

## Modelling of final demand financing based on SNA - the case of households

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**Abstract.** In the paper an identity-centered model is constructed basing on the sequence of national accounts according to ESA 2010 for the households sector. The empirical research concerns the variability of the model coefficients showing the relations between various categories of households' incomes and expenses finally leading to the coefficients defining the structure of final demand financing. Coefficients for Poland and the selected EU countries are determined on the basis of comparable statistical data for the years 2000-2013. Special attention is paid to those coefficients, which depend on economic policy, especially the fiscal one, and on changes in demographic structure. Basing on the results of the empirical analysis, – the sources of Polish households' final demand financing have been verified.

Received:  
June, 2015  
1st Revision:  
September, 2015  
Accepted:  
December, 2015

DOI:  
10.14254/2071-  
8330.2015/8-3/3

**Keywords:** incomes and expenses, households sector, Poland, EU

**JEL Classification:** D14, H31

## INTRODUCTION

The study presented in this paper is a part of the research project<sup>1</sup> that aims at analyzing basic phenomena and processes that emerged in Polish economy in the first dozen or so years of the current century. Empirical identification of these processes is used for the construction of alternative scenarios of their development in the medium and long term. These goals are implemented by using a system of macromodels: a central model combined with satellite models describing the research areas on which the project is focused. The central model is based on the identities for each institutional sectors (cf. Inforum types models – e.g. the accountant part expressed by Almon, 1995; KEMPO model developed by Czerwiński *et al*, 1999).

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<sup>1</sup> The project financed by Polish Science Center no. DEC-2012/07/B/HS4/02928 „Determinants of the development of the Polish economy in the twenty-first century. Empirical analysis and projections based on system of macroeconomic models.”

This paper is focused on households in the macroeconomic perspective, therefore, the analysis subject is the sequence of national accounts (revenues and spending) of the households sector. Basing on the full sequence of national accounts according to ESA 2010 (*European System of Accounts ...*, 2013), a series of identities was created. Transactions in the generation of primary income, allocation of primary income and secondary distribution of income between households and other institutional sectors lead to disposable income – the main source for final demand financing.

Due to the rule of double entry of all transactions applicable in ESA, identities determining certain forms of one sector's expenditure must comply with a certain form of other sector's resource (e.g., taxes paid by individual institutional sectors are general government's revenue and in turn a significant part of current expenses of general government constitutes households resources). Identities presented in this paper concern mostly households' primary incomes and expenditures. Whereas, other resources are appealed to values determined from identities stored for other sectors for their expenses – transfers to households sector.

The main subject of the empirical research presented in this study is the variability in the model coefficients showing the relations between various categories of households' incomes and expenses occurring in the stored identities finally leading to the coefficients defining the structure of final demand financing. Special attention is paid to these coefficients, which depend on economic policy, especially the fiscal one, and on changes in the demographic structure. The reference point is the sequence of national accounts for 2013 (the last available when this article was written), as well as time series for relevant coefficients calculated from the sequence of the previous years since 2000. The coefficients for Poland and the selected EU countries are determined on the basis of comparable statistical data from the Eurostat database. Some additional data for Poland are also recalled, especially in the context of below hypotheses verified basing on the results of empirical analysis for Poland and the selected European countries in the years 2000-2013.

- 1: Specific structure of households sector in Poland with a relatively high share of microenterprises (*Small Business Act...*, 2015) and the phenomenon that overall profits (mainly of large enterprises) are growing faster than wages and salaries (Piketty, 2014) caused the decreasing share of households' primary income in the value added for the whole economy.
- 2: As a result of demographic changes in Europe (*The 2012 Ageing Report...*, 2012), the degree of dependence of the households sector on the social security system, measured by the share of social benefits in disposable income financing final demand, increases.
- 3: An important determinant in the dynamics of households' liabilities for final expenses in Poland is the effect of catching-up with the economies of Western Europe (cf. research on the EU new member states by Backe, Wojcik, 2006; Kraft, 2007).

The structure of the paper is the following. The first part is a brief description of the methodology used in the ESA 2010 concerning the subjective scope of the household sector and the transactions made by units classified to this sector. The second part shows the construction of a deterministic model describing expenditures and revenues of the households sector, specifying the creation of sources of final demand financing. The third part contains some findings from the empirical analysis of the model coefficients for Poland and for selected the EU countries. The last section summarizes the outcomes of empirical research in relation to the formulated hypotheses and points out some directions of the model coefficient changes.

## 1. THE HOUSEHOLDS SECTOR IN THE SYSTEM OF NATIONAL ACCOUNTS (SNA)

In the system of national accounts the economy is described by the activity of institutional units grouped into institutional sectors: households, non-financial corporations, general government, financial corporations,

non-profit institutions and the rest of the world. According to ESA 2010 the households sector consists of individuals or groups of individuals such as consumers and producers – unincorporated enterprises (according to the Polish national accounts enterprises employing up to 9 persons). The households sector is subdivided into the following subsectors: employers and own-account workers, employees, recipients of property income, recipients of pensions, recipients of other transfers. In some countries (e.g. in Germany, United Kingdom) data for the households sector is developed together with non-profit institutions sector (separate legal entities which serve households). This aggregated category is analyzed in this study. Combination of the households sector and non-profit institutions increases operating surplus, final consumption and obtained miscellaneous current transfers. However, the share of non-profit institutions in operating surplus and consumption is marginal (operating surplus of non-profit institution in Poland constitutes less than 0,1%, consumption constitutes 1-1,5% of these categories for households and non-profit institutions put together). Therefore the findings for the households sector treated separately would be similar to those for households combined with non-profit institutions.

Transactions among the households sector and other institutional sectors are recorded on current and accumulation accounts.

Current accounts (see Tab. 1) represent the circulation of income among institutional sectors in the form of revenues and expenditures. Each of the accounts has a balancing item (underlined in Tab. 1 and Tab. 2), which in turn opens the revenue side of the next account in the sequence. In the case of households sector expenditures on production accounts (i.e. intermediate consumption) and generation of income account (i.e. compensation of employees, taxes less subsidies on production and imports, operating surplus and mixed income) mainly concern households of employers and own-account workers, i.e. generally producers.

Table 1

Transactions recorded on the current accounts of the households sector

Resources	Uses (expenditure)	Symbols used in the model
1	2	3
Production account		
	Intermediate consumption	
	Value added, gross	<i>valad(H)</i>
Generation of income account		
Value added, gross		
	Compensation of employees <sup>1</sup>	<i>comp(H)</i>
	Taxes less subsidies on production and imports	<i>prtax(H)</i>
	Operating surplus and mixed income, gross	<i>ops(H)</i>
Allocation of primary income account		
Operating surplus and mixed income, gross		
Compensation of employees <sup>2</sup>		<i>labl</i>
Property income		<i>proplo(H)</i>
	Property income	<i>propIp(H)</i>
	Primary income, gross	<i>priml(H)</i>
Secondary distribution of income account		
Primary income, gross		
	Current taxes on income, wealth, etc.	<i>Itax(H)</i>
Social benefits other than social transfers in kind		<i>socb</i>

1	2	3
	Social contributions	<i>socc</i>
	Net non-life insurance premiums	<i>ocurp(H)</i>
	Miscellaneous current transfers <sup>3</sup>	
Non-life insurance claims		<i>ocuro(H)</i>
Miscellaneous current transfers <sup>3</sup>		
	<u>Disposable income, gross</u>	<i>displ(H)</i>
Use of disposable income account		
Disposable income, gross		
Adjustment for the change in pension entitlements		<i>apen</i>
	Final consumption expenditures	<i>ce(H)</i>
	Saving, gross	<i>sav(H)</i>

<sup>1</sup> cost incurred by employers classified to households sector (marked here with symbol *H*)

<sup>2</sup> the sum of costs incurred by employers from various institutional sectors; *comp(H)* is part of *labl*

<sup>3</sup> subsidies and donations to the non-profit institutions, current transfers between households, administrative dues, operating with non-financial corporations, banks and households

Source: compiled by the authors on the basis of ESA 2010 (cf. current accounts of general government in Tomaszewicz, Trębska, 2015)

The sequence of non-financial accounts ends with capital account, which is the first of the accumulation accounts, the others are: the financial account, the account of other changes in the volume of assets and revaluation account. Accumulation accounts contain transactions and other changes that cause the differences between the values occurring in the opening and closing balance sheets. Revenues on accumulation account show the sources of financing tangible and financial assets of households, that are saving, capital transfers, and net incurrence of liabilities. In turn, the expenditures on this account are: capital formation (the acquisition of non-financial assets), capital transfers, and net acquisition of financial assets. The difference between net acquisition of financial assets and net incurrence of liabilities, i.e. net lending/borrowing ends the sequence of non-financial accounts (see Tab. 2).

Table 2

## Transactions of capital account of the households sector

Resources	Uses	Symbols used in the model
Saving, gross		<i>sav(H)</i>
Investment grants		<i>cap(H)</i>
	Capital taxes	
Other capital transfers	Other capital transfers	<i>inv(H)</i>
	Gross fixed capital formation	
	Changes in inventories	
	Acquisitions less disposals of valuables	<i>lend_bor(H)</i>
	Net lending(+)/Net borrowing(-)	

Source: compiled by the authors on the basis of ESA 2010 (cf. capital account of general government Tomaszewicz, Trębska, 2015).

## 2. THE MODEL OF HOUSEHOLDS' FINAL DEMAND FINANCING

The sequence of national accounts for households sector described by the model (elaborated in the aforementioned project) starts from an input-output table, showing accounts of products and income generation for the entire economy. Thus, the model for households sector is preceded by the input-output model, on the basis of which the gross output is determined by final demand:

$$(\mathbf{I} - \mathbf{A})^{-1} \mathbf{y} = \mathbf{x} , \quad (1)$$

where:  $\mathbf{y} = [y(i)]$  – exogenous vector of final demand (by products  $i = 1, \dots, n$ ),  $\mathbf{x} = [x(i)]$  – endogenous vector of output (by products),  $\mathbf{A} = [a(ij)]$  – matrix of input-output coefficients,  $a(ij) = x(ij) / x(j)$ ,  $x(ij)$  – intermediate consumption of product  $i$  in production of product  $j$  ( $j = 1, \dots, n$ ).

Then, value added vector  $\mathbf{v} = \hat{\pi} \mathbf{x}$  is calculated, where  $\hat{\pi} = [\pi(j)]$  is a diagonal matrix ( $n \times n$ ) of the shares of value added in the gross output. Transforming value added by products classification into NACE classification and using tables of cross-classification of activity (industry) and sector data (see *Rachunki narodowe według sektorów...*, 2015, pp. 240-260) value added by NACE is transformed into value added by institutional sectors. This category is the balancing item of production account for each institutional sector (see Tab. 1) and, at the same time, it opens the revenue side of generation of primary income account.

Value added for total economy ( $vadd$ ) is decomposed into compensation of employees – costs incurred by employers from each institutional sector, which are primary income of households presented on allocation of primary income account ( $\sum_k comp(k) = labl$ ,  $k$  denotes the number/symbol of institutional sector), taxes less subsidies on production that are general government's primary income ( $\sum_k prtax(k) = prtax$ ) and primary income of institutional sectors in the form of operating surplus ( $\sum_k ops(k) = ops$ ):

$$vadd = labl + ops + prtax . \quad (2)$$

As the households sector is considered, the revenue side of the allocation of primary income account constitutes wages (and other costs related to employment), the operating surplus (and mixed income) and property income. The following equations for the first two categories can be written:

$$labl = lablr \cdot vadd , \quad (3)$$

$$ops(H) = ops(H)r \cdot vadd , \quad (4)$$

where:  $lablr$  and  $ops(H)r$  are coefficients showing respectively shares of compensation of employees and households' operating surplus (and mixed income) in the value added for total economy.

The balancing item on the allocation of primary income account is gross primary income, which opens the revenue side of the secondary distribution of income account. Gross primary income ( $priml(H)$ ) of

households sector is the sum of compensation of employees, the operating surplus (and mixed income) and net property income -  $propI(H) = propIo(H) - propIp(H)$ . Thus:

$$primI(H) = labI + ops(H) + propI(H), \quad (5)$$

$$propI(H) = propI(H)r / \left[ (1 - propI(H)r) \cdot (labI + ops(H)) \right], \quad (6)$$

where:  $propI(H)r$  is the share of net property income in primary income.

Subsequent equations (from (7) to (11)) refer to the transactions recorded on secondary distribution of income account which are particularly important for disposable income and its use for final demand financing in the case of households sector.

On the uses side of secondary distribution of income account are current transfers paid by households ( $curp(H)$ ): taxes on income and wealth ( $Itax(H)$ ) and social contributions ( $socc$ ) paid by households sector to general government – sub-sector of social security funds ( $socc(G)$ ) and to financial corporations – sub-sector of pension funds ( $socc(F)$ ) as well as other current transfers ( $ocurp(H)$ ). Taxes and social contributions mainly depend on the primary income and rates of compulsory fiscal burden:  $Itax(H)r$  and  $soccr$ :

$$Itax(H) = Itax(H)r \cdot primI(H), \quad (7)$$

$$socc = soccr \cdot primI(H) = socc(G) + socc(F), \quad (8)$$

other current transfers are equal:

$$ocurp(H) = ocurp(H)r / \left[ (1 - ocurp(H)r) \cdot (Itax(H) + socc) \right], \quad (9)$$

where:  $Itax(H)r$  – income tax rate,  $soccr = socc(G)r + socc(F)r$  – social contribution rate for payments to general government and to financial institutions,  $ocurp(H)r = ocurp(H) / curp(H)$  is the share of other current transfers in total current transfers paid by households.

On the other hand, the revenues on the secondary distribution of income account are current transfers obtained by households: social benefits ( $socb$ ) and other current transfers ( $ocuro(H)$ ):

$$socb = socb(G) + socb(F), \quad (10)$$

$$ocuro(H) = occur(H)r / \left[ (1 - ocuro(H)r) \cdot socb \right], \quad (11)$$

where:  $ocuro(H)r$  is the share of other current transfers in current transfers obtained by households,  $socb(G) = socb(G)r \cdot socc(G)$  are social benefits paid by general government (excluding retirement pay from the capital part of the pension system if it is paid by general government),  $socb(F)$  are social benefits paid by financial corporations and retirement pay from the capital part of the pension system. Transactions occurring in identity (10) are determined on the basis of the identities stored for general government and financial corporations, which are also the part of the model in aforementioned project. The coefficient

$socb(G)r$  is the ratio that measures the relationship between the amount of social benefits  $socb(G)$  transferred to households in a given year and social contributions paid by households to general government ( $socc(G)$ ). Its level is particularly important for the analysis of the balance of pension systems in countries with a large share of non-capital part of the pension system (as it is in Poland).

The balancing item on the secondary distribution of income account is gross disposable income ( $dispI$ ), which is the sum of primary income and net of current transfers:

$$dispI(H) = primI(H) + socb - socc - Itax(H) + ocur(H), \quad (12)$$

where:  $ocur(H) = ocuro(H) - ocurp(H)$ .

From the point of view of demographic structure's impact on households' disposable income structure, the ratio

$$socIr = socb / dispI(H), \quad (13)$$

that measures the share of social benefits in disposable income, deserves special attention. Whereby, an additional cognitive value brings the disaggregation of social benefits due to retirement, disability and others by using data on pensions from sources other than the national accounts (see further).

Gross disposable income opens the revenue side of the use of disposable income account. The next item is the adjustment for the change in pension entitlements - net of pension transactions within the capital part of the pension system diminished by the service charges associated with pension scheme ( $feer$ ):

$$apen = (socc(F) - socb(F)) / (1 + feer), \quad (14)$$

where:  $feer$  is the rate of charges  $fee$ .

On the expenditure side of the use of disposable income account is consumption ( $ce(H)$ ), whereas the balancing item is gross saving ( $sav(H)$ ), determined residually in this model:

$$sav(H) = dispI(H) - ce(H) + apen, \quad (15)$$

$$\text{so } dispI(H) = sav(H) + ce(H) - apen. \quad (15a)$$

Gross saving opens the revenue on capital account, which together with the net of capital transfers ( $cap(H)$ ) and net borrowing constitutes sources of tangible accumulation ( $inv(H)$ ) financing. The balancing item of the capital account is net lending - in the national accounts recorded as a positive value (when the net acquisition of financial assets exceeds the net incurrence of liabilities) or net borrowing - negative value (when the net incurrence of liabilities exceeds the net acquisition of financial assets). This item also balances the entire sequence of non-financial accounts, being the difference between total revenue and total expenditure on current and capital account:

$$lend\_bor(H) = sav(H) - inv(H) + cap(H), \quad (16)$$

where:

$$cap(H) = cap(H)r \cdot inv(H), \quad (17)$$

$cap(H)r$  shows the scope of accumulation financing with capital transfers, including investments grants.

Taking into account formula (15):

$$lend\_bor(H) = dispI(H) + apen - ce(H) - inv(H) + cap(H), \quad (16a)$$

then, formula (12)

$$lend\_bor(H) = primI(H) + socb - socc - Itax(H) + ocur(H) + apen - ce(H) - inv(H) + cap(H). \quad (16b)$$

The equations (18b) and (18c) show that households' final demand (consumption and tangible accumulation) is financed with disposable income (primary income and the net of current transfers), including the adjustment for the change in pension entitlements, the net of capital transfers and net borrowing. Therefore, on the basis of (18b) :

$$\frac{dispI(H) + apen}{ce(H) + inv(H)} + \frac{cap(H)}{ce(H) + inv(H)} + \frac{-lend\_bor(H)}{ce(H) + inv(H)} = 1. \quad (18)$$

Equation (18) shows the percentage of sources of final demand financing. In the case of recording net borrowing the third component of equation (18) is negative and show to what extent final demand is financed with liabilities (changes in liabilities less changes in financial assets). Otherwise, i.e. when net lending is recorded, this component is positive and shows a surplus of funds of households sector as a percentage of final demand. In the analysis of final demand financing total category is considered, i.e. consumption and investments (accumulation of tangible assets). Thus, the saving isn't distinguished as a particular source of final demand financing. Saving of households in Poland is the subject of research conducted by Liberda (2013), whereas the degree of tangible accumulation financing with saving was analyzed by Tomaszewicz (2014).

In the paper the attention is put on the final demand financing with liabilities (net borrowing). From this point of view, a greater cognitive value would have the analysis of equation that decomposes the sources of households sector's final demand financing based on both non-financial and financial accounts:

$$\frac{dispI(H) + apen - FA(H)}{ce(H) + inv(H)} + \frac{cap(H)}{ce(H) + inv(H)} + \frac{L(H)}{ce(H) + inv(H)} = 1. \quad (18a)$$

Assuming the consistency of non-financial and financial accounts, for each institutional sectors the difference between net acquisition of financial assets ( $FA$ ) and net incurrence of liabilities ( $L$ ) should be equal to the balancing item of non-financial accounts, i.e. net lending / net borrowing:

$$FA - L = lend\_bor. \quad (19)$$



Unfortunately, in most countries, non-financial accounts and the financial accounts are not balanced, what is reflected by the item of discrepancy with the financial net lending / net borrowing (cf. Groon, 2005; Tomaszewicz, 2014; Trębska, 2014), which significantly hampers a detailed analysis of final demand financing with an indication of the specific financial market instruments showed on financial accounts.

### 3. CROSS-COUNTRY TIME-SERIES ANALYSIS OF SELECTED COEFFICIENTS OF THE MODEL

Time series presenting the most important transactions of the households sector in Poland and other selected European Union countries compared in the paper (Germany, United Kingdom, Spain, Denmark, France, Italy, the Czech Republic and Hungary) were constructed with the use of Eurostat database (non-financial transactions on sectoral annual accounts). Despite of the standardization of national accounts (ESA 2010), definitions of some transactions in individual countries may be characterized by a certain otherness (particularly with regard to social contributions and taxes). Thus, the results of comparative analysis should be interpreted with caution<sup>2</sup>.

The coefficients of equations presented in the previous part of the study, sequentially describing the structure of value added, current transfers, the structure of disposable income and the sources of households' final demand financing, are analyzed for the years 2000-2013. A special attention is paid to these coefficients, which values and dynamics are used to explain final demand financing and to verify hypotheses that were formulated. These are mainly: the participation of households' primary income in creating value added in the economy, the coefficients of the share of social transfers in disposable income of households, and coefficients concerning the scope of final demand financing from various components of households' income.

#### 3.1 Structure of value added (cf. equations 3-4)

In most EU countries more than 50% of value added in the economy constitutes compensation of employees (i.e. wages and social contributions paid by employers) - households' primary income. As the compared countries are taken into account, the share of compensation of employees in the value added in the economy (coefficient  $lablr$ ) is particularly high in the EU countries with GDP per capita exceeding the EU average, i.e. in Denmark, Germany, France, United Kingdom, whereas it is much lower in Italy and in the countries of Central and Eastern Europe. In Poland, this ratio is among the lowest in Europe (in 2013 it was lower only in Greece), and it was characterized by a downward trend in the analyzed period (see Tab. 3). At the same time, a particularly high, but declining share of operating surplus (and mixed income) of Polish households in the value added (coefficient  $ops(H)r$ ) is seen. This is associated with a relatively large number of micro-enterprises in Poland (according to *Small Business Act...*, 2015) in 2013 there were 1,4 million, representing 95.2% of enterprises, with the EU average of 92.3%). The number of active micro-enterprises was characterized by a slight rising trend (except for a decline in 2009), but the number of newly-registered micro-enterprises (as well as de-registrations) significantly increased in recent years. Table 3 shows, however, that the total share of wages and operating surplus of households in the value added in Poland (the sum of  $lablr$  and  $ops(H)r$ ) is close to the EU average. This means that the low share of wages in a certain sense was compensated for mixed income and operating surplus of households. The share of this aggregate category of primary income in the value added is generally declining in Poland, Spain and Germany. Also

<sup>2</sup> Authors of the paper had the opportunity to discuss the issue with representatives of various countries during the 23th INFO-RUM World Conference in August 2015 in Bangkok, where fragments of this study were presented.

the share of households in the creation of value added is declining in Hungary and slightly declining in the Czech Republic, but this is due to the rate of decrease in operating surplus which is greater than the growth rate of wages.

Table 3

The shares of compensation of employees and operating surplus (and mixed income) of households in the value added in the economy

Country	Coefficient year	<i>lablr</i>			<i>ops(H)r</i>		
		2000	2007	2013	2000	2007	2013
Germany		58.6	53.0	56.6	14.8	14.0	13.8
United Kingdom		58.8	58.5	57.4	13.7	14.2	14.8
France		56.9	56.7	59	16.3	16.5	15.6
Italy		41.2	42.8	44.1	26.6	26.2	27.2
Spain		53.4	53.8	51.4	22.0	20.2	19.6
Denmark		57.9	60.4	60.4	10.6	9.2	9.3
Hungary		53	54.4	54.7	20.7	16.1	15.1
Czech Republic		42.5	43.3	45.7	21.7	18.3	18.1
Poland		46.9	43.1	42.3	29.9	29.1	27.8
EU28 (average for 2002-2013)		53.6			17.2		

Source: calculated by the authors on the basis of Eurostat database: Non-financial transactions (update: 30-07-2015).

The declining share of wages and operating surplus of households sector in Poland, with the growing share of corporations' operating surplus (mainly non-financial corporations sector) confirms the first of the formulated hypotheses. Whereby, the specificity of the structure of households sector by sub-sectors in Poland means a relatively high share of operating surplus in the primary income of households.

### 3.2. Primary income of households (cf. equations 5-6)

In the years 2002-2013 compensation of employees constituted 66.6% of households' primary income in the EU, while operating surplus was about 21%. According to the model both categories are the fractions of the value added in the economy, their changes are analyzed above. Thus, in this paragraph the focus is only on the share of net property income in the primary income ( $propI(H)r$ ). This coefficient was characterized by especially great diversity, both spatial and over time. It was particularly high in Germany, Italy and United Kingdom - above the EU average (11.9% in 2002-2013) but far below 10% in France, Hungary, Spain, the Czech Republic, Poland and Denmark. In most of the analyzed countries, this ratio was characterized by a downward trend (see Fig. 1), which resulted primarily from the increase in household debt (especially before the crisis – i.e. to 2008). Diminishing net property income changes the structure of final demand financing.

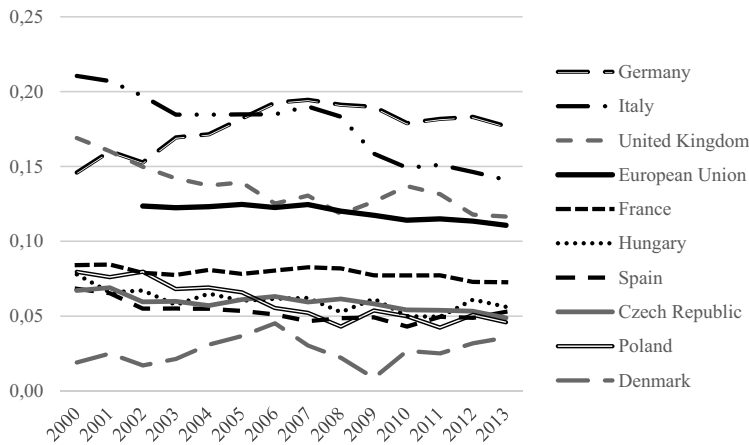


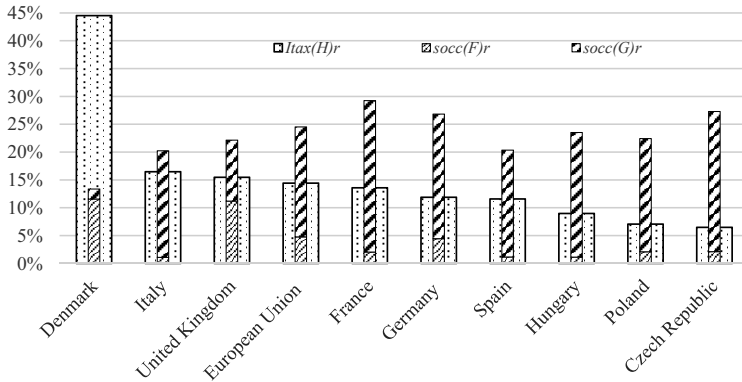
Figure 1. The share of net property income in primary income of households

Source: calculated by the authors on the basis of Eurostat database: Non-financial transactions (update: 30-07-2015).

### 3.3. Current transfers (cf. equations 8-12)

In the EU, 13.7% (on average in 2002-2013) of households' primary income was transferred to general government in the form of income taxes, while social contributions constituted on average 23.7% of primary income. The highest tax rates are observed in the Nordic countries and the lowest in the countries of Central and Eastern Europe (see Fig. 2). Due to some kind of substitution of income taxes and social contributions, a high tax rate ( $Itax(H)r$ ) is accompanied by low  $soccr$ , e.g. in Denmark, and inversely e.g. in the Czech Republic (Pearson coefficient calculated for  $Itax(H)r$  and  $soccr$  in the analyzed group of 9 countries in 2013 equals  $-0,77$ ). In Poland, both  $Itax(H)r$  and  $soccr$  were at a lower level than the EU average in 2013 (see Fig. 2).

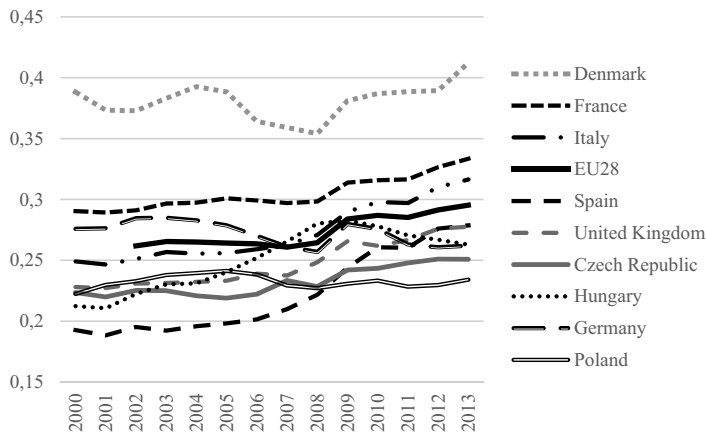
In the EU, on average 80% of social contributions constitute transfers to general government - sub-sector of social security funds, and around 20% are transfers to financial corporations - sub-sector of pension funds. Differences between countries are mainly due to the principles of pension systems (cf. e.g. *The 2012 Ageing Report...*, 2012, pp. 89-100), i.e. the proportion between capital and non-capital parts of the system (see Fig. 2). A particularly high proportion of contributions transferred to financial institutions is observed in Denmark (and other Nordic countries) and in the United Kingdom, on the contrary, it is significantly low in the countries of Central and Eastern Europe, and also in Italy, France and Spain.



**Figure 2. Fiscal burden in selected EU countries in 2013 (in % of primary income)**

Source: calculated by the authors on the basis of Eurostat database: Non-financial transactions (update: 30-07-2015).

In Poland, the rate of social contributions (*soccr*) was characterized by a slight upward trend in the years 2000-2013. One of the effects of the pension reform in Poland (as in the Czech Republic, Hungary, and Germany) was the increase in the value of contributions paid to the financial corporations (*socc(F)r*) observed until 2010 (cf. Figure 3). This trend was stopped in Poland after reducing in 2011 the obligatory dimension of the rate of social contributions paid to pension funds.



**Figure 3. Social contribution rates in Poland (in % of primary income)**

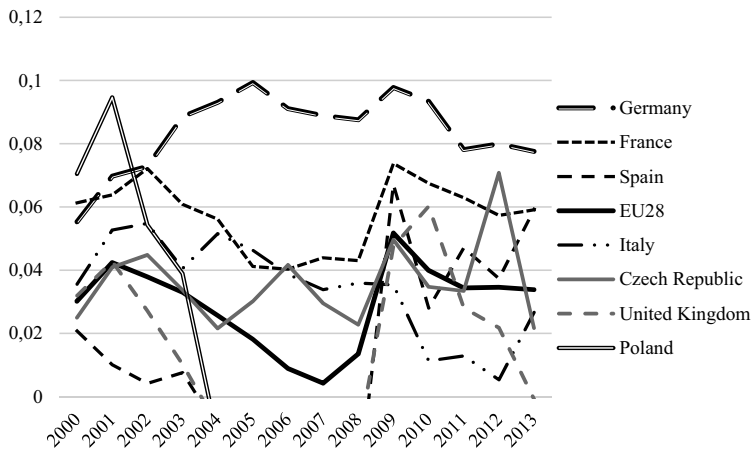
Source: calculated by the authors on the basis of Eurostat database: Non-financial transactions (update: 28-08-2015).

Demographic changes towards an increasing share of older people in the population mean an increase in the number of people receiving social benefits, especially social security benefits, which constituted above 80% of social benefits in Poland in the years 2000-2012 (according to ESA 1995 the year 2012 is last available for social security benefits; in ESA 2010 there is no distinction between social security and social

assistance benefits). It generally should result in an increase in the share of these benefits in the disposable income of households (on the condition that there is no tendency to decrease the average value of the pension payment in relation to average wage). The increase of this share is observed in most European countries in the years 2000-2013 (see Fig. 4), excluding Germany and Poland.

The extension of the analysis by more detailed data on pensions (Eurostat database: social protection) shows that the increase in this ratio in the EU is mainly due to old age pensions (in 2008 total old age pensions constituted 13.8% of households' disposable income in EU28, while in 2012 this share equalled 15.6%). The increase in this share was also observed in Poland by 2009 (in the years 2000, 2009 and 2012 it equalled respectively 11%, 14.8% and 13.5%). However, this increase was "compensated" by a decrease in disability pensions and temporarily stopped by the limited early retirement and a gradual shift in the retirement age in Poland.

The above empirical outcomes for EU28 indicate the truth of the hypothesis about the increasing degree of households dependence on the social security system, especially the pension system. The lack of confirmation of this hypothesis in the case of Polish households income stems from a number of changes in the principles of the pension system introduced in the recent years in Poland.



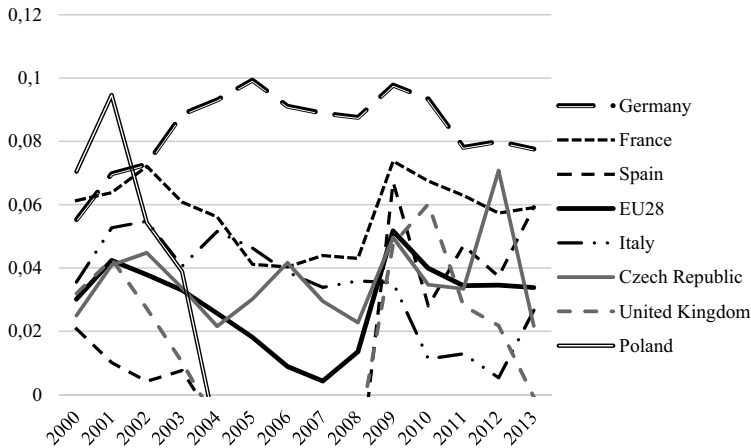
**Figure 4. The relationship between social benefits and households' disposable income (*socIr*)**

Source: calculated by the authors on the basis of Eurostat database: Non-financial transactions (update: 30-07-2015).

#### 4. THE SOURCES OF HOUSEHOLDS' FINAL DEMAND FINANCING

The sequence of national accounts brings to the equation (19), which represents the structure of final demand financing with disposable income, net capital transfers and net borrowing (if the last occurs). Final demand of households is financed primarily with disposable income, the structure of which was analyzed in the preceding paragraphs of this paper. In the case of the households sector capital transfers are of negligible interest (unlike in the case of non-financial corporations and general government sector). In most EU countries disposable incomes exceeded final expenses of households, thus net lending (surplus of funds) of households was observed, particularly high in Germany and France. Generally, the ratio of net lending to final demand in the UE28 was characterized by a downward trend due to increasing liabilities until 2007

(from Eurostat database: Financial transactions), while in some countries (Poland, United Kingdom and Spain since 2004) net borrowing was recorded. After the outbreak of the financial crisis and restrictions on the granting of new loans this ratio significantly increased (see Fig. 5).



Note: In years in which the line for a given country is not visible on the graph net borrowing is recorded.

Figure. 5. Net lending in relation to final demand

Source: calculated by the authors on the basis of Eurostat database: Non-financial transactions (update: 30-07-2015).

Table 4

The structure of households' final demand financing in Poland

Year <sup>1</sup>	$\frac{displ(H) + apen}{ce(H) + inv(H)}$	$\frac{cap(H)}{ce(H) + inv(H)}$	$\frac{-lend\_bor(H)}{ce(H) + inv(H)}$
2005	0,982	0,001	0,017
2006	0,986	0,006	0,008
2007	0,968	0,005	0,026
2008	0,953	0,004	0,043
2009	0,990	0,005	0,005
2010	0,980	0,003	0,017
2011	0,952	0,003	0,045
2012	0,945	0,003	0,052
2013	0,959	0,004	0,036

<sup>1</sup> lack of results for 2004 stems from negative net of capital transfers

Source: calculated by the authors on the basis of Eurostat database: Non-financial transactions (date: 28-08-2015).

By 2003 net lending of households in Poland was observed, while its sharp decline in 2002 and 2003 resulted in net borrowing since 2004. The share of households' net borrowing in the financing of final demand generally increases, a short drop was observed after the outbreak of the crisis in the years 2009-2010

(see Tab. 4). The increase in net borrowing was associated primarily with incurrence of liabilities, mainly long-term loans (including mortgages) for the purchase of dwellings due to expected increase in prices of real estate after May 1, 2004, among others, because of rising prices of construction materials (*Sytuacja na rynku kredytowym...*, 2004). The rate of growth in demand for long-term loans was halted only in 2009 due to tightening conditions for granting housing loans after the outbreak of the crisis. In the years 2003-2013 stock of households' liabilities in the form of long-term loans increased by more than 400% in real terms (authors' calculation based on Eurostat database: Financial balance sheets). Thus, despite a considerable increase in housing prices<sup>3</sup> the demand for housing has not been slowed down, which may indicate a catching-up effect in the housing area<sup>4</sup> after joining the EU strengthened by the concerns of an increase in real estate prices to the level observed in the EU. It should also be noted that the increase in net borrowing was due not only to the aforementioned increase in incurrence of liabilities, but also to significantly lower rate of growth of financial assets or even decline in their stock. e.g. equity and investment fund shares in 2008 and 2011 (Eurostat database: Financial transactions).

In Table 4, it is clearly visible that the share of disposable income in final demand financing of households in Poland is decreasing, while the share of net borrowing is growing. It means that liabilities grew faster than disposable income, and the variability of liabilities only in 24% (according to determination coefficient) can be explained by variability of disposable income. The increase in demand for loans in Poland may rather be explained by expectations concerning the growth of income in the future (Backe, Wojcik 2006) and an increase in propensity to consume and accumulate, which reflect the catching-up effect - on the one hand, and on the other hand - increase of the credit offer of banks and low interest rates.

## 5. CONCLUDING DISCUSSION ON PRELIMINARY ASSUMPTIONS FOR POLISH HOUSEHOLDS' INCOME SIMULATIONS

Application of the recorded deterministic model for the Polish households sector requires knowledge of coefficients of the stored identities. The starting point for formulating the assumptions for the changes of these coefficients in the medium and long term has to be - on one hand - their historical analysis compared to EU, presented in the previous part of the study. On the other hand, these assumptions must be linked with the desired directions of changes in economic policy (particularly fiscal and social ones), especially in the context of changes in the demographic structure. Many prerequisites for these changes stem from the ongoing discussions among Polish economists (Winięcki, 2009; Kołodko, 2011) and the broader debate on the shape and directions of changes in the market economy (Piketty, 2014; Krugman, 2012; Kaletsky, 2011).

The coefficients of the model relating to generation and distribution of households' income can be grouped as follows:

- 1) coefficients characterizing the relationship between the transactions on the account of generation and allocation of primary income, i.e. shares of compensation of employees and households' operating surplus in the value added for the whole economy ( $labl/r$  and  $ops(H)r$ ) as well as the share of net property income in primary income ( $propI(H)r$ ),

<sup>3</sup> The price of 1 m<sup>2</sup> of residential building area in the first quarter 2009 was 88% higher than in the first quarter of 2003 - see <http://stat.gov.pl/obszary-tematyczne/przemysl-budownictwo-srodk-trwale/budownictwo/cena-1-m2-powierzchni-uzytkowej-budynku-mieszkalnego-oddanego-do-uzytowania,8,1.html#>, during this period the prices of goods and services increased by only 15% - see <http://stat.gov.pl/obszary-tematyczne/ceny-handel/wskazniki-cen/wskazniki-cen-towarow-i-uslug-konsumpcyjnych-pot-inflacja/>.

<sup>4</sup> In 2015, there are 360 dwellings per 1,000 inhabitants, while in Germany 500 - see <http://www2.deloitte.com/pl/pl/pages/real-estate/articles/Polski-rynek-mieszkalniowy-na-tle-innych-krajow.html>.

- 2) the instruments of fiscal policy such as income tax rate ( $Itax(H)r$ ) and the rate of social contributions ( $soccr$ ),
- 3) coefficients related to social policy, i.e. the share of social transfers in disposable income ( $socIr$ ) whose changes are associated, among others, with changes in the demographic structure,
- 4) coefficients determining other current transfers, capital transfers paid and received by households and service charges associated with pension scheme ( $ocurp(H)r$ ,  $ocuro(H)r$ ,  $cap(H)r$ ,  $feer$ ).

Analysis of the structure of value added in Poland (the first group of coefficients listed above) in the last 14 years (since 2000) confirmed the hypothesis of the decreasing share of primary income of households in the value added in the economy. Should a further decline be expected in the future? Firstly, the fact that the share of wages in value added in Poland is much lower than in the EU should be considered. Secondly, from the opinion of many Polish economists expressed on various forums follow explicitly that wages in Poland must rise, emphasizing simultaneously that the competitiveness of the Polish economy can no longer rely on low labor costs (Belka from *Gazeta Wyborcza*, 18-19.07.2015; Orłowski from *Newsweek*, 26.02.2015; Olechowski, 2015). Moreover, the desired increase in innovations must be accompanied by an increase in wages (Mączyńska, 2015). The expected increase in wages is also associated with projected decline in labor supply (Wojtyna, 2015).

In turn, from polemics on the structure of the labor market in terms of employment forms stems suggestion to limit the size of self-employment (in Poland in 2013, 70% of micro-enterprises accounted for self-employed) and introduce certain restrictions relating to civil law contracts (at the beginning of the year 2015, they accoued for 30 % of all contracts - European Commission report of February 2015). These contracts are considered not as a form of flexible employment, but as a way to reduce the fiscal burden imposed on the employer. Thereby, the abusing of these kinds of contracts increases the risk of worsening of future pensioners' financial situation, additionally taking into account lowvoluntary saving for retirement, so far – cf. *Polacy o dodatkowym oszczędzaniu*, 2010; *Postawy Polaków...*, 2009). As it is indicated by Mączyńska (2015) social contributions paid from all forms of income will foster the balancing of the social system's finance, freeing the budget from rising subsidies for social security funds. However, civil contracts may promote the increase of labor market flexibility, what in turn, increases the level of economic activity (Kwiatkowski, 2003). The activity rate in Poland increased from 65.8% in 2000 to 67.9% in 2014, but it is still lower than the average for the EU28 in 2014, equal to 72.3% (Eurostat database: Population, activity and inactivity).

Tax burden in Poland in relation to primary income is generally much lower than the EU average (income taxes and social contribution in total constituted 27,3% of primary income in Poland in 2013, while in EU28 – 34,1%). From the ongoing debate follows that fiscal policy will not be based on the direct raising of tax rates. However, it is desirable to change the tax structure by increasing the progression of tax rates, the introduction of a tax on financial transactions, a cadastral tax, the broadly understood tightening of the tax system (Mączyńska, 2015).

The most complex issue is to anticipate transfers related to social policy, i.e. pension transfers (mainly retirement payments, disability pensions, survivors pensions) and other social benefits (mainly unemployment benefits). The amount of benefits depends on the number of beneficiaries and the average of the various types of benefits. Retirees account for the greatest number of beneficiaries. According to demographic forecasts (*Prognoza ludności na lata 2014-2050*, 2014), in the coming decades in Poland, their number will grow from 7.1 million in 2015 to 9.9 in 2050. At the same time, the working age population will decrease from 24.4 million in 2015 to 19 million by 2050. These changes are particularly unfavourable to the financial balance of the social security system, in particular of the pension system in Poland in its present form, i.e. with a small share of the capital part of the system. Balancing the social security system shall be



facilitated primarily by changes of the retirement age and decrease in the ratio between the average retirement payment and the average wage in Poland, i.e. replacement rate from 0,49 in 2010-2015 to 0,20 in 2050 (according to *The 2012 Ageing Report...*, 2012), as well as by projected growth in labor activity rate against a forecast of increase in the demographic dependency rate. Taking into account the above factors requires the use of more detailed sub-model for predicting pension transactions, which is also the subject of the aforementioned project (Trębska, 2015). One of the implications of this sub-model results indicates the level of replacement rate, that balances the pension system in Poland (which is close to those projected in *The 2012 Ageing Report...*).

The hypothesis about the growing dependence of households in Poland on the social security system through pension transfers in the years 2000-2012 has not been confirmed. The share of social benefits (in cash) in disposable income in the future will depend on the relationship between growth rates of total amounts of wages and pensions. Considering the potential increase in wages (for example 2% per year), projected increase in the post-working age population (from mentioned above 7.1 million in 2015 to 9.9 million in 2050 assuming subsequent increase in retirement age to 67), and decrease in labor force by 21% (from *The 2012 Ageing Report...*), the share of social benefits (in cash) in disposable income of households in Poland does not have to increase. Under above assumptions for 2050 and the projected decline in the replacement rate from 0,49 to 0,2, the increase in total amount of social benefits  $(9.9/7.1 * (2.0 * 0.2 / 0.49)) = 1,17$  – increase by 17%) will be much lower than the increase in total amount of wages  $(1,02^{35} * 0,79 = 1,58$  – increase by 58%).

Undoubtedly, the changes in the structure of final demand, i.e. the increase of the share of government consumption in final demand, in particular the expenses on health care due to the forecasted increase in the percentage of the post-working age population from 18.6% in 2015 to 29.3% in 2050 (see *Prognoza ludności na lata 2014-2050*, 2014) are expected.

The increase in the share of net borrowing in the financing of final demand (coefficient  $\frac{-lend\_bor(H)}{ce(H) + inv(H)}$ )

confirms to a large extent the truth of hypothesis about the importance of catching-up effect in the dynamics of households' liabilities in Poland. Long-term projection of changes in this ratio requires the simultaneous considering of the possible changes in the propensity to save and the propensity to borrow - issues which are often opposed to each other in theory and economic studies. The amount of liabilities is the highest in the middle class, both in the case of promotion from the lower class, as well as degradation from the higher class (Schraten, 2012). In the first case, the incurrence of liabilities is favoured by the effect of catching-up, while in the second, by striving to maintain a constant standard of living. The increase in income can interact bidirectionally – it can raise the propensity to save (e.g. Modigliani, Ando, 1963; Liberda, 2013) or raise the propensity to borrow with increasing creditworthiness (see cited before Backe, Wojcik, 2006; Kraft, 2007). Wealth level (stock of financial and tangible assets possess by households) is of crucial importance in this matter. In Poland, being a country that is still catching-up with economies of Western Europe, stock of households' assets in relation to GDP is much lower than in the group of EU28 countries (financial assets were 94,1% of GDP in Poland in 2014, while in EU28 – 225,5% of GDP). Therefore, an increase in income of households sector in Poland resulted in greater increase in propensity to borrow (as in the case of moving from a lower to a higher income group), than in propensity to save (what is evidenced by data from Eurostat database for the years 2000-2013 according to which the households sector's propensity to save decreased from 18,1% in 2000 to 3% in 2013, while the ratio between net borrowing and disposable income increased from 1,8% in 2005 to 3,8% in 2013).

A more detailed analysis of the sources of final demand financing in the economy, including the share of liabilities for final expenses, requires using a deterministic flow-of-funds model based on a sequence of

national accounts (see Klein 2003 and some application made by Tsujimura, Tsujimura, 2011; Duca Muellbauer, 2013; Li, 2008; Be Duc, Le Breton, 2009). With regard to the Polish economy, the attempts to build such a model have been made (Tomaszewicz Trębska, 2013; Trębska, 2014) and they will be continued in the aforementioned project.

## ACKNOWLEDGMENTS

The project financed by Polish Science Center no. DEC-2012/07/B/HS4/02928 „Determinants of the development of the Polish economy in the twenty-first century. Empirical analysis and projections based on system of macro-economic models.”

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