Demand for the Food Diversity in Central and Eastern European Countries: an Evidence from Slovakia

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Outline

- Introduction
- Food security and food diversity
- Food diversity estimation
- Results
- Conclusions

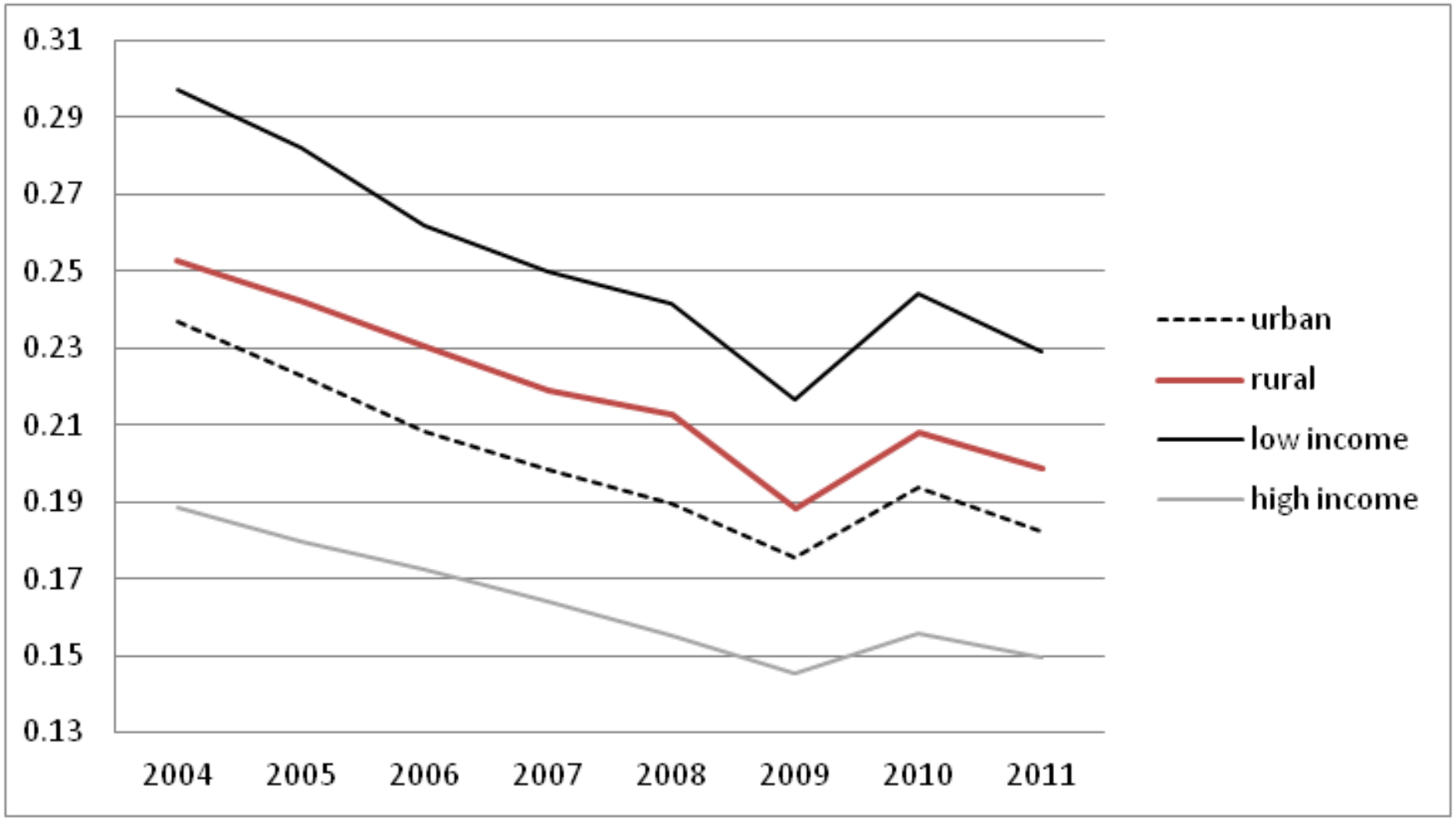
Introduction

- Renewed interest in food security following food price spikes and economic slowdown
- Also in developed countries where low income and marginalized groups especially affected
- Many of vulnurable households from developed countries reside in CEE
- Not much research done on food security in CEE

CEECs

- Transition process caused decline of GDP and redistribution of income in early stages.
- Reforms and EU accession led to recovery and growth
- The share of household expenditures on food has been steadily declining over the years until 2009
- The food price index in the EU rose by almost 20% between 2005 and 2012 (Eurostat, 2012)
- Recently food security situation affected by stagnating economies and higher food prices

Slovakia: Food expenditure to income ratio (2004-2011)



Food Security

"… when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life."

Food security and food diversity demand

How to measure household food security?

- Individual food intake
- Household caloric acquisition
- Dietary diversity (food diversity)

- Dietary diversity is a good measure of a household food security (Hatloy et. al, 2000)

Food diversity measures

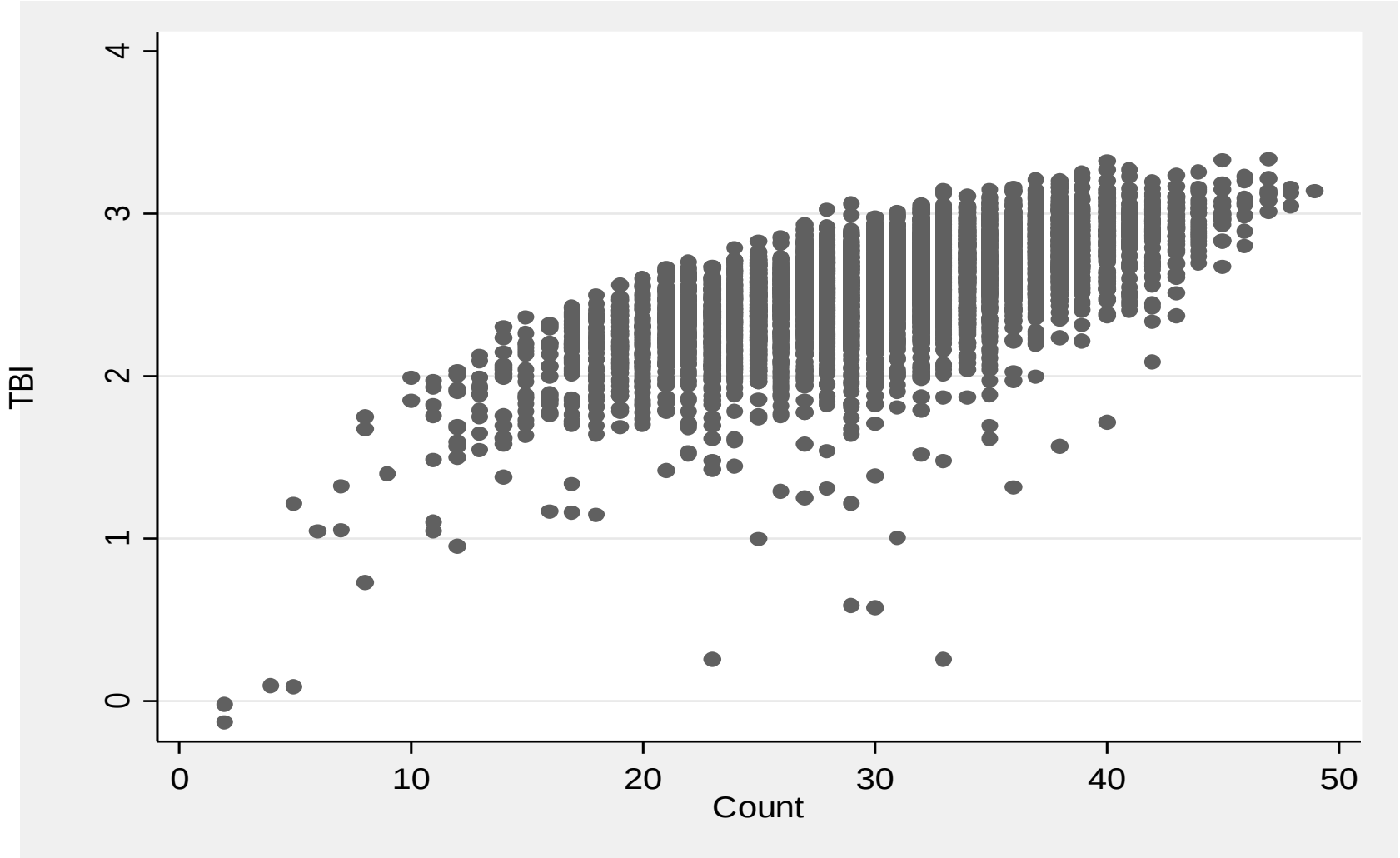
There have been proposed several indexes to measure food diversity at household/ individual level:

- Count measure of the food diversity (Jackson, 1984)
- Berry-index (Berry, 1971)
- Healthy food diversity index (Drescher et al., 2007)

Theoretical framework

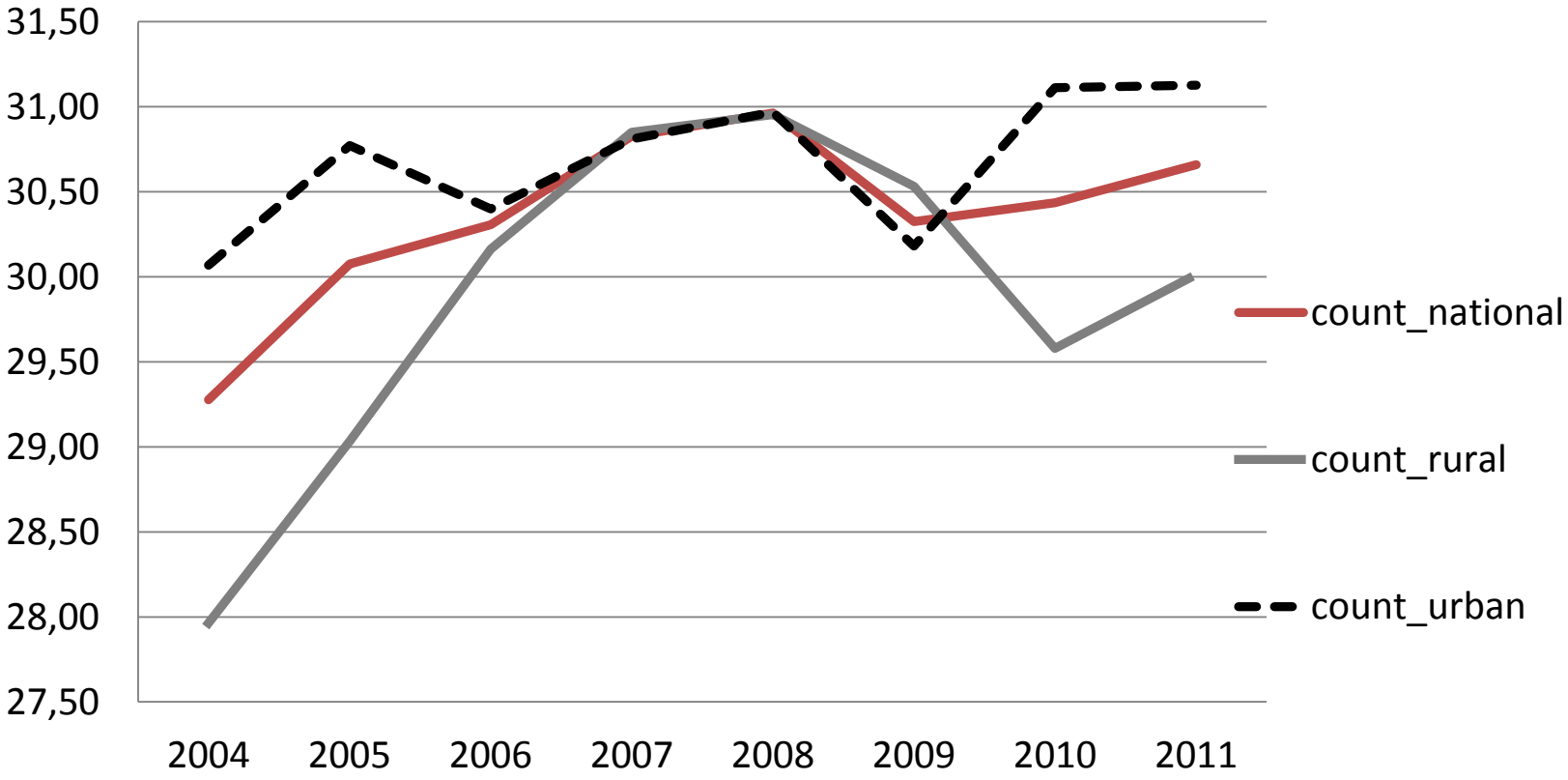
- Count measure: number of food items actually consumed within a time period q_j; $j = 1,2,\ldots,n$
- Berry-index: $BI = 1 - \sum_{i=1}^{n} s_i^2$
- Transformed Berry-index: $TBI = \ln\left[\frac{BI}{(1-BI)}\right]$
  - Both indices are closely correlated though

Correlation between Transformed Berry-Index and Count Measure



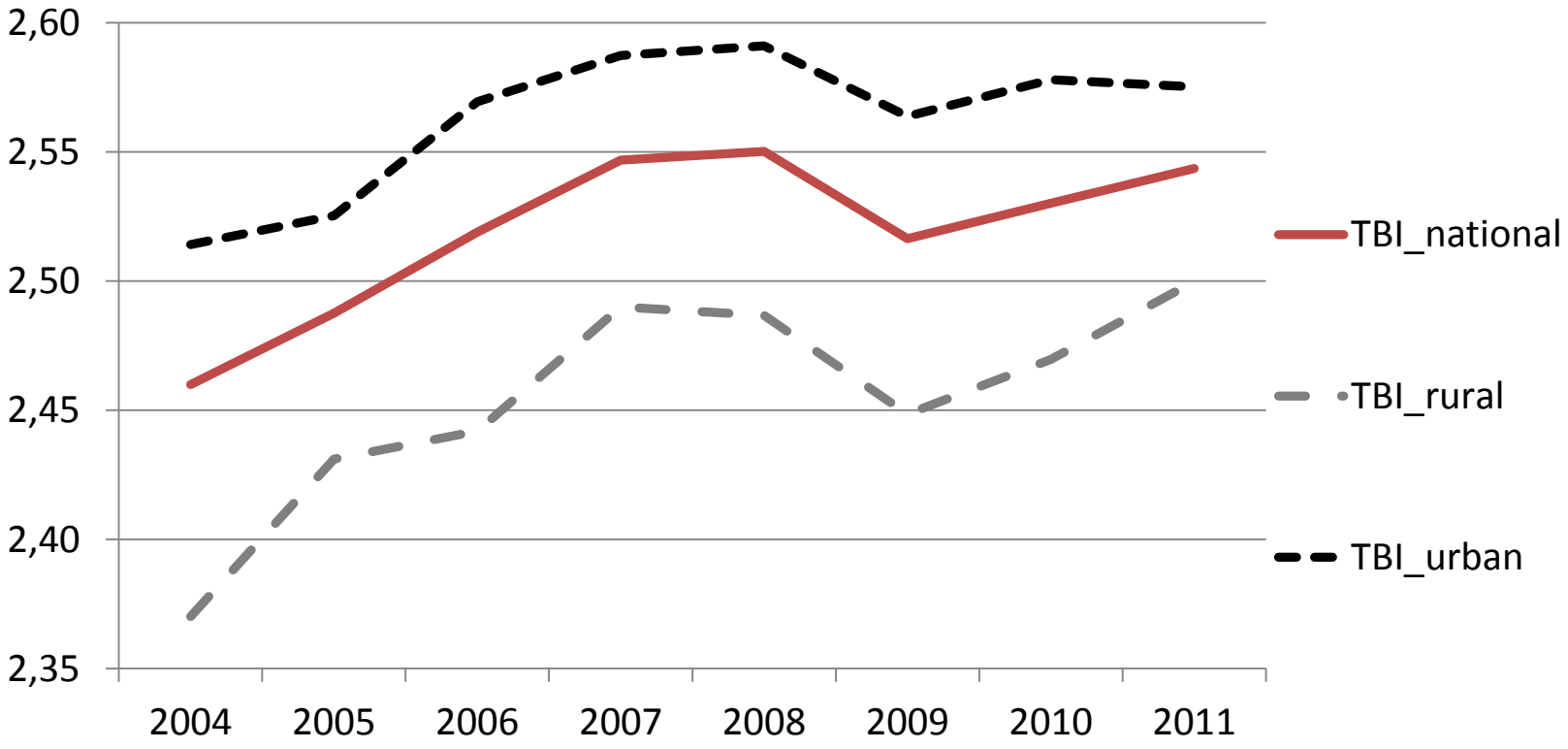
Evolution of the food diversity indexes in Slovakia (2004-2011)

Count measure of food diversity (CM)



Evolution of the food diversity indexes in Slovakia (2004-2011)

Transformed Berry-index (TBI)



Data

- Cross sectional data; two rounds (2004 and 2011) retrieved from the Household Budget Survey of Slovakia
- Detailed data on expenditures, income, and household & individual characteristics
- We focus mainly on the food basket
- Each year approximatelly 4700 households surveyed
- Disadvantage: not a genuine panel data

Table 1. Definition of the main variables and summary statistics.

Variables	Definition	2004		2011	
		Mean	SD	mean	SD
Count	Number of food items consumed	29.28	6.50	30.66	6.28
TBI	Transformed Berry-Index	2.46	0.36	2.54	0.32
Income	Net household's monthly income (€)	565.16	394.47	1053.95	603.00
Kids	Number of household members below age 16	0.53	0.86	0.46	0.81
Adults	Number of household members above age 18	2.22	0.97	2.11	0.92
Single	1 if single member household; 0 otherwise	0.17	0.37	0.22	0.41
Urban	1 if household residing in urban area; 0 otherwise	0.62	0.49	0.58	0.49
Age	Age of the head of a household	51.03	14.79	52.26	14.57
Gender	1 if male; 0 otherwise	0.68	0.47	0.64	0.48
Elementary	1 if grammar school; 0 otherwise	0.14	0.35	0.09	0.28
High school	1 if high school; 0 otherwise	0.73	0.44	0.76	0.43
University	1 if university; 0 otherwise	0.13	0.34	0.15	0.36
Instruments					
housing	monetary expenses on housing (€)	21.166	72.576	34.474	109.795
travelling	monetary expenses on travelling (€)	35.270	114.862	68.134	199.932

Summary statistics

- Rise in demand for food diversity between 2004 and 2011.
- Significant increase in the average household's income.
- Slight decrease in household size, number of children.
- More households residing in urban areas (62% in 2004)
- Average age of HH head 51.03 in 2004 and 52.26 in 2011.
- HH head was a male more frequently than a female (68.2% in 2004 and 64.4% in 2011).
- In 73% (2004) and 76% (2011) of all households, the highest educational level of the household's head was high school.
- Overall, around 60% of all the households' heads were employed in 2004 and 2011, respectively.

Econometric estimation: OLS

We first estimate the following regression:

$$FD_i = \beta_0 + \beta_1 Y_i + \beta_2 H_i' + \beta_3 HH_i' + \beta_4 REG' + \varepsilon_i$$

where:

- FD_i are food diversity indexes
- Y_i is log of household income
- H_i' is vector of household characteristics
- HH_i' is vector of individual characteristics of household head
- REG_i' are covariates capturing regional differences
- ε_i is an error term

Endogeneity and econometric estimation: 2SLS

- Endogeneity of income- **biased** estimates in OLS!!
  - Reverse causality (food diversity $\rightleftarrows$ income)
  - Ommited variables (food preferences, health status, etc.)
  - Measurement error
- We have to find valid instruments for income that are not correlated with food diversity but correlated with income
  - Expenditure on household assets
  - Expenditure on transportation vehicles

Endogeneity and econometric estimation: 2SLS

We estimate the 1st stage as:

$$Y_i = \pi_0 + \pi_1 IV_{1i} + \pi_2 IV_{2i} + \pi_3 H_i' + \pi_4 HH_i' + \pi_5 REG_i' + \varepsilon_i$$

where: IV_{1i}, IV_{2i} are instruments

and 2nd stage as follows:

$$FD_i = \beta_0 + \beta_1 \hat{Y}_i + \beta_2 H_i' + \beta_3 HH_i' + \beta_4 REG' + \nu_i$$

where: $\hat{Y}_i$ is the estimated income from the 1st stage ; H_i', HH_i', REG_i' are same covariates as in OLS and ν_i is an error term

Results: testing endogeneity and validity of instruments

		2004		2011	
		TBI	CM	TBI	CM
1st stage regression	R-squared	0.562	0.562	0.582	0.582
	Robust F	13.507	13.507	10.005	10.005
	P-value	0.000	0.000	0.000	0.000
Test of endogeneity	Wu-Hausman test	4.981	3.246	0.000	0.750
$H_{0:}$ Variables are exogenous	P-value	0.026	0.072	0.991	0.387
Test of overidentifying	Sargan test	1.472	2.244	0.451	1.749
Restrictions (weak instruments)	P-value	0.225	0.134	0.502	0.186

Results: testing endogeneity and validity of instruments

- Income is assumed to be endogenous in our model- biased results
- Income is highly correlated with intruments in the first stage regression with R-squared values about 0.5
- We test endogeneity of income by the Hausman test; in most cases we do not reject the null- income is exogenous in a presence of the chosen instruments
- We either do not reject the null that isntruments are weak/not valid by the Sargan test

Results: OLS and 2SLS regressions

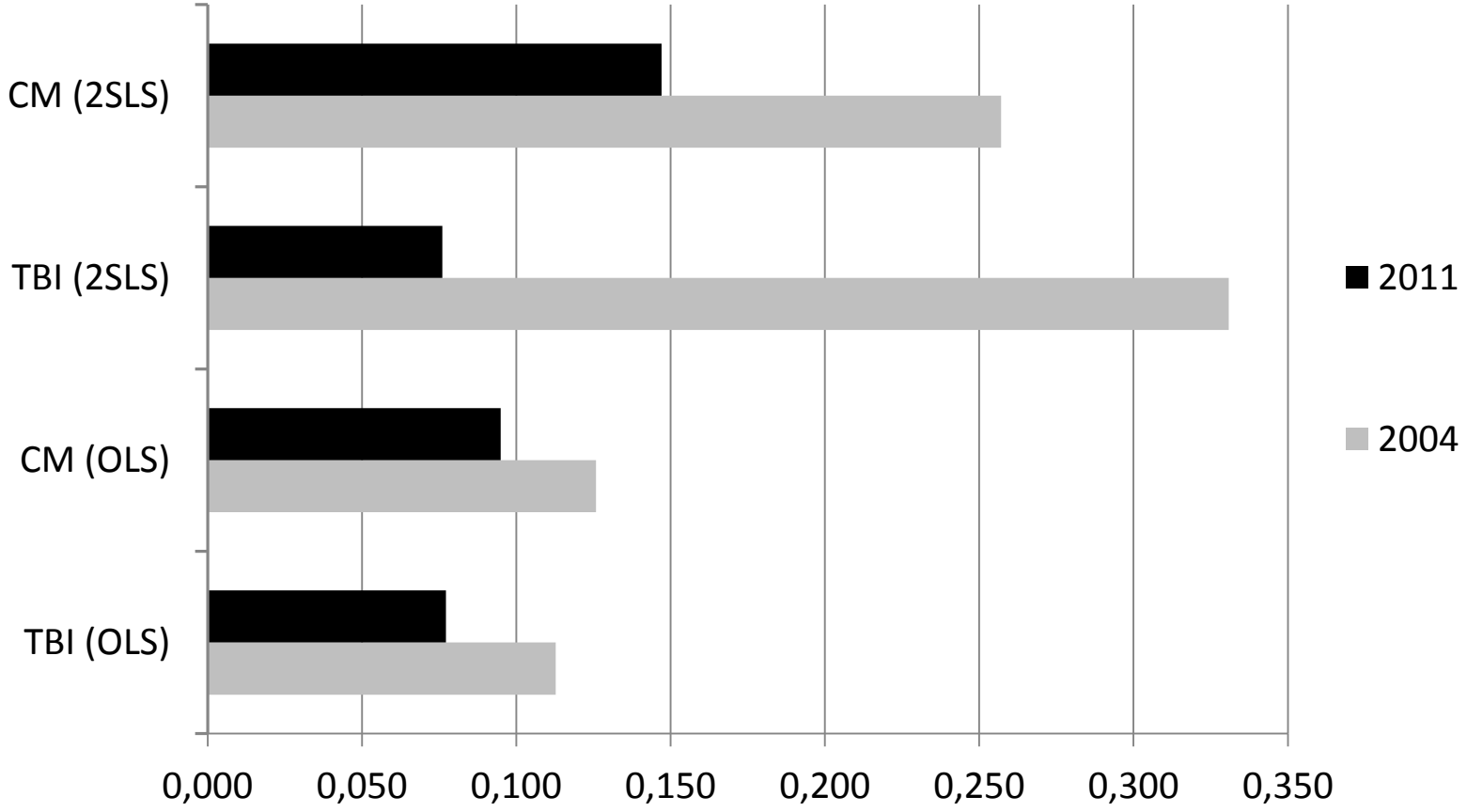
	OLS		2SLS (second stage)	
Variable	TBI	CM	TBI	CM
Constant	1.058***	1.813***	-1.168	0.474
Income	**0.113*** **	**0.126*** **	**0.331*** **	**0.257*** **
Kids	0.001	0.021***	-0.004	0.017***
Adults	-0.020***	0.014***	-0.069***	-0.016
Single	-0.079***	-0.135***	0.004	-0.085***
Urban	0.139***	0.091***	0.135***	0.088***
Age	0.003***	0.002***	0.005***	0.003***
Primary	-0.056**	-0.012	0.032	0.040
High school	0.001	0.023**	0.047**	0.051***
Gender	0.074***	0.041***	0.093***	0.053***
Prob> F	0.000	0.000	0.000	0.000
R-squared	0.078	0.203	0.027	0.167

Note: some variables had to be ommited because of the colinearity problem

Results: summary

- Positive impact of income on demand for food diversity.
- Adding quadratic term did not contribute to the explanatory power of the models.
- Income elasticities of food diversity are higher in 2SLS; OLS understates the role of income.
- Food variety is significantly higher for urban households.
- Number of adults and kids impact demand for food variety. Single-member households have lower demand for food diversity in comparison to other household types.
- Demand for diverse food is also significantly influenced by individual characteristics of the household's head such as education level, gender, and age.

Results: income elasticities of food diversity (2004, 2011)



Conclusions & Policy implications

- In terms of food security a noteworthy nationwide trend is the continuous reduction in the food expenditure/income ratio. By 2011 the food expenditure ratio has dropped to about 15% for high-income households – a level comparable with demand patterns in the richer EU-15
- The ratio is still quite high though, at about 23%, for the low-income, rural households

Conclusions & Policy implications

- Clear trend of food diversity increase between 2004 and 2011 (convergence to Western EU levels)
- Economic slowdown had a negative impact on consumption of healthy food
- OLS income effects are understated in comparison to 2SLS
- We still need to deal with unobserved heterogeneity of food preferences; panel data would be ideal

Conclusions & recommendations

- Consumptions of diverse food $\longrightarrow$ better nutrition
  $\longrightarrow$ better health status
- Income aid for low income and marginalized groups (safety nets)
- Because average expenditure elasticities for all food groups surpass in magnitude the own-price elasticities, policy tools for enhancing income generating activities might be more effective compared to policies that are targeted at price reductions – estimated by QAIDS – not presented here
- Educational enlightment on the nutritional value of food items (e.g., in schools)

Thanks for your attention

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