shows expenditures per person and month compared to country average. Expenditure side generally follows the income size. The differences between income and expenditures are observed for year 2009, if there is no other indication.

**Table 3. Expenditures per person and month compared to country average, %**

|                              | BA     | TT     | TN     | NI     | ZA     | BB     | PV     | KE     | SR     |
|------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| <b>Expenditures per head</b> | 399,21 | 299,05 | 306,69 | 304,81 | 305,33 | 282,25 | 269,31 | 309,56 | 308,02 |
| <b>% of avg</b>              | 29,61% | -2,91% | -0,43% | -1,04% | -0,88% | -8,37% | -12,6% | 0,50%  | 0,00%  |

Source: Calculations of authors

During transition period since 1990 there have been also significant changes on households' expenditure structure. Changes in consumption basket during period 1996 – 2009 by COICOP classification (Classification of Individual Consumption According to Purpose) are shown in Table 4. There have been observed several significant trends. First is continuously decreasing expenditure level on food, clothing. Little less significant is decreased level of expenditures on transportation and household equipment. On the other side, significantly increases expenditure on housing (also caused by regulated prices) and communications.

**Table 4: Change in consumption basket during 1996 -2009 (COICOP)**

| YEAR      | FOOD | ALCT | CLOTH | HOUS | FURN | HEAL | TRNS | COMM | RECR | EDUC | RSTH | MISC | REST |
|-----------|------|------|-------|------|------|------|------|------|------|------|------|------|------|
| <b>96</b> | 29,6 | 3,5  | 10,7  | 12,9 | 6,0  | 1,0  | 9,1  | 1,5  | 8,1  | 0,6  | 3,8  | 6,2  | 7,0  |
| <b>97</b> | 29,6 | 3,5  | 10,5  | 12,7 | 5,9  | 1,2  | 8,0  | 1,7  | 7,5  | 0,5  | 4,5  | 6,5  | 7,9  |
| <b>98</b> | 28,4 | 3,4  | 9,9   | 12,3 | 6,2  | 1,2  | 8,7  | 2,0  | 8,0  | 0,5  | 4,9  | 7,1  | 7,4  |
| <b>99</b> | 27,7 | 3,3  | 8,6   | 14,6 | 5,7  | 1,4  | 8,0  | 2,4  | 7,7  | 0,5  | 5,1  | 7,6  | 7,4  |
| <b>00</b> | 26,2 | 3,1  | 8,0   | 16,4 | 5,5  | 1,5  | 7,9  | 2,7  | 7,5  | 0,5  | 5,1  | 7,6  | 8,0  |
| <b>01</b> | 24,3 | 2,8  | 7,8   | 15,6 | 5,2  | 1,5  | 9,2  | 3,3  | 7,3  | 0,6  | 5,5  | 8,1  | 8,8  |
| <b>02</b> | 24,2 | 2,8  | 7,7   | 16,0 | 5,3  | 1,6  | 8,1  | 3,6  | 7,4  | 0,6  | 5,8  | 8,1  | 8,8  |
| <b>03</b> | 23,5 | 2,7  | 6,6   | 18,8 | 4,6  | 1,9  | 8,3  | 3,6  | 6,8  | 0,6  | 5,7  | 8,1  | 8,8  |
| <b>04</b> | 24,7 | 3,0  | 5,4   | 22,4 | 4,2  | 2,6  | 7,0  | 4,1  | 6,2  | 0,6  | 4,1  | 7,7  | 8,0  |
| <b>05</b> | 24,2 | 2,8  | 5,5   | 21,0 | 4,1  | 2,7  | 8,2  | 4,2  | 5,9  | 0,8  | 4,3  | 8,4  | 7,9  |
| <b>06</b> | 22,6 | 2,6  | 5,3   | 21,8 | 4,3  | 2,6  | 7,8  | 4,8  | 6,4  | 0,7  | 4,6  | 7,5  | 9,1  |
| <b>07</b> | 22,3 | 2,7  | 5,5   | 20,1 | 4,8  | 2,5  | 8,3  | 4,9  | 6,6  | 0,7  | 4,6  | 7,3  | 9,6  |
| <b>08</b> | 22,1 | 2,6  | 5,8   | 19,8 | 4,8  | 2,7  | 7,8  | 5,0  | 7,0  | 0,5  | 5,0  | 6,4  | 10,6 |
| <b>09</b> | 21,4 | 2,6  | 5,5   | 20,1 | 4,4  | 2,7  | 7,6  | 5,5  | 6,7  | 0,5  | 5,1  | 6,5  | 11,3 |

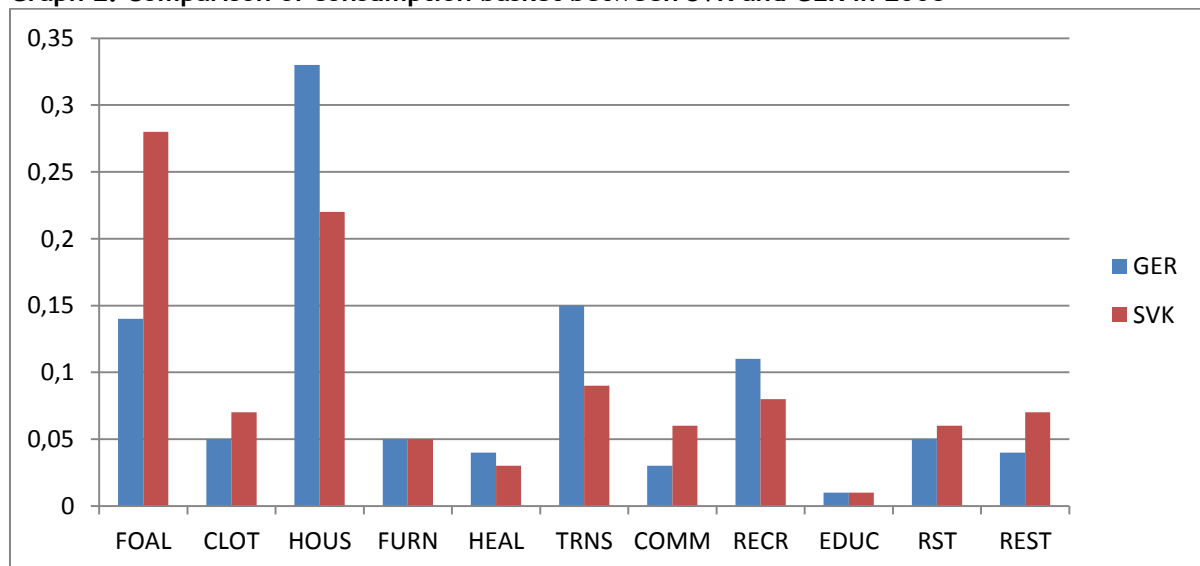
Source: Calculations of authors

Where consumption basket consist of:

|              |  |
|--------------|--|
| <b>FOOD</b>  | Foodstuffs and non-alcoholic beverages                             |
| <b>ALCT</b>  | Alcoholic beverages, tobacco                                       |
| <b>CLOTH</b> | Clothing and footwear  |
| <b>HOUS</b>  | Housing, water, electricity, gas, fuels                            |
| <b>FURN</b>  | Furnishing, household equipment, services for households maintains |
| <b>HEAL</b>  | Health   |
| <b>TRNS</b>  | Transport  |
| <b>COMM</b>  | Posts, Communications  |
| <b>RECR</b>  | Recreations and culture  |
| <b>EDUC</b>  | Education  |
| <b>RSTH</b>  | Hotels and restaurants   |
| <b>MISC</b>  | Miscellaneous goods & services                                     |
| <b>REST</b>  | Other gross expenditures   |

According to comparison with more developed Germany (Graph 2), there is still big gap between level of expenditures on food stuff, housing and transportation. This differences does not affect the estimation of regional index, but we need to think about this issues, where is assumed same level of expected consumption by family with same income level at different regions.

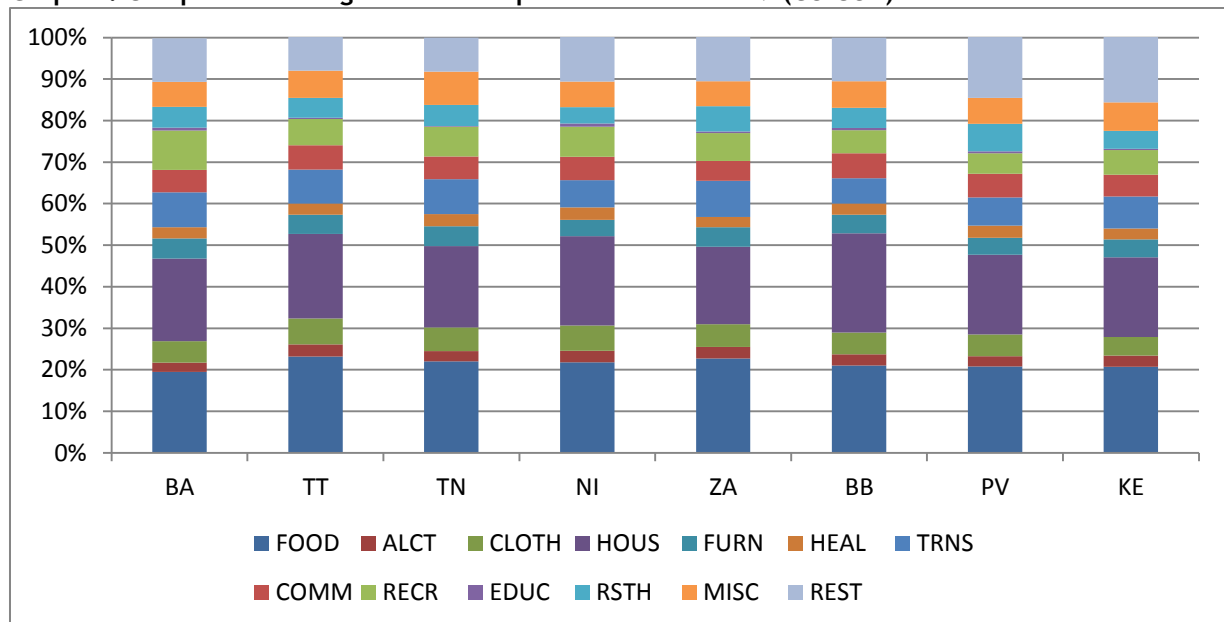
Graph 2. Comparison of consumption basket between SVK and GER in 2008



Source: Calculations of authors

Based on family budget data we have estimated structure of consumption basket (Graph 3). Biggest differences between regions except Other gross expenditures are at housing expenditures, recreation (poorer regions spend less) and food expenditures. In the second wave, there are differences at transportation and hotels and restaurants.

**Graph 3: Comparison of regional consumption basket in 2009 (COICOP)**



Source: Calculations of authors

## Modeling approach and Methodology

There have been selected 4 different approaches to estimate regional price index based on structure of families in the regions, income levels, net mean equalized income, and structure of expenditures. Estimations are counted at statistical software SAS. Structure of income and expenditures was best fitted by three parameter log-log regression based on maximum likelihood method. This approach has not been applied yet to the selected problem. Correspondence of selected statistics was confirmed by Kolmogorov-Smirnov and Chi2 test.

### Index 1

Basic regional index are used simple regional baskets and aggregate basket based on all available data. It is based on following equation and results can be observed at table 5.

$$I_{region} = \sum_{i=1}^n w_i I_i$$

Where  $i$  is indicator of expenditure group (based on observations of selected group, as income group or number of households with selected number of members, which represent all observations at index 1),

$w_i$  are weight for subindex and  $I_i$  is price subindex. Weights  $w_i$  will be computed as

$$w_i = \frac{\text{number of data for } i - \text{expenditure group for selected region}}{\text{total number of data for all expenditure groups for selected region}}$$

and value of subindexes (used to calculate following indexes) is enumerated as sum of specific prices of simple basket expenditure groups

$$I_i = \sum_{j=1}^{13} \overline{w}_{ij} x_{ij}$$

where  $j$  is an indicator of expenditure sector ( $j=1$  for food),  $x_{ij}$  denotes average expenditures of group  $i$  to sector  $j$  at selected region and  $\overline{w_{1j}}$  denotes ratio of weights of aggregate consumption basket to weight of the regional basket to expenditure group  $i$  and expenditure sector  $j$ .

By this construction of price index there is significant sense of weights  $\overline{w_{1j}}$ . Weights of consumption baskets differ for every region, despite that between several regions and sectors could be marginal. To be able of comparing consumption baskets, there is always taken into consideration national aggregate consumption basket. Weight  $\overline{w_{1j}}$ . Simply denotes, how much is the weight of household expenditures at region higher or lower (by sector or group) with comparison to aggregate country consumption basket.

**Table 5: Regional price indexes based on baseline methodology, 2009**

|      | SR   | BA   | TT   | TN   | NI   | ZA   | BB   | PV   | KE   |
|------|------|------|------|------|------|------|------|------|------|
| SR=1 | 1,00 | 1,30 | 0,97 | 1,00 | 0,99 | 0,99 | 0,92 | 0,87 | 1,01 |

Source: Calculations of authors

This index 1 in the way how it is constructed has number of disadvantages. Main disadvantage is that it absolutely do not take into consideration income differences, which affect mainly high price index for Bratislava region because price index is mainly affected by higher expenditure level than real price difference. Also positive sample correlation coefficients between net income and expenditure sectors confirms, that at the constructing of regional index is necessary divide households into more homogenous groups (by income or number of members). That should minimize bias caused by different behaviour of groups and income differences.

## Index 2

At enumerating index 2, there were divided households into income groups by average income per head of households. There was necessary choose groups with significant number of observations. Most usable was sample of income groups between 200 to 650 Euro per head with step of 50 Euro for  $n=9$  groups. According this selection, there have been used 92,88 % of available data (4369). All regions have used more than 90 % of available data except Bratislava (82,48) because of generally higher income. By this selection there have been estimated consumption baskets for all regions and all income groups. Partial price indices for income groups are presented in Table 6.

**Table 6: Regional subindexes divided by income per head, 2009**

| Income group | SR | BA   | TT   | TN   | NI   | ZA   | BB   | PV   | KE   |
|--------------|----|------|------|------|------|------|------|------|------|
| (100-200)    | 1  | 1,08 | 0,94 | 1,02 | 1,00 | 1,09 | 0,99 | 0,89 | 1,10 |
| (200-250)    | 1  | 1,10 | 0,95 | 1,00 | 1,10 | 1,04 | 1,03 | 0,94 | 1,03 |
| (250-300)    | 1  | 1,15 | 1,01 | 1,01 | 0,98 | 1,03 | 0,96 | 0,95 | 1,06 |
| (300-350)    | 1  | 0,98 | 0,99 | 1,03 | 1,02 | 1,01 | 0,99 | 1,01 | 1,04 |
| (350-400)    | 1  | 1,12 | 0,92 | 1,02 | 0,97 | 1,07 | 1,00 | 0,91 | 1,06 |
| (400-450)    | 1  | 1,09 | 0,96 | 1,00 | 1,05 | 0,96 | 0,99 | 0,96 | 1,05 |
| (450-500)    | 1  | 1,00 | 0,95 | 0,94 | 1,06 | 1,02 | 0,98 | 1,09 | 1,08 |
| (500-550)    | 1  | 1,03 | 1,06 | 0,98 | 1,02 | 0,96 | 1,04 | 0,92 | 1,08 |
| (550-650)    | 1  | 1,06 | 0,99 | 1,05 | 0,94 | 0,92 | 0,92 | 0,97 | 1,13 |

Source: Calculations of authors

Based on this selection, there have been enumerated two price indexes (2.1 and 2.2 presented in Table 7). They differ by weights selection. At index 2.1 there are allocated different weights  $\overline{w}_{ij}$  according to %age of data used for particular income group. It is obvious, that wealthiest regions will have higher weights for higher income groups, which significantly positive affect on estimated price index. Index 2.2 used same average weights for all regions according income groups. This estimation has opposite effects and calculated price differences are probably too low. Real price index will be with high probability somewhere between these indexes.

**Table 7: Regional indexes based on income groups, 2009**

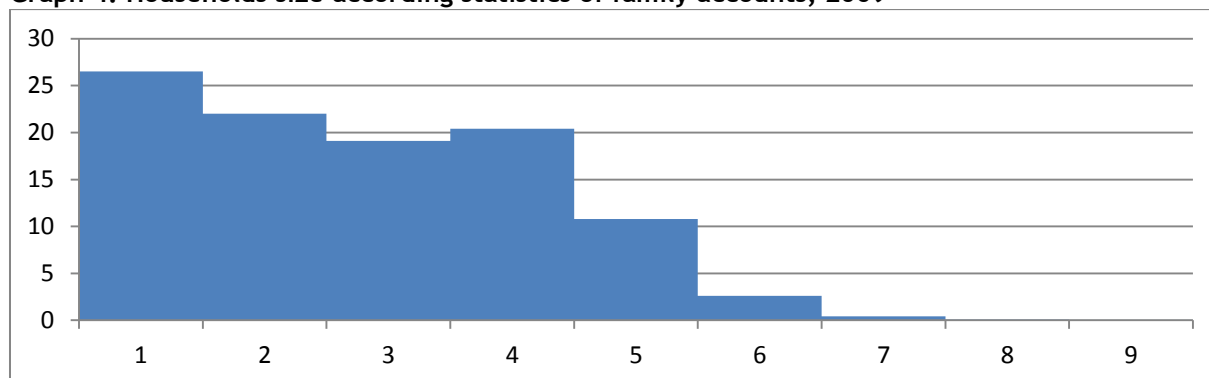
|                 | SR | BA   | TT   | TN   | NI   | ZA   | BB   | PV   | KE   |
|-----------------|----|------|------|------|------|------|------|------|------|
| <b>INDEX2.1</b> | 1  | 1,19 | 0,99 | 1,00 | 0,99 | 1,01 | 0,95 | 0,93 | 1,04 |
| <b>INDEX2.2</b> | 1  | 1,07 | 0,97 | 1,01 | 1,01 | 1,01 | 0,99 | 0,97 | 1,07 |

Source: Calculations of authors

### Index 3

Price index 3 is based on simple assumption, that households with same number of heads will have similar behavior, what is basically strong assumption. The distribution of households according heads at sample is pictured at graph 4.

**Graph 4: Households size according statistics of family accounts, 2009**



Source: Calculations of authors

There has been used similar estimation by groups as it was presented at index 3. It has been selected 5 groups (with relevance more than 10 % in sample). Overview of price index related to number of heads in household is shown at Table 8. According to higher average income at Bratislava region, there has been added limitation to income level per head below 700 Eur (used was more than 90 % of available data).

**Table 8: Regional price subindexes based on family size**

| 2009             | SR | BA   | TT   | TN   | NI   | ZA   | BB   | PV   | KE   |
|------------------|----|------|------|------|------|------|------|------|------|
| <b>1 member</b>  | 1  | 1,19 | 1,00 | 1,00 | 0,98 | 0,99 | 0,85 | 0,96 | 0,99 |
| <b>2 members</b> | 1  | 1,13 | 0,96 | 0,96 | 0,92 | 1,09 | 0,91 | 0,92 | 1,01 |
| <b>3 members</b> | 1  | 1,11 | 0,98 | 1,01 | 0,97 | 0,95 | 0,95 | 0,98 | 1,01 |
| <b>4 members</b> | 1  | 1,23 | 0,98 | 0,97 | 1,02 | 0,99 | 0,90 | 0,90 | 1,04 |
| <b>5 members</b> | 1  | 1,24 | 0,98 | 1,01 | 0,98 | 0,98 | 0,91 | 0,95 | 1,04 |

Source: Calculations of authors

At index 3.1 again used relative weights according to group size, index 3.2 used common average weights for each group, what increases the price index of Bratislava region. The results are shown at Table 9.

**Table 9: Regional price indexes based on family size**

|                 | SR | BA   | TT   | TN   | NI   | ZA   | BB   | PV   | KE   |
|-----------------|----|------|------|------|------|------|------|------|------|
| <b>INDEX3.1</b> | 1  | 1,09 | 0,98 | 1,01 | 0,96 | 1,03 | 0,88 | 1,00 | 1,03 |
| <b>INDEX3.2</b> | 1  | 1,18 | 0,98 | 0,99 | 0,98 | 1,00 | 0,91 | 0,94 | 1,02 |

Source: Calculations of authors

#### Index 4

In previous three indexes was used arithmetic average as the main indicator of expenditures of selected group  $w_{ij}$ . As it commonly observed at income comparisons, arithmetic average is usually biased and overestimate selected group. At index 4 was used similar methodology as at index 1, but instead average, there have been used median. Only households with income per head between 100 – 700ur was taken into consideration. It has been used more than 94 % of available data and results are shown at Table 10. Median slightly decrease the price index in richest region, what have been expected.

**Table 10: Composed regional price index, 2009**

|                | SR | BA   | TT   | TN   | NI   | ZA   | BB   | PV   | KE   |
|----------------|----|------|------|------|------|------|------|------|------|
| <b>INDEX 4</b> | 1  | 1,21 | 0,99 | 0,99 | 0,99 | 0,99 | 0,93 | 0,91 | 1,03 |

Source: Calculations of authors

#### Results:

Overview of all estimated regional price indexes are shown in Table 11. We have discussed advantages of all approaches. None of them is perfectly suitable for selected problem, as well as use of average or median of selected groups, but all approaches indicate the interval, from which we should expected real regional prices. We have also computed index based on average of indexes 2-4. It is presented at the table as comp 2-4.

**Table 11: Overview of estimated regional price indexes and computation of final index, 2009**

|           | Index 1 | Index 2.1 | Index 2.2 | Index 3.1 | Index 3.2 | Index 4 | Comp 2-4. |
|-----------|---------|-----------|-----------|-----------|-----------|---------|-----------|
| <b>SR</b> | 1       | 1         | 1         | 1         | 1         | 1       | 1         |
| <b>BA</b> | 1,3     | 1,19      | 1,07      | 1,09      | 1,18      | 1,21    | 1,17      |
| <b>TT</b> | 0,97    | 0,99      | 0,97      | 0,98      | 0,98      | 0,99    | 0,98      |
| <b>TN</b> | 1       | 1         | 1,01      | 1,01      | 0,99      | 0,99    | 1,00      |
| <b>NI</b> | 0,99    | 0,99      | 1,01      | 0,96      | 0,98      | 0,99    | 0,99      |
| <b>ZA</b> | 0,99    | 1,01      | 1,01      | 1,03      | 1         | 0,99    | 1,00      |
| <b>BB</b> | 0,92    | 0,95      | 0,99      | 0,88      | 0,91      | 0,93    | 0,93      |
| <b>PV</b> | 0,87    | 0,93      | 0,97      | 1         | 0,94      | 0,91    | 0,93      |
| <b>KE</b> | 1,01    | 1,04      | 1,07      | 1,03      | 1,02      | 1,03    | 1,03      |

Source: Calculations of authors



Finally, we have achieved the point, for which this price index was calculated. At Table 12 is presented calculation of real wage based on these indexes as well as standard deviation. In general, the real wage disparities between regions are significantly lower.

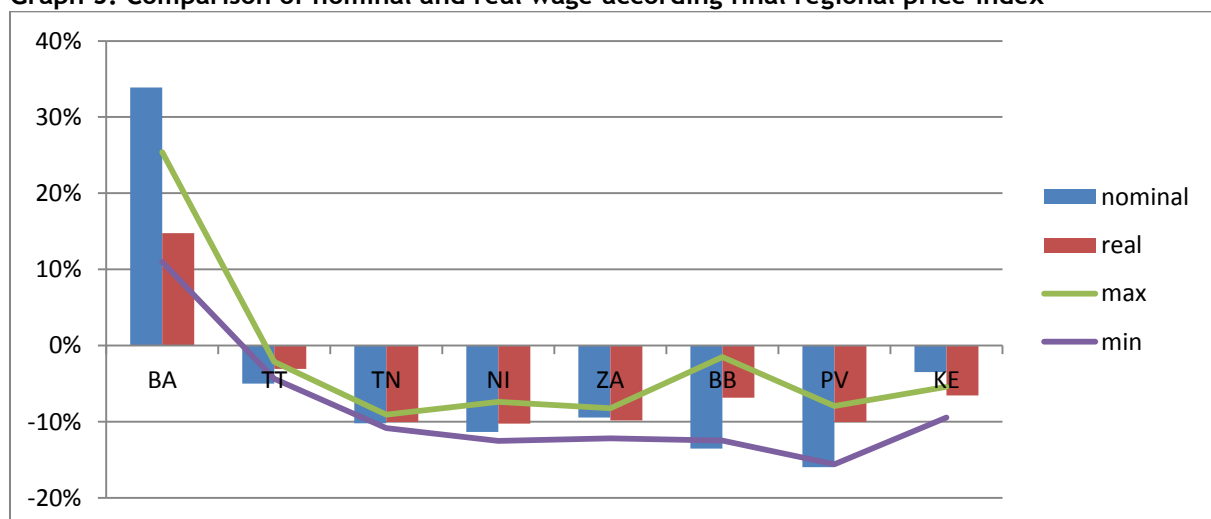
**Table 12: Comparison of nominal and real net wage according to estimated indexes, 2009, Eur**

|           | nominal wage | I.1   | I.2.1 | I.2.2 | I.3.1 | I.3.2 | I.4   | avg.  | Stdev |
|-----------|--------------|-------|-------|-------|-------|-------|-------|-------|-------|
| <b>SR</b> | 635,2        | 635,2 | 635,2 | 635,2 | 635,2 | 635,2 | 635,2 | 635,2 | 0,00  |
| <b>BA</b> | 850,5        | 656,2 | 715,5 | 796,6 | 780,4 | 719,6 | 704,8 | 728,8 | 51,70 |
| <b>TT</b> | 603,3        | 621,4 | 607,5 | 621,6 | 615,9 | 616,7 | 610,8 | 615,6 | 5,66  |
| <b>TN</b> | 570,5        | 573,0 | 568,0 | 566,3 | 567,0 | 577,5 | 576,8 | 571,4 | 5,01  |
| <b>NI</b> | 563,2        | 569,1 | 566,4 | 555,8 | 588,3 | 575,1 | 566,6 | 570,2 | 10,86 |
| <b>ZA</b> | 575,2        | 580,3 | 571,0 | 569,0 | 557,9 | 575,4 | 582,8 | 572,7 | 8,99  |
| <b>BB</b> | 549,3        | 599,5 | 576,4 | 555,8 | 625,7 | 603,1 | 589,1 | 591,6 | 23,98 |
| <b>PV</b> | 533,7        | 610,4 | 574,9 | 552,9 | 536,0 | 569,3 | 584,8 | 571,4 | 25,74 |
| <b>KE</b> | 613,1        | 610,0 | 589,1 | 575,0 | 593,0 | 600,7 | 593,1 | 593,5 | 11,70 |

Source: Calculations of authors

Better illustration of difference between nominal and real wage at NUTS 3 regions is provided by Graph 5. There is used average, minimal and maximal range of estimated price index. In real terms we can observe leveling of wage and originally poorest region is at the same level as 3 others regions. Generally, based on statistical significance we couldn't tell, which of 7 regions except capital has highest real wage and basically there are indicate three weakest regions, surprisingly on at western part of the country.

**Graph 5: Comparison of nominal and real wage according final regional price index**



Source: Calculations of authors

Similarly we can illustrate real regional income per head. Nominal disparity between best and worst region was 59,3 %. Using estimated price index this disparity significantly drops by more than 50 % to 27,8 %.

**Table 13: Comparison of nominal and real income per head according to estimated indexes, 2009, Eur**

|           | net_inc/head | p.1   | p.2.1 | p.2.2 | p.3.1 | p.3.2 | p.4   | priemer | stdev |
|-----------|--------------|-------|-------|-------|-------|-------|-------|---------|-------|
| <b>SR</b> | 350,2        | 350,2 | 350,2 | 350,2 | 350,2 | 350,2 | 350,2 | 350,2   | 0,00  |
| <b>BA</b> | 460,4        | 355,2 | 387,3 | 431,2 | 422,4 | 389,5 | 381,5 | 394,5   | 27,98 |
| <b>TT</b> | 354,9        | 365,6 | 357,4 | 365,7 | 362,3 | 362,8 | 359,3 | 362,2   | 3,33  |
| <b>TN</b> | 344,9        | 346,4 | 343,4 | 342,4 | 342,8 | 349,2 | 348,8 | 345,5   | 3,03  |
| <b>NI</b> | 341,5        | 345,1 | 343,4 | 337,0 | 356,7 | 348,7 | 343,5 | 345,7   | 6,58  |
| <b>ZA</b> | 336,2        | 339,2 | 333,7 | 332,5 | 326,1 | 336,3 | 340,6 | 334,7   | 5,26  |
| <b>BB</b> | 319,3        | 348,4 | 335,0 | 323,0 | 363,6 | 350,5 | 342,4 | 343,8   | 13,94 |
| <b>PV</b> | 312,1        | 357,0 | 336,2 | 323,3 | 313,5 | 332,9 | 342,0 | 334,1   | 15,05 |
| <b>KE</b> | 332,1        | 330,4 | 319,1 | 311,5 | 321,2 | 325,3 | 321,3 | 321,5   | 6,34  |

Source: Calculations of authors

Very interesting side result from estimating index 3 is at Table 14 illustrates average differences at consumption basket according to income per head. These results generally confirmed theoretical economic assumptions. Share of expenditures on housing and food significantly decreasing by income, on the other way, there is growth in the expenditures for recreation and clothing.

**Table 14: Differences at consumption basket according to income per head, 2009**

|                  | FOOD | ALCT | CLOTH | HOUS | FURN | HEAL | TRNS | COMM | RECR | EDUC | RSTH | MISC | REST |
|------------------|------|------|-------|------|------|------|------|------|------|------|------|------|------|
| <b>(100-200)</b> | 28%  | 3%   | 5%    | 23%  | 3%   | 2%   | 6%   | 6%   | 5%   | 1%   | 5%   | 7%   | 8%   |
| <b>(200-250)</b> | 27%  | 3%   | 5%    | 21%  | 4%   | 3%   | 6%   | 6%   | 5%   | 1%   | 5%   | 6%   | 9%   |
| <b>(250-300)</b> | 25%  | 3%   | 5%    | 21%  | 5%   | 3%   | 6%   | 5%   | 5%   | 0%   | 5%   | 6%   | 10%  |
| <b>(300-350)</b> | 25%  | 3%   | 6%    | 22%  | 5%   | 3%   | 6%   | 5%   | 6%   | 1%   | 5%   | 6%   | 10%  |
| <b>(350-400)</b> | 23%  | 3%   | 6%    | 22%  | 4%   | 3%   | 6%   | 5%   | 7%   | 0%   | 5%   | 6%   | 10%  |
| <b>(400-450)</b> | 21%  | 3%   | 6%    | 20%  | 5%   | 3%   | 7%   | 5%   | 6%   | 1%   | 5%   | 7%   | 10%  |
| <b>(450-500)</b> | 21%  | 3%   | 7%    | 19%  | 4%   | 3%   | 8%   | 5%   | 7%   | 0%   | 6%   | 7%   | 11%  |
| <b>(500-550)</b> | 19%  | 2%   | 7%    | 18%  | 7%   | 2%   | 7%   | 5%   | 10%  | 0%   | 6%   | 8%   | 10%  |
| <b>(550-650)</b> | 18%  | 3%   | 7%    | 17%  | 6%   | 3%   | 9%   | 5%   | 9%   | 0%   | 6%   | 7%   | 11%  |

Source: Calculations of authors

## Discussion and conclusions

These exercise shown that differences in regional prices shouldn't be underestimated at analysing regional disparities. After applying regional price index onto nominal data, the regional income disparities in estimated real prices halved from almost 60 % to less than 30 %. Main city region is generally not so attractive. Also regional GDP level is biased (in Bratislava region is more than 160 % of EU27 average) by way of calculating by main residence of enterprise, also at the companies which are operating national wide.

Again, there is needed to stress out, that presented values has significant limitations. There is not enough data and limited to use deeper multi-dimensional or cross-section analysis. Pictured analysis can be also more complex by more detail selection, for example considering gender, age etc... On the

other way, this simple estimation can be easily replicate for every European country according to available data from national comparable statistics of households expenditures (COICOP).

Regional disparity thus, especially at wage and mean equalized income are significantly lower in real terms. All 4 approaches to estimate regional prices show similar results. This topic should be also more analysed in the future.

Based on the results, we are convinced, that selected approach could be taken as a proxy for real regional price indices. This should be therefore taken into account by selecting adjusted regional policy. This paper supports effort to persuade statistical offices to start analysing regional price indexes.

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