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## Macroeconomic and demographic determinants of household expenditures in OECD countries

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### Abstract

Household expenditures are one of the indicators of individual and social welfare. Analysis of household expenditure dynamic has showed a significant change in the period of economic crisis: during the global economic crisis and the recession in Europe. Change of household expenditures occurs under the influence of such macroeconomic factors as disposable income of households, government spending, inflation, interest rate that should be considered in public policies. The population and the education level of population are also significant demographic factors that influence consumer spending and household spending on health.

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### 1. Introduction

Household expenditures are closely interrelated and reflect the notions of well-being and wealth. The level of household expenditures indicates the level of economic system development as a whole. This raises the question of what factors influence the magnitude of household expenditures in different countries. In this regard, it is necessary to distinguish exogenous factors dictated by the state of a particular country economy and of world economy in general, so as demographic factors, which determine household structure and composition.

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The analysis of literature has showed that researches that try to identify factors influencing on household spending, are aimed at investigating of the relationship between separate macroeconomic, environmental and cultural factors. The economies of certain countries are often chosen as the object of research.

As the macroeconomic factors affecting household consumption, the indicators related to the functioning of the economy as a whole and conducted public policy are mentioned. For example, Berben and Brosens (2007) analyze the impact of government debt on private consumption in OECD countries and conclude that fiscal policy is less effective at higher levels of government debt. Verter and Osakwe (2014) allocate net disposable income, cross-cultural dynamics, inflation rate, and saving rate as factors influencing household spending in Czech Republic. The researchers have proved the relationship between household spending and social globalization index. Parker (1999) refutes, basing on microdata of household surveys in the United States, basic life-cycle permanent-income hypothesis, suggesting that predictable changes in income have no effect on the growth rate of consumption expenditures. Thus, even expected changes in social security taxes lead to significant changes in the structure of household consumer spending.

A number of studies are based on financial approach to household spending determinants formulation. Ludwig and Sløk (2004) analyze the impact of stock prices changes on consumption in countries with a market-based financial system comparing with countries that have a bank-based financial system. De Bonis and Silvestrini (2012) showed that both net financial wealth and real wealth have a positive effect on consumption.

Separate studies are devoted to the analysis of certain types of household expenditures - health expenditure (Newhouse (1977), Hitiris and Posnett (1992), Matteo and Matteo (1998), Karatzas, 2000). Therefore, Di Matteo (2005) on the example of Canada and the United States highlights age distribution, income and time using as macroeconomic factors affecting health expenditure in private sector. The results of the study indicate that age distribution and income have small share in changes of health expenditure, the main factor is time using, which explains approximately two-thirds of the increase in health expenditures. Health expenditure model, built by Narayan and Narayan (2008), illustrates the necessity of considering environmental factors that impact on health expenditure. In addition to the traditionally considered real per capita income, the researchers have included in the model nitrogen oxide emissions, sulphur oxide emissions and carbon monoxide emissions.

Carroll et al. (2014) have developed a macroeconomic model based on microfoundations and suggest that the annual marginal propensity to consume is much larger than the 0.02-0.04 range implied by commonly-used macroeconomic models. Our model also predicts that the aggregate MPC can depend on how the shock is distributed across categories of households (low-wealth versus high-wealth households).

The purpose of this study is to identify macroeconomic and demographic factors affecting household expenditures in OECD countries. Empirical data for building models are official OECD data for 34 countries in 2012. The main method of research is the analysis of statistical information and the construction of multiple regression models based on OLS.

## 2. Research methodology

We test which factors have a significant effect on total household spending, and some its types (final consumption expenditure). Therefore, in the study expenditures of households are represented by the following indicators:

- Household spending, Total, Million US dollars (Household spending). This indicator reflects the amount of final consumption expenditure made by resident households to meet their everyday needs, such as: food, clothing, housing (rent), energy, transport, durable goods (notably, cars), health costs, leisure, and miscellaneous services. It is typically around 60% of gross domestic product (GDP) and is therefore an essential variable for economic analysis of demand (OECD 2015b);
- Household final consumption expenditure, current US\$ (Household final consumption expenditure). According to World Bank and OECD methodology it is the market value of all goods and services, including durable products, purchased by households. It excludes purchases of dwellings but includes imputed rent for owner-occupied dwellings. It also includes payments and fees to governments to obtain permits and licenses (World Bank 2015).

- Health expenditure per capita by private sector, total, current and capital, in 2011, per capita USD PPP, (Health expenditure).

The hypothesis of the study is that household spending is affected by both macroeconomic and demographic factors. As macroeconomic factors, we have analyzed the following:

- Household disposable income, gross adjusted, US dollars/capita (Household disposable income);
- Gross domestic product (GDP), current PPPs, billions US dollars;
- Short-term interest rates (Short-term interest rates);
- General government consumption expenditure, percentage of GDP (General government consumption);
- Consumer prices reflects the growth rate of consumer prices (Consumer prices);
- Tax on goods and services, Total, % of GDP (Tax), 2000 – 2013;
- Tax on personal income, Total, % of GDP, 2000 – 2013 (TaxPers);
- Old age support ratio (Support rate).
- Imports of goods and services, volume, annual growth rates in percentage (Import);
- Average wages, Total, US dollars, 2012 – 2013 (Wage);

Demographic factors also determine household spending. As the latter, we have reviewed:

- Population, Total, Million persons (Population);
- Proportion of respondents aged 15 and over by relationship status, percentages (Mar);
- Population with tertiary education 25-34 year-olds, percentage in same age group, 2000 – 2013 (PopEd).

The sample of countries consists of 31 countries characterized according to the classification of World Bank as countries with high income and 3 countries (Hungary, Mexico, Turkey) related to the countries with upper middle income.

### 3. The analysis of the main variables' dynamics

According to OECD (2015b) household spending in total was growing during 1970-2013, except year 2009, when there was a definite reduction of the rate dictated by the global economic crisis.

According to OECD (2015a) and World Bank national accounts data, final consumption expenditures of households have, over the past 40 years, a clear increasing trend (see Fig. 1). Meanwhile, attention should be drawn to the tendency of faster growth of consumer spending in developing countries, which reflects in exceed of curve that shows consumption expenditure of households around the world (World) in comparison with the dynamics of the same indicator in OECD countries (OECD members). Besides, this trend can also be observed among OECD countries: final consumption expenditure of households in OECD members is higher than in OECD countries with high income (High income: OECD).

The average growth rate in 1970-2013 was globally - 7.896%, in OECD members - 7.562%, in High income OECD - 7.501%. If we pay attention to changes in the growth rate of final consumption expenditure of households in 2000-s, we can note that there has been a slowdown: the average growth rate was globally - 5.996%, in OECD members - 4.54%, in High income OECD - 4.43% [the authors' calculations according to OECD (2015) and World Bank data].

During the last decade, the certain decrease of the analyzed indicator is marked in 2009, due to the impact of the global economic crisis. Countries with low income show higher change rates of final consumption expenditure of households both in the period of economic growth and in times of crisis. In OECD countries with High income there was more significant decline of final consumption expenditure of households in 2009 - 4.38%, compared to average global meaning of 3.56%. However, in OECD countries, this decrease was even more substantial - 4.99% [the authors' calculations according to OECD (2015) and World Bank data].

There are certain regional differences in the dynamics of final consumption expenditure of households in the period 2010-2013. In European countries, a steady growth of the rate was observed during all the period except the year 2012, because of the recession in the EU. Outside the EU – in Australia, Canada, Chile, Rep. Korea, Mexico, Norway, New Zealand, Turkey, and United States – such a reduction of household consumer spending was not observed, on the contrary, spending rate was gradually increasing. The recovery of the EU countries in 2013 had different rates: some countries could exceed the level of 2010 expenses; some countries reduced the rate of development significantly (Spain, Greece, Portugal, Slovenia). The main reason of the significant fall of some

countries during the period of recession was linked with the internal problems of budget deficit and public debt. Without adequate financial assistance from the European Bank Spain, Greece, Portugal would be unable to overcome the recession of 2012.

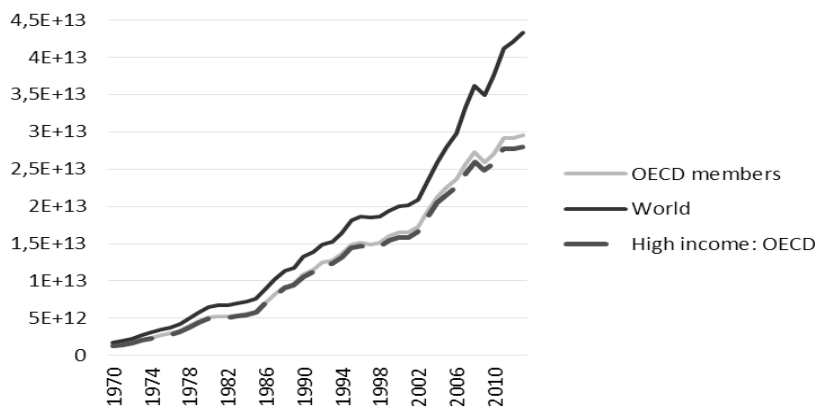


Fig. 1. The dynamics of household final consumption expenditure during 1970-2013.

Out of the EU Japan has serious problems with the level of household consumption. Since 1995 in Japan, there have been serious fluctuations in the dynamics of households consumer expenditure, and since April 2014 they have been showing a negative growth. Horioka (2006) examines the causes of Japanese economy long stagnation in the 1990-s and concludes that the main reason is the reduction of investments, especially private fixed investment. In addition, Horioka highlights the factors contributing stagnation of consumer spending of households: the stagnation of household disposable income, the decline in household wealth and increased uncertainty about the future.

Target household spending on health care differs widely among OECD countries. The leader is, no doubt, the United States, where health expenditure per capita by public sector and private sector are almost the same in volume and superior the average for OECD countries in 2.6 times. This feature is not typical for other OECD countries: private sector spending is only 27% of total expenditure on health [calculations according to OECD data (2014)]. A distinct trend in health expenditure, appeared in 2000-s years in OECD countries should be noted. If during the period 2000-2009 the annual average growth rate in real current health expenditure in the studied countries had positive values, the global financial crisis made significant changes. In 11 OECD countries - Greece, Ireland, Iceland, Estonia, Portugal, United Kingdom, Denmark, Slovenia, Czech Republic, Spain, Italy - the annual average growth rate in real current health expenditure in 2009-2011 had negative values. The greatest reduction in health expenditure was typical for Greece [OECD (2014), p.39].

After the global crisis, health spending growth also slowed significantly in most countries outside of Europe, even in Canada (0.8%) and the United States (1.3%). It is possible to allocate only two OECD countries - Israel and Japan, in which the rate of health spending growth accelerate since 2009 compared with the period before. Also in Korea health spending continued to grow at more than 6% per year since 2009 [OECD (2014), p.39].

#### 4. The results of the regression model

During the work, a lot of specifications were built. In the end, the models with the highest explanatory ability for each of the studied aspects of household expenditure in OECD countries were selected. To build a multiple regression equation, it was necessary to count logarithms for a number of variables that are known as accepting only positive values and are measured by relative performance. The transition to the logarithm in equation fundamentally changes nothing, but helps to improve the quality of the regression model.

Tables 1, 2 represent the coefficients of independent variables and demonstrate the overall quality of multiple regression equations. Models show that changes in imports compared with the previous year (Import) and inflation

rate (Consumer prices) are significant for household spending and household final consumption expenditure. The increase of imports share has a negative impact on household spending. This relationship is explained by the role that import plays in the economy: it creates competition for domestic goods that generally leads to lower prices and consequently reducing household expenditure. At the same time, the inflation rate shows a statistically strong positive relationship with household expenditure, which corresponds to the economic nature of the studied parameters. In the conditions of rising consumer prices household incomes are depreciating, that leads to the needed increase of expenditure on the acquisition of a similar basket of goods.

Table 1. Model 1.

<i>Dependent variable</i>	<i>ln_Household spending</i>			
	<i>Coeff.</i>	<i>Std.er.</i>	<i>t-stat.</i>	<i>P-value</i>
const	-22.6512	13.8056	-1.6407	0.12036
Import	-0.0822284	0.034659	-2.3725	0.03054**
Short-term interest rates	0.290589	0.164567	1.7658	0.09651*
General government consumption	0.0921588	0.0527887	1.7458	0.10001
Consumer Prices	0.231593	0.125876	1.8399	0.08442*
Tax	-0.536045	0.0831466	-6.4470	<0.00001***
Support Rate	-0.658277	0.316821	-2.0778	0.05419*
l_Household disposable income	2.50752	1.89202	1.3253	0.20368
l_Wage	-0.821636	1.26031	-0.6519	0.52370
<i>R<sup>2</sup> adjusted</i>	<i>0.797</i>			
<i>F-stat.</i>	<i>19.59158</i>			

Household spending is influenced by two opposite factors: tax on goods and services (Tax) as a source of government revenue and old age support ratio as a relative measure of government spending. The increase of taxes share in GDP leads to lower household expenditures. The greater is the amount of money spent by households on this article, the less is cash it can guide to the ultimate costs. Senior citizens support reduces their spending as households.

Table 2. Model 2.

<i>Dependent variable</i>	<i>ln_Household final consumption expenditure</i>			
	<i>Coeff.</i>	<i>Std.er.</i>	<i>t-stat.</i>	<i>P-value</i>
const	0.490156	1.3582	0.3609	0.72291
Import	-0.0154022	0.00326167	-4.7222	0.00023***
Consumer Prices	0.022964	0.0119015	1.9295	0.07160*
Support Rate	-0.0471511	0.0339234	-1.3899	0.18359
l_Household disposable income	0.51977	0.140217	3.7069	0.00191***
General government consumption	-0.0171597	0.00467128	-3.6734	0.00205***
PopEd	0.00643025	0.00160032	4.0181	0.00099***
Short-term interest rates	-0.0168252	0.012199	-1.3792	0.18680
<i>R<sup>2</sup> adjusted</i>	<i>0.809</i>			
<i>F-stat.</i>	<i>14.03647</i>			

Short-term interest rates have a positive statistical relationship with the indicator that must be taken into account in conducting monetary policy. The increase of interest rates will lead to a rise of consumption expenditure that must be taken into account in public policies.

In the second model the relationship with macroeconomic factors such as: household income (Household disposable income), government consumption (General government consumption), and demographic factor - the proportion of the population with higher education (PopEd) is identified for household final consumption expenditure. The proportion of the population with higher education defines highly skilled workforce that is potentially able to receive higher incomes and consequently spend more. Household incomes positively correlate with costs. Accordingly, it is necessary to create conditions for their growth, which ultimately will contribute long-term economic development.

Table 3. Model 3.

<i>Dependent variable</i>	<i>Health spending</i>			
	<i>Coeff.</i>	<i>Std.er.</i>	<i>t-stat.</i>	<i>P-value</i>
const	-13.6896	3.34	-4.0987	0.00051***
l_Household disposable income	2.14241	0.350648	6.1099	<0.00001***
General government consumption	-0.0651428	0.0147197	-4.4256	0.00023***
Short-term interest rates	0.113185	0.0335373	3.3749	0.00286***
l_Population	-0.0363753	0.0177456	-2.0498	0.05308*
<i>R<sup>2</sup> adjusted</i>	<i>0.747417</i>			
<i>F-stat.</i>	<i>11.83388</i>			

Target household spending on health (see Model 3) is also affected by macroeconomic factors such as household income, government expenditure and interest rate that is correlating with the previous models. As the demographic factors, we have chosen population amount, which determines the overall size of government spending on health care and the burden on the state budget

## 5. Conclusion

Household spending in OECD countries reflects trends of the global economic system development. During 1970-2013, household expenditures were characterized by sustainable rates of growth. However, the impact of the global economic crisis in 2009 caused a reduction of household expenditure averagely on 5%, which was higher comparing to the global average value.

The impact of the crisis on the dynamics of household expenditure can be clearly seen if we compare this indicator in the EU and outside the EU. In the EU countries there was a decline tendency of this indicator in 2012, what happened in the recession conditions. Countries outside the EU are characterized by increasing household expenditure in 2010-2013; the exception was Japan, where the difficult economic situation was observed during the 1990-2000-s.

By comparing the global average growth rate of final consumption expenditure of households with similar indicators in OECD countries, the excess of the global average rate due to a more rapid development of developing countries was distinguished.

As the target household spending health expenditure was analyzed. The positive dynamics of this type of spending in OECD countries before the global economic crisis has changed into various trends in the studied countries. In 11 OECD countries, there was negative average annual growth rate in 2009-2011, reflecting the strong dependence of these countries from the world situation. During the analysis of the dynamics of household health expenditure, we have found a peculiarity in the USA. In this country unlike other OECD countries, the share of health expenditure of the private sector and public sector are almost the same, while in other OECD countries, the share of private spending in total health expenditure is about 27%.

In our research, we have studied the influence of various factors on population spending. The analysis has revealed a strong statistical relationship between household expenditure and macroeconomic indicators: short-term interest rates, general government consumption expenditure, consume prices, tax on goods and services as share of GDP, imports growth rate, household income.

Most of all household expenditure is affected by economic characteristics: prices and factors associated with them, taxes level, income and imports. A number of socio-demographic characteristics have not showed any significance and as a result are not included in the model. Strong statistically significant interaction is shown by population education, which also indirectly affects income level and level of elderly population support. In this case, the inverse relationship is observed, as higher social support contributes to reducing consumption expenditure.

The research results are useful from a practical point of view, because they reflect a strong relationship between separate macroeconomic and demographic factors and the ultimate spending of economic agents. Understanding of the considered relationships allows us to build socio-economic policy of the state, promoting the effective development of the economic system and increase of its competitiveness.

The results of our analysis have shown that level of income has a statistically significant effect on expenditures. This suggests that for increasing of income level and quality of life the right economic policies is needed. The analysis of the real sector has shown that more developed economic environment positively affects the income of population. The most significant characteristics are the indicators associated with economic development and economic conditions.

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