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## A time series analysis of macroeconomic determinants of household spending in the era of cross-cultural dynamics: Czech Republic as a case study

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### Abstract

The paper investigates selected macroeconomic variables where are seemingly influencing household spending in the Czech Republic in the present era of evolving cross-cultural interactions from 1993–2012. Based on the estimated regression model, it is plausible to state that net disposable income, cross-cultural dynamics, inflation rate, and saving rate as a proportion of disposable household income impact significantly on household spending. Moreover, the Granger causality analysis provides evidence of a feedback relationship between household spending and social globalization index. The results equally indicate bidirectional causality between saving rate and household spending as well as between the inflation rate and household spending.

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*Keywords:* Household spending; income; globalization; Czech Republic; Granger causality

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### 1. Introduction

Globally, household income, consumption and wealth are regarded among the key determinants of well-being of the citizens (Slesnick, 2000; Stiglitz, Sen, & Fitoussi, 2009; Gerstberger & Yaneva, 2013), and the level of households economic behaviour plays a vital role in national macroeconomic determinants. The major economic function of the households in a given country is that of consumption. Moreover, in the process of their income generation and expenditure, households also indirectly play the role of income redistribution through payments of income taxes and social contributions to governments (Hronova & Hindls, 2013), and donations to non-profit organizations.

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In the today's era of globalization, factors that determine the household final consumption expenditure do not lie only in local markets but also internationally. For instance, the development of the flows of cultural goods like the media and films, notably Hollywood across countries on a daily basis has been changing the patterns of consumer spending, arguably at the cost of traditional or local cultures (Bourdieu, 1998). Information dissemination and ideas from the mass media do not only reflect in today's social world, but it is also contributing to the shape, and is central to the changes in the global lifestyle and consumer patterns (Giddens, 1991). This change in consumption patterns is partly because individuals vary in their taste for cultural goods, hence more likely to consume other cultural goods leading to cultural diversity (Janeba, 2004).

The discussion of globalization before 1960 was mainly economic and later political and technological forces. However, since 1960 due to worldwide socio-cultural changes, social indicator has been discussed and considered as among the driving forces of globalization (Dreher, 2006; Dreher, Gaston & Martens 2008).

Some researchers have empirically investigated and identified some connections between household spending and social-cultural trade, income, price and other variables to countries in recent time. For instance, Rauch, & Trindade (2009) examined the relationship between trade and cultural diversity. Their results showed that increase in the share of consumption network externalities across nations might possibly affect domestic market, so increased travel between countries will increase the cultural market share and household spending. Fuchs & Lorek (2000) examined the effects of globalization on sustainability of household consumption in advanced economies. They found out that globalization influences household consumption expenditures in products like foods, technology, energy use, mobility and other domestic household consumptions in countries.

Hollis (2009) examined the importance of culture in competition between global and local brands of various products. Investigating the opinions of consumers from eight different countries; he concluded that global product brands were more successful in most of the surveyed attributes. His results also showed that product brands that have more attributes of local culture are more likely to be sold than brands that are purely foreign. He argued that firms like Cocoa-Cola and MacDonald have a huge global market share because they have built and maintained long term relationships with local consumers across the globe, and they have integrated their products into the local culture.

Konya & Ohashi (2007) examined the relationship between globalization and aggregate consumption patterns in OECD countries. They found out that increased in trade and foreign direct investment (FDI) have contributed to the convergence of consumption patterns within OECD countries. Prices and income play major roles in explaining the consumption patterns in countries. The integration of local markets into the global market and the progress in ICT has over the years been reshaping consumption patterns in the developed countries. In the same direction, Domazet, Sendić & Alić (2012) examined the existence of household expenditure convergence in the EU-27 countries, using the absolute  $\beta$ -convergence method. They found evidence that EU member countries had attained a high level of consumer expenditure convergence within the study period.

Mohammad (2010) tried to explore both long run and short run determinants of trade deficit and household spending with reference to Pakistan, using Johansen Co integration and ECM approaches. His findings suggested that domestic household spending is negatively correlated and significantly affect the trade deficit in the country. Arguably, an increase in the household spending might cause an increase in the trade balance in Pakistan. Gozgor (2013) investigated stochastic properties of the consumption-income ratios in eleven central and eastern European countries (CEE), Czech Republic included. He found that external shocks had effects on the consumption-income ratios in Croatia and Slovenia, and the main hypothesis was proved only for these countries. He found that there was a mean reversion in the other nine out of eleven CEE economies. His results provide statistically significant support for the existing hypothesis that the consumption-income ratio is a mean-reversion in the Czech Republic, Bulgaria, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, and Slovakia.

Mallik & Pradhan (2012) have attempted to determine if there is a causal relationship between per capita consumption expenditure and personal income in India using the Granger Causality method. They found a unidirectional causality running from per capita consumption expenditure to personal disposal income in the country. Dvořáková & Seidler (2012) examined how the change of wealth, of households which was proxied for housing prices and stock market prices influences households' consumption in the Czech Republic using VAR and VEC approaches. They found a positive effect of both housing and stock market wealth on household spending. Arguably, the household would spend more when the return on their investment (income) increases and vice versa.

In this paper, consumption expenditure is used interchangeably with household spending, just as cross-cultural dynamics and social globalization. Given that the purpose of this research is in two fold – one to investigate the impact of the selected variables on household spending, and two, to explore the interactions of selected variables with domestic household spending. Hence, we have employed the Granger causality test based on a Vector Autoregressive (VAR) model for the empirical analysis. The motive behind this study is not only to investigate the nexus between household spending and macroeconomic variables but also to determine the connections between the KOF social globalization index and household consumption expenditure in the Czech Republic, which to the best of our knowledge there is no such study in the Czech Republic, hence, the relevance of this paper.

This paper is organized as follows: Section 1 presents an introduction and some empirical evidence related to household spending in various countries, Czech Republic included. The literature review with descriptive analysis of Czech household income, savings and expenditures is presented in section 2 while section 3 covers both research methodology as well as the empirical results and interpretations. Finally, section 4 concludes the study.

## 2. Literature Review

### 2.1. Cross Cultural Dynamics

There is ongoing debate on consumer cultural needs, and consumer behaviour or spending in the global market. Global cultural preferences have taken over from local tastes and the way of spending leading to a cross cultural homogenization (Levitt, 1983). Reducing cultural diversity will entail an inter-temporal welfare tradeoff if the ideas of cross cultures are imperfect substitutes in production of the quality of future cultural goods (Rauch & Trindade, 2009).

The study of cross cultural dynamics can be traced to the work of Charles Darwin's biological evolution, who argued that, human societies struggle with another for survival just like a biological organism. He maintained that conflicts between societies lead to social change as powerful groups defeat inferior ones. Other notable scientist argued that, social change is not only as a result of human struggle for survival, but also as a result of physical environment, political organization, and cultural factors (Giddens, 1991).

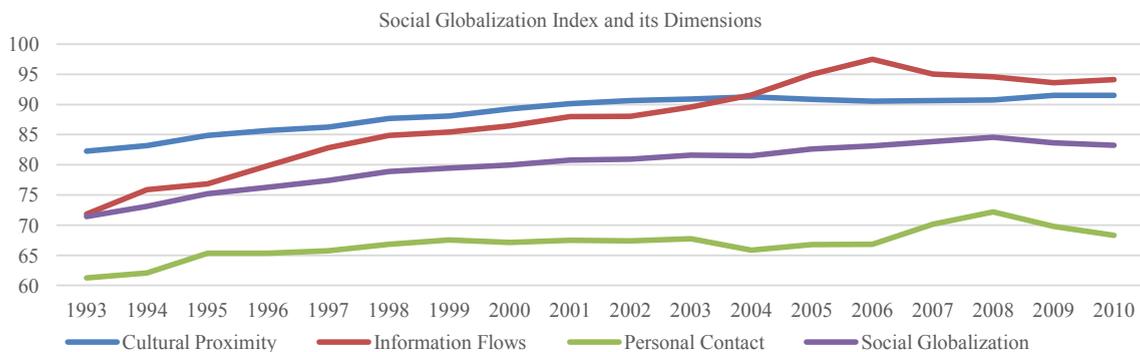


Fig. 1. Czech Republic: Social Globalization Index and Three Dimensions (1993–2010)  
Source: Authors' Analysis Based on KOF Index of Globalization

In an attempt to find an acceptable platform for measuring globalization, the KOF Index of Globalization was developed in 2002 by Axel Dreher (2006), and Dreher et al. (2008) which could be considered as the best indicator for measuring globalization. They obtain data from various organizations like the World Bank and United Nations to measure the three social globalization dimensions: first, cultural proximity (number of McDonald's restaurants (per capita); number of Ikea (per capita); foreign trade in books). Second, information flows (worldwide internet network

users, share of households with a television set, foreign trade in newspapers and periodicals). Third, personal contact (international telephone traffic, transfers (% of GDP), services, income, international tourists as a share of population, and foreign population) in a given country. The KOF social globalization index and its dimensions are measured on a scale (1–100), where 100 is the most globalized, while 1 is the least globalized country.

Figure 1 shows a comparable trend of the KOF social globalization index and its three dimensions in the Czech Republic from the period 1993 to 2010. It shows that the Czech Republic is more socially globalized in cultural proximity and cross border information flows. Cultural proximity was recorded highest in the period from 1993 to 2004 when the country joined the European Union (see appendix B) after which it started declining. The trend of cultural globalization in the country could be partly attributed to increase in the number of McDonald's restaurants, Ikea shops as well as Coca-Cola consumption. Globally, the presence of these firms and similar related organisations could directly or indirectly influence household spending patterns'.

The consumption of foreign cultural goods is an input to the production of national "identity," giving rise to special welfare implications of cultural goods trade and household consumption patterns in countries (Janeba, 2004). In the current era of globalization, cross-cultural interactions have proven to be sweeping across cultural boundaries. The pattern of Western culture has been transmitted to other cultures worldwide. For instance, the youths in the Czech Republic and other countries have been culturally affected. This is because they now imitate (adopt) other cultures in their consumption patterns like the food they consume in the restaurants like MacDonal, furniture from Ikea, foreign languages and alphabet, religion, modes of transport, method of communication, including their music, without much regard to the national culture (AbdulRaheem, 2003; Thong, 2012). Arguably, turning nations into 'trans-cultural diffusion' or cultural homogenization as a result of social globalization (Conversi, 2013).

### 3.2. Household Income, Saving and Expenditure

As posited by Stiglitz, *et al.* (2009), the level of living standards, income and wealth determine who has access to the consumption of goods and services produced within an economy. Empirical evidence from several studies suggested that domestic disposal income, prices of products (Tellis & Ackerman, 2001; Dvořáková & Seidler, 2012) and economic growth (Gerstberger & Yaneva, 2013) have relationships with household consumption expenditure.

Figure 2 shows the trends of domestic final household consumption expenditure (DFHCE), net disposal income and social globalization index from 1993–2012. The figures of net disposal income within the time period were slightly higher than DFHCE in many years and parallel in some years suggesting that income might have influenced household spending. This practically shows a relatively stable relationship between disposal income and consumer final spending in the country. Figure 3 displays DFHCE growth rate has been steadily decreasing over the years. The country recorded its highest DFHCE (22 %) in 1994 and after which it started to decline and recorded a negative growth rate (–1.7 %) in 2012. In the period, GDP per capita growth rate has been fluctuating with negative and positive signs. The country recorded its highest GDP per capita in 1995 and the lowest in 2009 with 6.3 % and –5 % respectively. The poor result in 2009 was partly attributed to the recent global economic meltdown.

The household saving rate is the ratio of the household saving to disposable income. It reflects the average propensity to save. In other words, it is the difference between a household's disposable income (mainly wages received, the revenue of the self-employed and net property income) and its consumption (Czech Statistical Office, 2013).

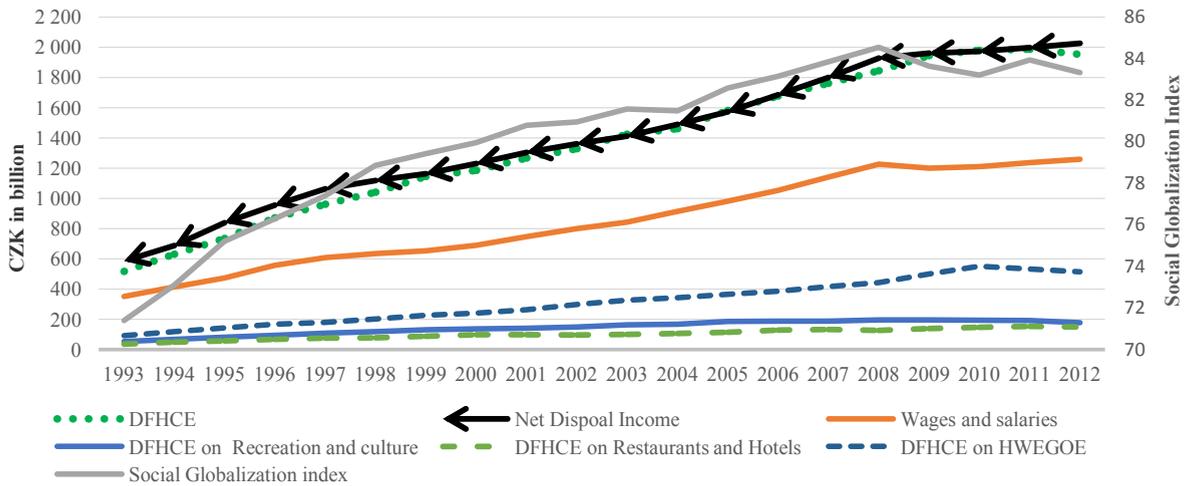


Fig. 2. Czech Republic: DFHCE,† Net Disposal Income, Wages and Salaries (CZK Billion), and Social Globalization Index (1993–2012)  
 Source: Authors’ Analysis Based on Czech Statistical Office (CSO), KOF Index of Globalization  
 Note: DFHCE = Domestic Final Household Consumption Expenditure by purpose – domestic concept (constant prices of 2005); HWEGOF = Housing, water, electricity, gas and other fuels

The household saving rate is generally regarded as the main national source of income to finance investment, which is a major ingredient for long-term economic growth. Due to institutional, demographic and socioeconomic differences, household saving rates vary between countries across the globe (OECD, 2013). Changes in the household saving rate are partly dependent on the household present and future income, their expenditures, interest and inflation rates, and the general socioeconomic uncertainties. All things being equal, households might decide to spend more and save less when their net disposal income increases and vice versa.

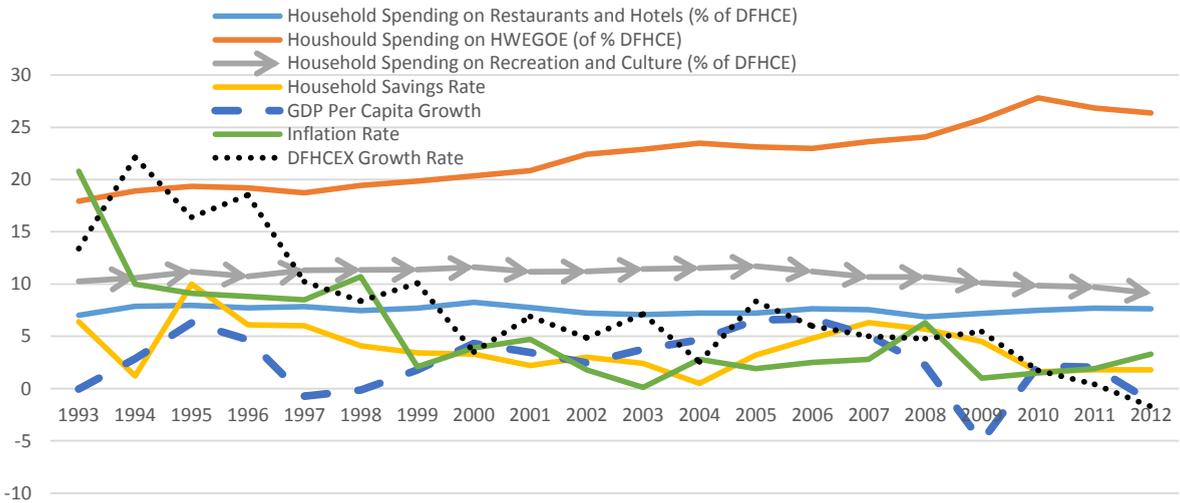


Fig. 3. Czech Republic: GDPK Growth Rate, DFHCE growth rate, Household Saving rate and Inflation Rate (%) (1993–2012)  
 Source: Authors’ Analysis Based Czech Statistical Office; OECD

† Czech Statistical Office (2013) Classified domestic final household final consumption expenditure (DHFCE) as household spending on goods and services to satisfy their individual needs which are covered by households’ incomes and which acquired through purchases, gifts and also through natural consumption. HFCE include household expenditure on housing, water, electricity, gas, recreation and culture, restaurants and hotels, transportation, communication, health and food etc.

### 3. Research Methodology

#### 3.3. Data Sources and Model Estimation

The annual aggregate data used in this study span from 1993 to 2012. The data were sourced from online databases of Czech Statistical Office, World Bank world development indicators, OECD, and ETH KOF Index of Globalization.

The method employed in this paper borrows extensively from the standard neoclassical production function and so we set out to incorporate the variables of interest in an econometric model. The model specification is as highlighted below:

$$\ln HXPED_t = \beta_0 + \beta_1 \ln NETDY_t + \beta_2 AECGR_t + \beta_3 HSAVR_t + \beta_4 INFLR_t + \beta_5 CCUD_t + \varepsilon_t \tag{1}$$

Where, lnHXPED is the natural log for household spending (proxied by domestic household final consumption expenditure, lnNETDY is natural log of net disposable income, AECGR represents annual economic growth Rate (captured by annual GDP per capita growth), HSAVR denotes household saving rate (as a proportion of disposable household income), INFLR denotes the inflation rate (proxied by CPI), CCUDX denotes cross-cultural dynamics (proxied by social globalization),  $\beta_0$  is a constant term,  $\beta_1 - \beta_5$  are parameter estimates, and  $\mu_t$  denotes the stochastic term. Also, note that  $\beta_1$  in this instance represents “Marginal Propensity to Consume-MPC” while  $\beta_0$  is autonomous consumption.

#### 3.4. Data Analysis and Empirical Findings

##### 3.4.1. Stationarity Test

Unarguably, the use of non-stationary time series data has been proven to generate spurious regression results (Gujarati, 2003), hence it is always of essence to carry out a unit root test prior to estimating an econometric model. The result of the unit root test is as presented in table 1.

Table 1. Unit Root Test (with constant term only)

Variable	PP Test	ADF Test	Inference
lnHXPED	-7.746 <sub>2</sub> ***	-3.023 <sub>1</sub> ***	I (0)
lnNETDY	-5.153 <sub>2</sub> ***	-1.945 <sub>1</sub> **	I (0)
AECGR	-2.738 <sub>2</sub> *	-1.840 <sub>2</sub> **	I (0)
HSAVR	-3.374 <sub>2</sub> **	-3.598 <sub>2</sub> ***	I (0)
INFLR	-4.745 <sub>2</sub> ***	-2.179 <sub>2</sub> **	I (0)
CCUDX	-6.357 <sub>2</sub> ***	-2.764 <sub>2</sub> ***	I (0)

Note: The subscripts (1 and 2) represent the optimal lag length chosen based on the two tests. The asterisks (\*, \*\*, \*\*\*) denote statistical significance at 0.1, 0.05, and 0.01 levels respectively

##### 3.4.2. Estimated Regression Model

Given that all variables are stationary at levels, we have opted to use the ordinary least squares (OLS) estimation method. It appears that the estimated model (see table 2) is a good fit given that about 99 % of the variability in the dependent variable is fully captured in the model. The estimated model diagnostics seem to satisfy a priori econometric test (see appendices A, B, and C). Our results hint that autonomous consumption (constant) is positive, but it is statistically insignificant.

The estimated model provides robust evidence that household spending is positively associated with cross-cultural dynamics (proxied by social globalization index); a unit rise in social globalization index spurs domestic household spending by 1.7 % (statistically significant at the 0.05 level). Further evidence provides support that household spending is positively associated with net disposable household income; this implies that a 1 % increase in net disposable income accelerates spending by 0.88 % (statistically significant at the 0.01 level).

Table 2. Estimated Regression Model – OLS, using observations 1993–2012 (T = 20)

Dependent variable: lnHXPED				
	Coefficient	Std. Error	t-ratio	p-value
const	0.367846	0.468846	0.7846	0.44577
lnNETDY	0.879777	0.0679674	12.9441	<0.00001***
HSAVR	-0.00611141	0.00177255	-3.4478	0.00392***
AECGR	-0.000203085	0.00144653	-0.1404	0.89035
CCUDX	0.0165271	0.00664871	2.4858	0.02618**
INFLR	-0.00309827	0.00146151	-2.1199	0.05236*
Sum squared resid	0.003357		S.E. of regression	0.015485
R-squared	0.998896		Adjusted R-squared	0.998502
F(5, 14)	2533.447		P-value (F)	3.55e-20
Durbin-Watson	1.752270			

This shows that the marginal propensity to consume (MPC) is 0.88; and as a result, marginal propensity to save (MPS) is 0.12, *ceteris paribus*. Moreover, inflation rate is seen as a disincentive to household spending (statistically significant at the 0.1 level). Also, our findings suggest that there is an inverse relationship between household saving rate and household spending (statistically significant at the 0.01 level). Even though annual economic growth rate appears to be negatively associated with household spending, it is statistically insignificant.

### 3.4.3. Granger Causality Test Result

Due to brevity of space, we have omitted the estimated baseline VAR (6-equation all-endogenous variable) model which was used to arrive at the Granger Causality test result. The minimum R-squared value for the 6-equation model was 91.82 %. The optimal lag length of 2 was chosen based on what all the information criteria indicated (see Appendix C). In order to avoid spurious predictability, we checked on the stability of the model and we can state without mincing words that all the eigenvalues lie within the unit circle (see next panel in Appendix C). From the table (see table 3), it appears there is a feedback relationship between household spending and household saving rate as well as between household spending and cross-cultural dynamics. The same bidirectional relationship is true of household spending and inflation rate.

Rather surprisingly, there is a reverse causality between household spending and disposable income. What this shows is that household expenditures most likely precede household disposable income and maybe as a result of the availability of credit facilities. Even though this finding seems to be a departure from a priori economic theory; it supports the findings of Vinod (2008) and Malik & Pradhan (2012). Our results equally reveal a unidirectional causality from household spending to annual economic growth rate.

Nonetheless, as can be seen from the Granger causality analysis (see table 3), there is a transmission channel that emanates from net disposable income to household saving rate and ultimately Granger causes household consumption expenditure. A similar picture was equally observed of the transmission channel running from annual economic growth rate to household consumption expenditure via saving rate. A breakdown of the table (see table 3) equally shows that cross-cultural dynamics in terms of info globalization, cultural proximity and personal contacts have feedback relationships amongst other variables in the model. It is equally same between the inflation rate and the rest of the variables, other intriguing results can be seen from the table (see table 3).

Table 3. VAR Granger Causality/ Block Exogeneity Wald Test (2 lags)

Equation	Excluded	Chi2	df	Prob > chi2	Decision Rule	Inference
lnHXPED	lnNETDY	3.8908	2	0.143	Fail to reject Ho	Non-Causality
	HSAVR	16.575	2	0.000***	Reject Ho	Bi-directional Causality
	AECGR	1.6668	2	0.435	Fail to reject Ho	Non-Causality
	CCUDX	29.016	2	0.000***	Reject Ho	Bi-directional Causality
	INFLR	14.167	2	0.001***	Reject Ho	Bi-directional Causality
lnNETDY	ALL	102.81	10	0.000***	Reject Ho	Valid
	lnHXPED	14.128	2	0.001***	Reject Ho	Uni-directional Causality
	HSAVR	4.1401	2	0.126	Fail to reject Ho	Non-Causality
	AECGR	1.5359	2	0.464	Fail to reject Ho	Non-Causality
	CCUDX	7.5378	2	0.023**	Reject Ho	Bi-directional Causality
HSAVR	INFLR	10.251	2	0.006***	Reject Ho	Bi-directional Causality
	ALL	133.31	10	0.000***	Reject Ho	Valid
	lnNETDY	36.108	2	0.000***	Reject Ho	Uni-directional Causality
	lnHXPED	43.036	2	0.000***	Reject Ho	Bi-directional Causality
	AECGR	123.39	2	0.000***	Reject Ho	Bi-directional Causality
AECGR	CCUDX	54.608	2	0.000***	Reject Ho	Bi-directional Causality
	INFLR	327.3	2	0.000***	Reject Ho	Bi-directional Causality
	ALL	1469.2	10	0.000***	Reject Ho	Valid
	lnNETDY	32.57	2	0.000***	Reject Ho	Uni-directional Causality
	lnHXPED	35.413	2	0.000***	Reject Ho	Uni-directional Causality
CCUDX	HSAVR	41.313	2	0.000***	Reject Ho	Bi-directional Causality
	CCUDX	31.248	2	0.000***	Reject Ho	Bi-directional Causality
	INFLR	24.31	2	0.000***	Reject Ho	Bi-directional Causality
	ALL	151.15	10	0.000***	Reject Ho	Valid
	lnNETDY	6.4136	2	0.040**	Reject Ho	Bi-directional Causality
INFLR	lnHXPED	7.922	2	0.019**	Reject Ho	Bi-directional Causality
	AECGR	6.2182	2	0.045**	Reject Ho	Bi-directional Causality
	HSAVR	5.3392	2	0.069*	Reject Ho	Bi-directional Causality
	INFLR	9.5643	2	0.008***	Reject Ho	Bi-directional Causality
	ALL	27.065	10	0.003***	Reject Ho	Valid
ALL	lnNETDY	10.413	2	0.005***	Reject Ho	Bi-directional Causality
	lnHXPED	24.673	2	0.000***	Reject Ho	Bi-directional Causality
	AECGR	13.094	2	0.001***	Reject Ho	Bi-directional Causality
	HSAVR	35.085	2	0.000***	Reject Ho	Bi-directional Causality
	CCUDX	56.785	2	0.000***	Reject Ho	Bi-directional Causality
ALL	124.46	10	0.000***	Reject Ho	Valid	

\*\*\*, \*\* and \* indicate the rejection of the null hypothesis at 0.01, 0.05 and 0.10 significance level respectively.

#### 4. Concluding Remarks

The paper has investigated the impact of some selected variables (e.g. Net disposal income, GDP per capita growth, inflation rate, cross cultural dynamics) on household spending (proxies for DFHCE) in the Czech Republic, using Granger causality test based on a Vector Autogresssive (VAR) model.

The empirical results show that net disposable income, cross-cultural dynamics, inflation rate, and household saving rate have a significant relationship with household spending in the Czech Republic within the period under study (1993–2012). In addition, the Granger causality analysis also provides a positive relationship between household spending and social globalization index (a proxy for cross-cultural dynamics). The results equally indicate bidirectional causality between household saving rate and household spending as well as between the inflation rate and household spending. On the contrary, there is a unidirectional Granger causality running from household spending to both net disposable income and GDP per capita growth. Notwithstanding, both disposable income and GDP per capita growth rate act as transmission channels to the household spending through household savings rate.

## Acknowledgement

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## Appendix A. Model Diagnostic Tests

Test Type	Test Statistic [Prob]
Normality (Jarque Bera)	Chi-square (2) = 3.05586 [0.216985]
Heteroskedasticity	
White's test	LM = 15.0679 [0.129606]
Breusch-Pagan	LM = 4.08911 [0.536659]
Autocorrelation (1 <sup>st</sup> -Order)	
Breusch-Godfrey test	LMF = 0.009022 [0.926]
Ljung-Box Q'	0.00965725[0.922]
ARCH Effect	
Test for ARCH of order 1	LM = 3.20269 [0.0735173]
Test for ARCH of order 2	LM = 2.77753 [0.249383]

## Appendix B. Chow test for structural break at selected observations (years)

Observation (Year)	F-Statistic (with p-value)
2000 – Millennium	F (6, 8) = 2.11555 with p-value 0.1612
2004 – Join EU	F (6, 8) = 1.80591 with p-value 0.2151
2005 – A year after EU ascension	F (6, 8) = 1.83135 with p-value 0.2100
2007 – Join Schengen Zone	F (6, 8) = 1.08763 with p-value 0.4430
2008 – Global Financial Meltdown	F (5, 9) = 1.45335 with p-value 0.2945
2009 – Global Financial Meltdown	F (4, 10) = 1.63249 with p-value 0.2411
2010 – Global financial Meltdown Recovery Phase	F (3, 11) = 0.725051 with p-value 0.5579

## Appendix C. VAR Model Selection and Parameter Stability

Eigenvalue Stability Condition	
Eigenvalue	Modulus
-.1949 + .9108i	.9314
-.1949 - .9108i	.9314
-.9116	.9116
.8651	.8651
.7864 + .3571i	.8637
.7864 - .3571i	.8637
.5486 + .6088i	.8195
.5486 - .6088i	.8195
-.6472 + .3632i	.7421
-.6472 - .3632i	.7421
-.0226 - .48082i	.4814
-.0226 + .48082i	.4814

All the eigenvalues lie inside the unit circle.  
VAR satisfies stability condition

Selection-order for Sample: 1995-2012								
Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-75.90				.00036	9.10	9.141	9.396
1	27.815	207.43	36	0.00	2.5e-07	1.576	1.862	3.654
2	449.276	842.92	36	0.00	4.8e-25*	-41.253*	-40.721*	-37.395

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