

EQUILIBRIUM

Quarterly Journal of Economics and Economic Policy

Volume 13 Issue 2 June 2018

p-ISSN 1689-765X, e-ISSN 2353-3293

www.economic-policy.pl



ORIGINAL PAPER

Citation: Trębska, J. (2018). Polish households' savings in the financial intersectoral linkages. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 13(2), 307–329. doi: 10.24136/eq.2018.016

Contact: jtrebska@swspiz.edu.pl, University of Social Sciences in Lodz, Sienkiewicza 9, 90-113 Łódź, Poland

Received: 13 June 2017; Revised: 19 January 2018; Accepted: 25 February 2018

Joanna Trębska

University of Social Sciences in Lodz, Poland

Polish households' savings in the financial intersectoral linkages

JEL Classification: E21; G2; C82

Keywords: *saving; flow of funds; data estimation; financial input-output model*

Abstract

Research background: Savings of households are accumulated as a result of individual propensity to save. Simultaneously, they provide the sources of financing investments in the economy through financial institutions as intermediaries in the flow of funds, between entities with a surplus and those with a demand for them.

Purpose of the article: The paper aims at indicating the changes in the structure of households' financial savings in Poland in the period 2003–2015, as well as at exploring them as a source of financing the activities of other sectors through institutional mechanisms of the financial system.

Methods: Intersectoral financial flows were estimated using input-output methods for compiling “sector by instrument” tables of financial assets and liabilities into “sector by sector” matrices of intersectoral flows of each financial instrument. The research is based on statistical data published in the Eurostat database, i.e. annual accounts — financial balance sheets by institutional sectors and subsectors. The role of households' financial savings in the network of intersectoral linkages in the financial system has been examined on the basis of financial input-output model.

Findings & Value added: The comparison of the significance of particular institutional sectors' supply of funds clearly indicates that the increase in households' financial assets causes the largest increase in financial flows both as a result of direct effect and indirect effects reflecting the size of these flows' feedback in the financial system. The study presented herein is the first application of the input-output approach for the Polish financial system. The idea of financial input-output model proposed by Tsujimura & Mizoshita

(2003) is extended to disaggregate intersectoral flows in the form of individual financial instruments.

Introduction

Households, as the primary saving sector, provide funds to the financial system, which are then transferred mainly to non-financial corporations and become a source of investment financing. The study, therefore, focuses on achieving two main objectives. The first one is to report on the structure of households' financial savings in terms of the reasons for saving and the availability of various forms of saving. The second objective is to examine the financial assets of households as a source of financing other sectors' activity through institutional mechanisms of the financial system, with particular emphasis on the role of financial institutions as intermediaries in the flow of funds between the entities with their surplus and those with demand for them. The research is done for the Polish households in the period 2003–2015

Statistical data derived from the annual financial accounts were used in order to achieve these goals. They are constructed in accordance with ESA'2010 (*European System of Accounts ESA 2010*, 2013), published in the Eurostat database. The financial accounts are presented by the following institutional sectors: non-financial corporations, financial institutions, general government, households, non-profit institutions serving households, and the rest of the world. Financial institutions are additionally divided into 4 subsectors: 1) monetary financial institutions, 2) other financial institutions (except ICPFs), financial auxiliaries, CFIs, and money lenders, 3) non-MMF investment funds, 4) insurance corporations and pension funds¹. Many countries, and the EU as a whole, prepare financial accounts for the household sector in conjunction with non-profit institutions. In order to ensure comparability of data, this principle was also adopted in this study. The aggregated sector includes natural persons obtaining income from employment and non-earned sources, own-account workers in private farms in agriculture and outside agriculture, employing up to 9 persons, as well as non-profit institutions which are separate legal entities operating for households, e.g. trade unions, churches, sport clubs, community housing, etc.

The meaning of the financial savings term used herein is the stock of financial assets accumulated by individuals classified to the household sector (together with non-profit institutions²). The realization of specific mo-

¹ The names of the sectors and subsectors are cited verbatim from ESA'2010.

² Since financial assets of non-profit institutions account for less than 1.5% of the assets

tives/reasons for saving is associated with fund accumulation in particular financial (and non-financial) assets suitable for the purpose of saving.

Financial savings gathered by households circulate in the financial system and therefore finance the debt of other sectors, which in turn cover their expenses by incurred liabilities, e.g. the investments of corporations. In this way, financial savings and tangible investments are closely related, linking the financial and “real” sphere of the economy. The financial crisis of 2008 highlighted the need to analyze the financial connections between different sectors of the economy. Palumbo and Parker (2009, pp. 81–81) explain in particular the role of households in the outbreak of the last financial crisis. In this context, many authors notice the need to fully integrate financial balance sheet and accumulation account, as well as to make compilation of this kind of data on a from-whom-to-whom basis, which allows for identifying who is financing whom, in what amount, and with which type of financial instrument (see *The Financial...*, 2009, Shrestha *et al.*, 2012, pp. 3–5). The importance of this problem increases with the growing degree of global financial integration that speeds up the spread of financial shocks around the world (Tsujimura & Tsujimura, 2011, p. 2). Financial accounts present assets and liabilities as sector-by-instrument data. They show in which financial instruments, entities — institutional sectors — locate their surplus of funds and in which financial instruments they incur liabilities. Such system does not show who (which sector) the creditor and the debtor is in terms of a given financial instrument. An attempt to estimate flows of financial instruments on a “from whom to whom” basis, is undertaken in this study. The idea of the method, proposed by Tsujimura and Mizoshita (2003), is extended to disaggregate intersectoral flows in the form of individual financial instruments. Although the methodology employed in the study is quite common internationally, it is relatively rare in Poland.

The structure of the paper is the following. The first part is a brief literature review on reasons for saving. In the next part, the changes in households’ financial assets structure in Poland in 2003–2015³ are depicted. The third part describes the estimation method of intersectoral flows of various financial instruments and the basic equations of the financial input-output model as a tool for simulation of supply of funds and demand for them. The fourth part shows the maps of financial intersectoral linkages, with particular emphasis on the flow of households’ financial savings as the sources of

of households and non-profit institutions in total, further data analysis focuses on the household sector.

³ The analyzed time period results from the availability of statistical data compiled by the standards of ESA 2010.

financing the activity of entities in the economy, through financial institutions (as intermediaries). The scale of the impact of household financial savings on the financial system is explored through the financial input-output multipliers. The concluding paragraph contains a brief summary and some directions of future research.

Reasons and forms of households' financial saving

Decisions on income spending depend on the individual propensity to consume and save. The strength of propensity to save results from the level of income, its variability, and different kinds of personal and socio-economic characteristics of an individual. Keynes (1936) distinguishes objective and subjective saving reasons (factors). The main objective (macroeconomic) factors are: changes in the purchasing power of money, changes in the difference between gross income and net income (after deduction of compulsory fiscal burden), the level of interest rate and its changes, instruments of fiscal policy relevant to a given form of financial saving, predictions about the relationship of current and future income (e.g. on the basis of economic development forecasts). The above-mentioned objective factors influence the propensity to save, measured usually by the relationship between savings and disposable income. The main microeconomic factor is the financial position of a saver — especially his/her income level. Numerous empirical studies on propensity to save of households in the United States (Klein, 1960; Attanasio, 1994, pp 57–123; Attanasio, 1993; Attanasio *et al.*, 2004), in Great Britain (Attanasio *et al.*, 2004), in Canada (Burbidge & Davies, 1994, pp. 11–56), in Asia (Horioka & Terada-Hagiwara, 2012, pp. 128–137) in Poland (Kolasa & Liberda, 2015, pp. 124–148; Liberda & Szymczak, 2011; Liberda & Pęczkowski, 2012, pp. 1–10; Liberda *et al.*, 2004, pp. 1–18; 2011, pp. 93–104) and cross-sectional studies (Alessie *et al.*, 2013, pp. 308–328; Loayza *et al.*, 2000, pp. 165–181) were conducted.

Savings are accumulated for the following reasons, which are distinguished by Keynes as potential, subjective factors/reasons of saving:

- to increase expenses in the future, including tangible assets (for future purchase of goods, the cost of which exceeds current income, e.g. real estate);
- for prudential reason (as a contingency reserve);
- to leave inheritance;
- for speculative reason (for the benefits coming from interest and cash deposits enlargement);
- for the reason of avarice (the reluctance to spend).

Saving can be a goal in itself, resulting from a general precaution of individuals who want to have a sense of security (cf. precautionary saving described by Carroll and Samwick (1998, pp. 410–419) and recently studied among others by Rossi and Sansone (2017, pp. 1–23), Broadway and Haisken-DeNew (2017, pp. 1–32)). Furthermore, a crucial reason for saving is to achieve security for the old age period. This means a desire to equalize the consumption during one's life regardless of the level of disposable income, which usually decreases at retirement (cf. the theory of relative income described in the context of the propensity to save above all by Brady & Friedman (1947, pp. 247–265); Modigliani (1949, pp. 369–444)).

Subjective factors largely stem from the individual character traits. They basically remain almost unchanged in the short term, since their intensity depends on the cultural background, religious norms and prevailing social attitudes. The form of the implementation of these factors results from the offer of products (financial instruments) available in the financial system. Various instruments of financial saving, which are listed in Table 1 can pursue several reasons of saving simultaneously. One of the most popular forms of saving in Poland is currency and deposits, which are accumulated both to enlarge expenses in the future, as a contingency reserve, as well as due to parsimony. Research on pension consciousness of Poles proves that these forms of saving are also major means of saving aimed at securing the old age period (Czapiński & Góra, 2016, p. 10). Formally, this reason of saving is realized by instruments related to pension systems, including compulsory savings in open pension funds and voluntary retirement savings in the form of employee pension scheme (PPE), individual retirement account (IKE), individual security pension account (IKZE), etc. Leaving inheritance as a reason of saving, especially important in the Polish culture, is realized mainly through long-term saving instruments, i.e. other deposits, long-term debt securities, equity, life insurance, as well as tangible assets — e.g. property. Implementation of the speculative factor of saving is associated with instruments of relatively high potential profit, but also of high financial investments risk, such as equities, derivatives, loans granted by households to other entities.

Structure of financial savings of Polish households in the years 2003–2015

Empirical analysis of household savings structure continues the realisation of the first objective of the paper. It is also a kind of introduction to the

next two parts of the paper showing the role of this sector in intersectoral financial linkages. As it was mentioned above, it is based on statistical data derived from financial accounts which distinguish 19 types of financial instruments (grouped into 7 categories) which can be acquired by households.

The specificity of the structure of Polish households' financial assets consists primarily in a relatively high share of currency and deposits, a small share of insurance systems, pension and standardized guarantee schemes, a large share of other accounts receivable/payable (see Figure 1).

In the group of UE28 countries the share of currency and deposits in households' assets fluctuated between 28% and 31% in 2004–2015, only in 2008–2009, i.e. during the financial crisis and poor economic conditions in the capital markets, did it increase to 33%. In Poland, this share ranged from 34 to 48% in the years 2003–2015, reaching the lowest level in 2007. While the share of current deposits grew due to the increasing prevalence of settlement accounts, the share of other deposits decreased mainly because of low real interest rate.

The decline in interest in the long-term deposits was accompanied by an increase in the share of equities in households' financial assets mainly as an implementation of speculative saving reason. This share exceeded 40% in 2007 in Poland (28.5% in the UE28), but the financial crisis and the significant downturn in the capital markets led to a 50% decrease in stock of equities in 2008. A similar trend was observed in most EU countries.

The share of pension entitlements in the households' assets grew systematically until 2010, reaching 19%, which was similar to the average in the UE28. However, due to a series of acts⁴ changing regulations of the pension scheme in Poland, this share decreased to 9% in 2015 with a decrease in assets collected in open pension funds by almost 50%. The share of voluntary pension savings, which are accumulated for achieving old age security in employee pension schemes, individual retirement accounts and individual security pension accounts did not exceed 1% of Polish households' financial assets in 2015.

The share of life-insurance in financial assets of Polish households ranged between 4.5 and 7% in the analyzed period (the average for UE28 oscillates around 15%) without a clear upward trend. Only the increase in the interest of households in life insurance combined with insurance capital

⁴ These acts involve transfer of part of the funds from the Open Pension Funds to the Social Insurance Institution and reduced contribution transferred to Open Pension Funds from 2011 onwards (J.o.L. 2011 No. 75 item 398 as amended) and the abolition of compulsory participation in the capital part of the pension scheme from 2014. (J.o.L. 2013, item 1717).

fund is visible, which might be treated not only as precautionary saving, but also as a kind of saving for retirement.

Other accounts receivable/payable recorded in the financial accounts as assets of households are receivables arising from the discrepancy between the date of transaction and the effective date of payment in respect of this transaction, as well as tax receivables, social and health contributions, overpaid by households in a given period for various reasons.

Other financial instruments, i.e. debt securities and loans accounted for less than 3.5% of households' financial assets, the share is characterized by a clear downward trend, especially with regard to debt securities.

Methods of intersectoral flows estimation and financial input-output model

The idea of compilation procedure of intersectoral flows tables, proposed by Tsujimura & Mizoshita (2003, pp. 51–67; 2004, pp. 3–9), is based on input-output methodology (see also Leontief & Bródy, 1993, pp. 225–233; Klein, 2003, pp. 269–277; Okuma, 2012, pp. 2–9). It was adopted in this study for estimation the intersectoral linkages in terms of various financial instruments. The sector-by-sector square matrices are constructed from a set of balance sheets of financial assets (**E**) and liabilities (**R**).

Each element of the matrix⁵ $\mathbf{E} = [e_{ij}]$ shows the value of the i -th type of asset ($i = 1, 2, \dots, m$) held by the sector j ($j = 1, 2, \dots, n$). Rows of **E** matrix are therefore $1 \times n$ vectors \mathbf{e}_i , showing the i -th type of assets of individual institutional sectors:

$$\mathbf{E}_{m \times n} = \begin{bmatrix} \mathbf{e}_1 \\ \mathbf{e}_2 \\ \dots \\ \mathbf{e}_m \end{bmatrix}, \quad (1)$$

In turn, the rows \mathbf{r}_i of the matrix $\mathbf{R} = [r_{ij}]$ are the vectors showing liabilities incurred by various sectors in a form i :

⁵ In the notation of equations, the following markings are used: lowercase bold indicates vector (e.g. **d**, **b**), uppercase bold — matrix (e.g. **E**, **R**), lowercase italics — scalar (e.g. s).

$$\mathbf{R}_{m \times n} = \begin{bmatrix} \mathbf{r}_1 \\ \mathbf{r}_2 \\ \dots \\ \mathbf{r}_m \end{bmatrix}. \quad (2)$$

The sum of \mathbf{e}_i vectors' elements as well as the sum of \mathbf{r}_i vectors' elements shows the stock of i -th instrument⁶:

$$s_i = \mathbf{e}_i \cdot \mathbf{i}_n = \mathbf{r}_i \cdot \mathbf{i}_n, \quad (3)$$

where:

\mathbf{i}_n is the summing vector (n -element unity column).

Each element of \mathbf{R} and \mathbf{E} matrices has double interpretation (similarly to use and make matrices in input-output analysis (see Miller & Blair, 2009, pp. 185–187)). On the one hand, the elements of a given column of \mathbf{R} matrix characterize the demand for funds in the form of various instruments, on the other hand, they supply instruments offered on financial market. The elements of \mathbf{E} matrix columns can be seen from two sides: as a realization of each sector's demand for various assets and as a supply of funds in the form of various financial instruments. Taking into account this double nature of the elements of \mathbf{R} and \mathbf{E} matrices, the compilation of “sector by sector” square tables of intersectoral flows can be based on liability-oriented system of the use and supply matrices or on asset-oriented system. Since the main role of households (as the sector which this study is devoted to) is consumption and saving, the square tables of intersectoral flows built in the paper are based on asset-oriented system where financial instruments are treated as commodities which the institutional sectors demand.

The transition from the “asset-by-sector” matrices \mathbf{R} and \mathbf{E} to the “sector-by-sector” square matrix requires a number of intermediate matrices determined on the basis of \mathbf{R} and \mathbf{E} .

⁶ If all financial transactions recorded simultaneously on the side of financial assets and liabilities are measured in common value.

- 1) $1 \times n$ vectors \mathbf{d}_i showing the shares of liabilities of the sector j in the stock of the i -th instrument ($\mathbf{d}_i \cdot \mathbf{i}_n = 1$):

$$\mathbf{d}_i = \frac{1}{s_i} \mathbf{r}_i. \quad (4)$$

- 2) $1 \times n$ vectors \mathbf{b}_i :

$$\mathbf{b}_i = \mathbf{e}_i \cdot \hat{\mathbf{z}}^{-1}, \quad (5)$$

where $\hat{\mathbf{z}}$ is a diagonal matrix consisting of elements z_j which are the stock of financial assets or liabilities of the j -th sector, whichever stock is larger; if z_j is a stock of assets, the given element of vector \mathbf{b}_i shows the share of the i -th type of asset in total assets of sector j .

- 3) The $n \times n$ square matrix $\mathbf{C}_i = [c_{kj,i}]$, which elements show the shares of the k -th sector's i -th type of liabilities in z_j :

$$\mathbf{C}_i = \mathbf{d}_i^T \cdot \mathbf{b}_i. \quad (6)$$

Finally, square $n \times n$ matrix $\mathbf{Y}_i = [y_{kj,i}]$ presents intersectoral financial flows in terms of the i -th financial instrument, each element $y_{kj,i}$ reflects the flow of i -th financial instrument between sector j and k ; or in other words $y_{kj,i}$ is the value of i -th type of assets acquired by sector j from sector k and simultaneously the value of i -th type of liabilities incurred by sector k from sector j :

$$\mathbf{Y}_i = \mathbf{C}_i \cdot \hat{\mathbf{z}}. \quad (7)$$

Having the tables of intersectoral flows of all financial instruments the table of financial flows (in total) $\mathbf{Y} = \sum_{i=1}^m \mathbf{Y}_i$ can be built. \mathbf{Y} matrix is the first quarter of financial input-output table (based on the asset oriented system) which also consists of $n \times 1$ vector \mathbf{p} of excesses of assets over liabilities of sector k (if exist; 0 otherwise), $1 \times n$ vector $\mathbf{\varepsilon}$ of excesses of liabilities over assets of sector j (if exist), vector \mathbf{z} of stocks of assets or liabilities, whichever is larger (see Table 2).

The following balancing equation is true for Table 2:

$$\mathbf{Y} \cdot \mathbf{i}_n + \boldsymbol{\rho} = \mathbf{z} \text{ or } \sum_{j=1}^n y_{kj} + \rho_k = z_k. \quad (8)$$

Taking into account the relationship (8), and setting matrix $\mathbf{C} = \mathbf{Y} \cdot \hat{\mathbf{z}}^{-1}$ by analogy to equation (7), a financial input-output model is obtained:

$$\mathbf{C} \cdot \mathbf{z} + \boldsymbol{\rho} = \mathbf{z}, \quad (9)$$

Thus,

$$\mathbf{z} = (\mathbf{I} - \mathbf{C})^{-1} \boldsymbol{\rho} = \boldsymbol{\Gamma} \cdot \boldsymbol{\rho}. \quad (10)$$

Elements of matrix $\boldsymbol{\Gamma} = [\gamma_{kj}]$ are the financial multipliers, which indicate the supply of funds in sector k induced by the increase by unit in the j -th sector's supply of funds. The multipliers indicate not only the direct effects of the increase in supply of funds by j -th sector, but also all indirect effects that are seen in the increase of financial assets and liabilities of this sector as well as of all other sectors. The column sums of matrix $\boldsymbol{\Gamma}$, i.e. total multipliers $\sum_{k=1}^n \gamma_{kj}$ show the total effect – the sum of the increases in all institutional sectors' resources z_j .

Moreover, the power-of-dispersion index for sector j :

$$wp_j = \frac{\sum_{k=1}^n \gamma_{kj}}{\frac{1}{n} \sum_{k=1}^n \sum_{j=1}^n \gamma_{kj}} \quad (11)$$

indicates the portion of sector j in total chain reactions originated in the supply of funds ($\sum_{j=1}^n wp_j = n$).

Assuming an increase in the supply of funds, which is recorded as $\Delta \boldsymbol{\rho}$ (net lending) in financial input-output model, $\Delta \mathbf{z} = (\mathbf{I} - \mathbf{C})^{-1} \Delta \boldsymbol{\rho}$ for each

institutional sector and total increase in financial flows $\Delta \mathbf{Y} = \mathbf{C} \cdot \Delta \hat{\mathbf{z}}$ ($\Delta y_{jk} = c_{jk} \cdot z_k$) can be determined. The sums $\sum_j y_{kj}$ and $\sum_k y_{kj}$ show increase in liabilities of sector k and increase in assets of sector j respectively, as a result of $\Delta \mathbf{p}$.

Intersectoral flows of households' financial assets

The flows of all financial instruments between Polish institutional sector were estimated on the basis of the method described in the above paragraph. The following analysis of financial flows is the realisation of the second objective of the study. It is focused on three groups of instruments: currency and deposits, equities and insurance, pension and standardized guarantees schemes, which are the most essential forms of households' financial saving (see Figure 1).

Currency and deposits are recorded on the liabilities side of financial institutions — the subsector of monetary financial institutions (MFI) and rest of the world sector (ROW)⁷. However, basing only on available data it is not possible to indicate what portion of particular sectors' assets in these forms should be recorded on the liability account of MFI and what on ROW's one. Hence, flows of currency and deposits are estimated. Currency and deposits are the assets of all institutional sectors, while household sector creates over 50% of total flows in these instruments. Moreover, the maps of intersectoral linkages (see Figure 2) generally show that the amount of financial flows increased significantly in 2015 compared to 2003. Households receivables in respect of monetary institutions in the form of currency and deposits increased by 135% (in real terms), of which current deposits increased to the greatest extent (by 305%).

Equity and investment fund shares are assets of all institutional sectors, and liabilities of entities that issue shares, i.e. non-financial corporations, financial institutions (all sub-sectors) and rest of the world. Intersectoral flows of equities are estimated. Households acquire equities as individual investors on the markets operated by the Stock Exchange. Although the stock of households' assets in this form increased by 67% in 2015 compared to 2003 (in real terms), their share in total assets decreased from 31%

⁷ There are also liabilities of general government in the form of other deposits, these are flows within the sector (investment of funds of the entities of public finance sector with the Minister of Finance), their scale is marginal.

2003 to 21% 2015, among others as a result of an increased interest of foreign investors (see Figure 3).

Insurance, pensions and standardised guarantees belong to the group of instruments, the disaggregation of which (see Table 1) allows for unambiguous indication of the sectors they concern, in particular: life insurance and annuity entitlements represent flows from households to financial institutions (the subsector of insurance corporations and pension funds), provisions for calls under standardised guarantees are the flows from non-financial corporations to the government, pension entitlements, claims of pension funds on pension managers and entitlements to non-pension benefits are flows from households to financial institutions. Only the flows of non-life insurance technical reserves are estimated.

Approximately 90% of flows of these instruments is created by households. This group of financial instruments is the only one for which there is no systematic increase. They grew only by 2013, while the rate of growth was significantly inhibited in 2011. In 2015, households' receivables towards insurance corporations and pension funds were 152% higher than in 2003, but 51% lower than in 2013 (in real terms). This was a consequence of the changes of rules concerning the pension scheme in Poland, mentioned in the preceding paragraph of the paper.

Households' financial assets are not only the way to fulfil their propensity to save, but also a source of financing expenses of these entities whose own resources are insufficient. The degree of financing the borrowing in the i -th form (s_i) by households assets in this form (e_i^{HH}) might be measured by a quotient e_i^{HH} / s_i for each financial instrument (see Figure 5).

Financial assets of households throughout the whole analyzed period accounted for approximately 20% of total assets, equal to the total liabilities⁸, which means that the role of the household sector in financing of the total debt of domestic institutional sectors and rest of the world is basically unchanged (it slightly decreased in the period 2008–2011 when nonfinancial corporations increased their financial assets due to a decrease in fixed capital formation). However, households' participation in the financing of various forms of debt has changed according to the changes in the structure of households' assets, analyzed in the previous section.

The assets of this sector are mainly the flows to financial institutions, which transmit them to other sectors in a different form (e.g. deposits are a source of funding loans or of the purchase of debt securities issued by

⁸ The equality is due to the fact that every financial transaction is reflected on the account of the assets of one entity and of liabilities of the other (this rule does not apply to monetary gold, which is excluded from the analysis).

general government, pension entitlements fund the purchase of equities issued by corporations).

The analysis of the effects of the increase in households' savings, measured by the increase in financial flows between sectors, is enabled by the financial input-output multipliers (see Table 3). The comparison of the influence of particular institutional sectors' demand of funds on the financial flows clearly indicates that the increase in households' financial assets causes the largest increase in financial flows. This characteristic is also confirmed by the values of power-of-dispersion indices (see formula 11), which are still the highest for the household sector (see Figure 6). Moreover, the increase in the total of all multipliers reflects the growing complexity of intersectoral linkages in the financial system, although it is still much lower in Poland than in Western European countries (e.g. multipliers for Germany exceed the value of 8).

The increase in the excess of households' financial assets over their liabilities by 1 million PLN induces a total increase of financial resources by 5.3 million PLN, which consists of an increase in assets and liabilities of all institutional sectors (see Figure 7). The increase in net lending of households means increasing savings in the economy, and also increasing capacity of financing tangible investments. In the financial input-output model it is visible in the increase of the sum of net borrowing of sectors whose liabilities exceed financial assets — nonfinancial corporations and general government to the great extent.

According to the structure of intersectoral financial flows in 2015, the increase in net lending of households induces a direct increase in liabilities, mainly of monetary institutions (primarily in the form of currency and deposits) and of non-financial corporations (mainly in the form of equities) — cf. Figure 7. Monetary institutions — as the most important financial intermediary — transmit the funds received from households to other sectors, mainly to non-financial corporations (the purchase of corporations' equities and loans granted to them) and to general government (the purchase of debt securities). A multitude of intersectoral linkages causes rising flows between all sectors (see Figure 8).

Conclusions

Saving is a very complicated, heterogenic category, which could be explored from different points of view. It can be analyzed in the context of individual's propensity to save, as well as savings in the economy as a crucial determinant of investments. This paper focuses primarily on the finan-

cial savings of households. The resources of households' savings reflect their demand for certain financial instruments as an implementation of various saving motives. Savers define the competitiveness of financial instruments in a variety of ways. For some individuals the instruments with a relatively high potential rate of return are paramount, while for others a guaranteed profit of any kind is important. The share of instruments with relatively low but guaranteed profit (e.g. deposits) is relatively constant over time. On the other hand, the share of instruments such as equities is characterized by much greater variability, which was apparent during the recent financial crisis of 2008, when the resources of households' assets of this kind fell by nearly 50% in Poland (similar effects were also observed in other countries).

The identification of changes in the structure of households' financial savings in Poland in the period 2003–2015 (according to the first goal of the paper) indicates that they resulted largely from the regulation of the pension and tax systems as well as institutional extortion of having bank accounts. As a result of the pension reform in Poland in 1998, households' savings in the open pension funds increased steadily until 2010. However, a number of changes in 2011–2014 led to a reduction of the capital part of the system⁹ and the share of pension entitlements in the financial assets of households dropped from 19% in 2010 to 9 % in 2015.

The comparison of financial intersectoral flows structures for 2003 and 2015 (that realizes the second objective of the study) indicates an increase in linkage between the household sector and monetary financial institutions, both in flows of funds from households to financial institutions (mainly in the form of currency and deposits) as well as from financial institutions to households (mainly loans). The obtained results can be compared with the flows of financial instruments' estimations for 2003 and 2010 based on the maximum entropy method made for Financial Supervision Commission in Poland (Wolak (Ed.), 2011, pp. 21–27).

The last part of the empirical analysis reported in the paper clearly depicted that complexity of intersectoral linkages is also increasing, which is reflected in the size of feedback effects measured by financial input-output multipliers. It still remains unexplained (for the author) why in countries such as Germany or the Netherlands, financial multipliers are more than twice as big as in Poland, and for example in Italy similar to those for Poland.

⁹ Changes which limited the scope of the capital part of the pension system were also introduced in Estonia, Lithuania, Latvia, Slovakia, Hungary.

An assessment of the changes in the financial system resulting from a certain institutional regulation, such as the effects of changes in the structure of household savings due to adjustments of the pension system, would be, in the author's opinion, a valuable direction of further research on the financial input-output models application.

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Annex

Table 1. List of financial instruments recorded as assets of households' in the financial accounts

Symbol		Specification	
F.2	Currency	Transferable deposits	Other deposits
F.3	Short-term debt securities	Long-term debt securities	
F.4	Short-term loans	Long-term loans	
F.5	Listed shares	Unlisted shares	Other equity
F.6	Non-life insurance technical reserves and provisions for calls under standardised guarantees	Life insurance and annuity entitlements	Investment fund shares or units Pension entitlements, claims of pension funds on pension managers and entitlements to non-pension benefits
F.7	Financial derivatives and employee stock options		
F.8	Trade credits and advances,	Other accounts receivable/payable, excluding trade credits and advances	

Source: author's elaboration based on Eurostat database — Financial flows and stocks.

Table 2. Financial input-output table (based on the asset oriented system)

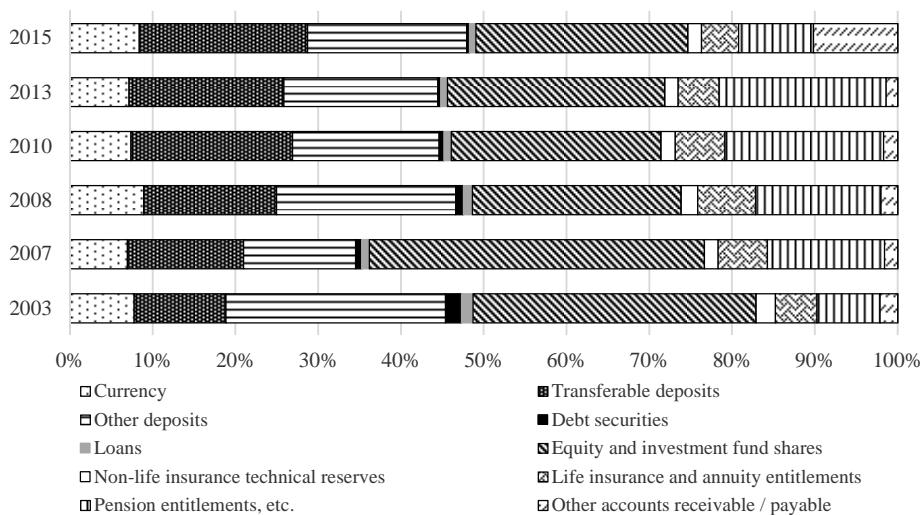
sector	sector	j	ρ_k	z_k
k	$\mathbf{Y} = [y_{kj}]$		$\boldsymbol{\rho}$	\mathbf{z}
\mathcal{E}_j	flows of funds from j -th sector to k -th one			
z_j	$\boldsymbol{\varepsilon}$			
	\mathbf{z}^T			

Source: elaboration based on Tsujumura & Mizoshita (2004).

Table 3. Total multipliers measuring the effects of growth in net lending of individual institutional sectors on the basis of the financial input-output tables for Poland

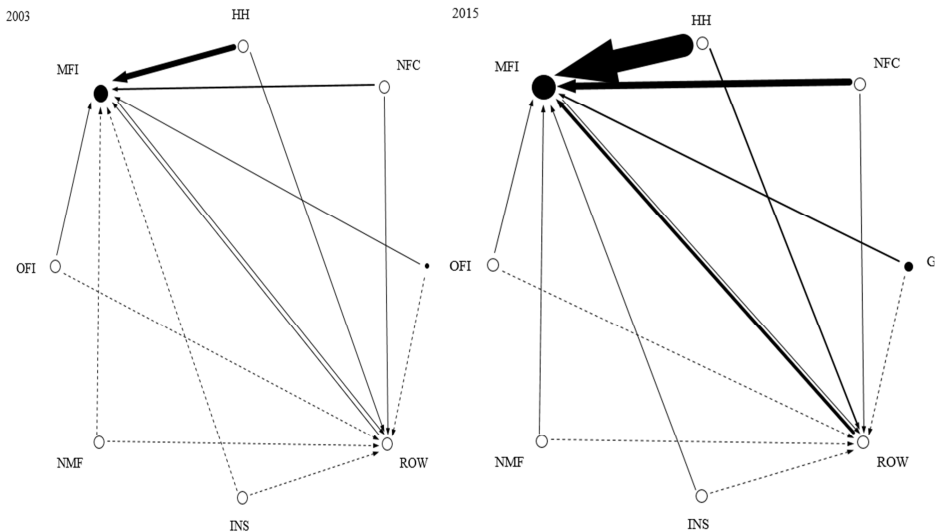
Sector \ Year	Non-financial corporations	Monetary financial institutions	Other financial institutions	Non-MMF investment funds	Insurance corporations and pension funds	General government	Households; non-profit institutions	Rest of the world
2003	2.175	4.150	3.712	3.925	3.916	2.549	4.475	3.753
2010	2.794	4.925	4.000	4.649	4.427	3.156	5.364	4.632
2015	2.808	4.865	4.161	4.620	4.436	2.697	5.263	4.497

Figure 1. Structure of financial assets of the household sector in Poland in selected years of the period 2003–2015



Source: author's own elaboration based on Eurostat Database (update: 04-05-2017).

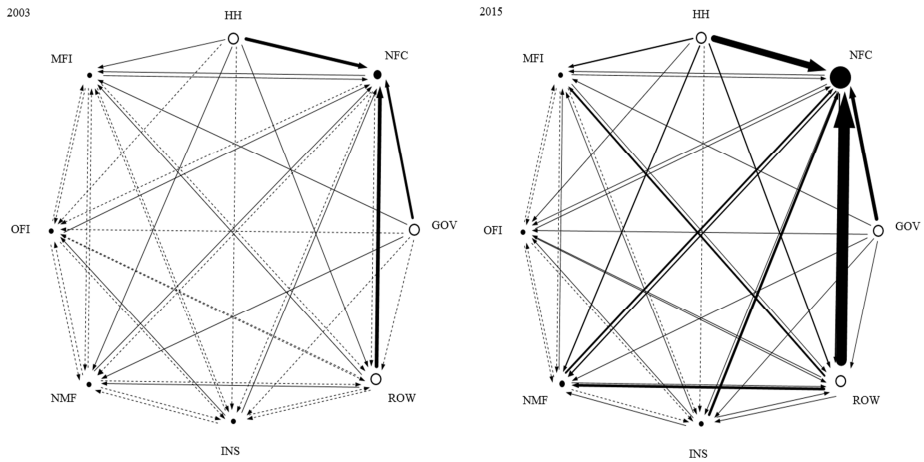
Figure 2. Currency and deposits flows* in 2003 and 2015



HH — households and non-profit institutions serving households; NFC — non-financial corporations; GOV — general government; ROW — rest of the world; INS — insurance corporations and pension funds; NMF — non-MMF investment funds; OFI — other financial institutions; MFI — monetary financial institutions.

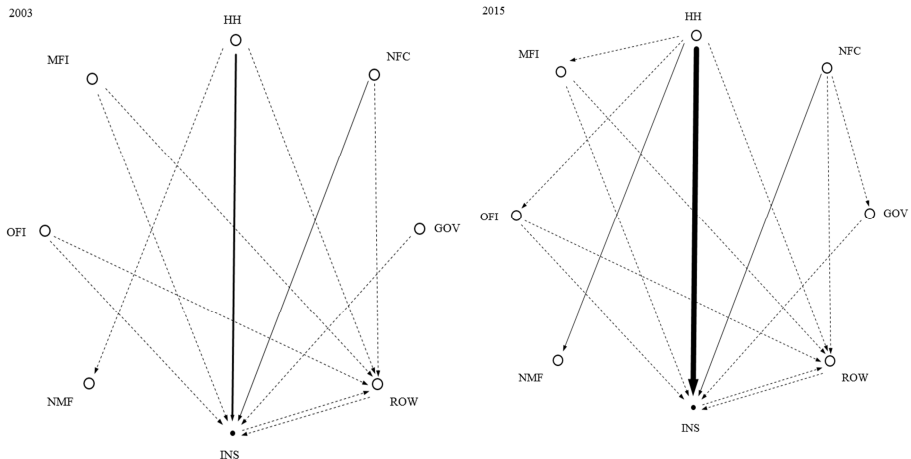
Note: * Intersectoral financial flows are presented with the map of linkages including the direction of flows and approximate picture of their scale (see e.g. Okuma, 2012, p. 16; Castrén & Kavonius, 2009, p. 15, 32). These plots are composed of nodal point for individual institutional sectors, and lines connecting these points. The size of the node illustrates the amount of flows within sectors. The thickness of the links shows the size of the flows between two sectors. Additionally, the arrows indicate the direction of the flows, in such a way that the arrow comes out of the sector being a net creditor in relation to the sector, which the arrow points.

Figure 3. Flows of equity and investment fund shares in 2003 and 2015



HH — households and non-profit institutions serving households; NFC — non-financial corporations; GOV — general government; ROW — rest of the world; INS — insurance corporations and pension funds; NMF — non-MMF investment funds; OFI — other financial institutions; MFI — monetary financial institutions.

Figure 4. Flows of insurance, pensions and standardised guarantees in 2003 and 2015



HH — households and non-profit institutions serving households; NFC — non-financial corporations; GOV — general government; ROW — rest of the world; INS — insurance corporations and pension funds; NMF — non-MMF investment funds; OFI — other financial institutions; MFI — monetary financial institutions.

Figure 5. The role of the household sector in the financing of various forms of debt

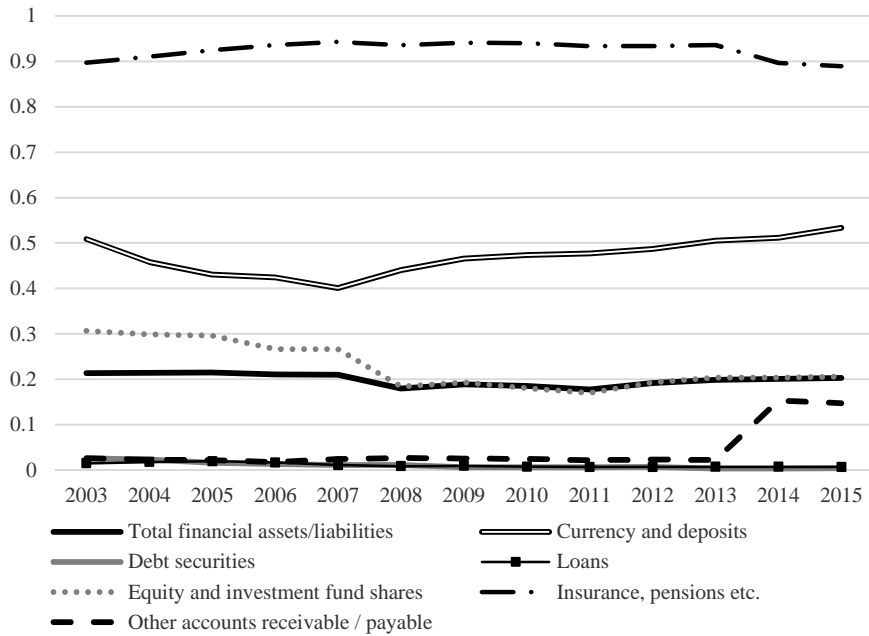


Figure 6. Power-of-dispersion indices for the Polish institutional sectors

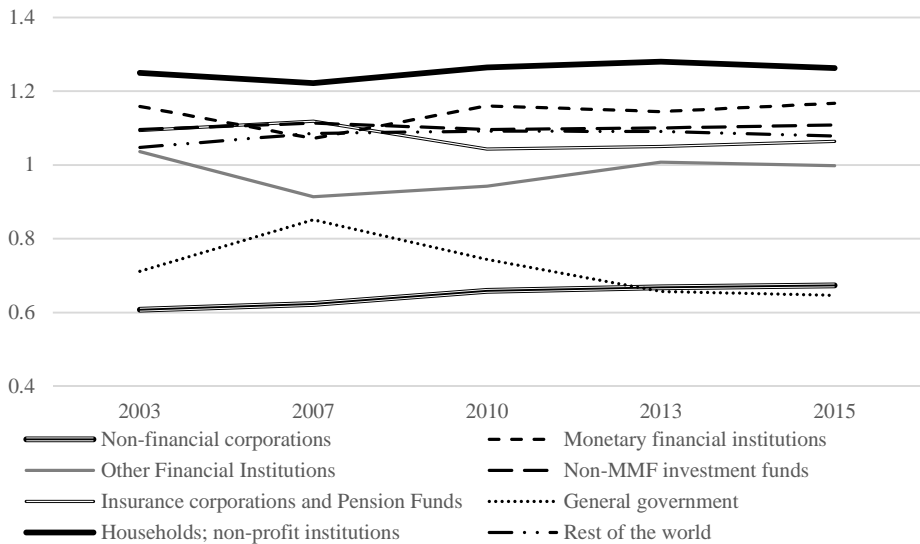


Figure 7. The effects of the increase in excess of financial assets over liabilities of households — net lending — by 1 million PLN

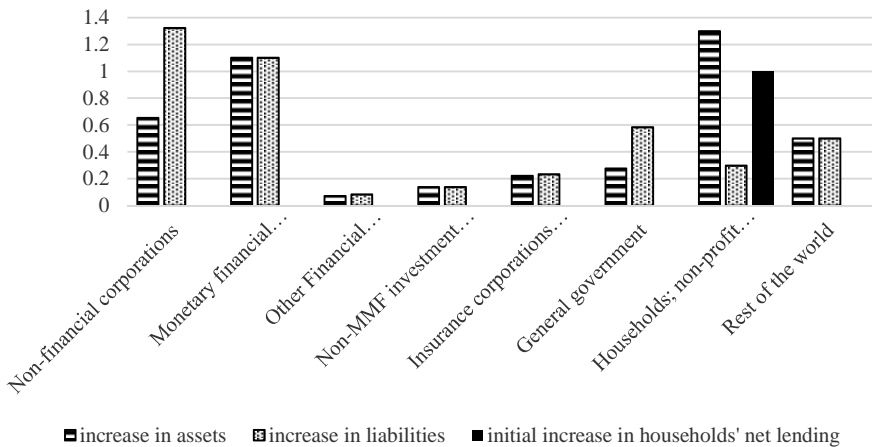
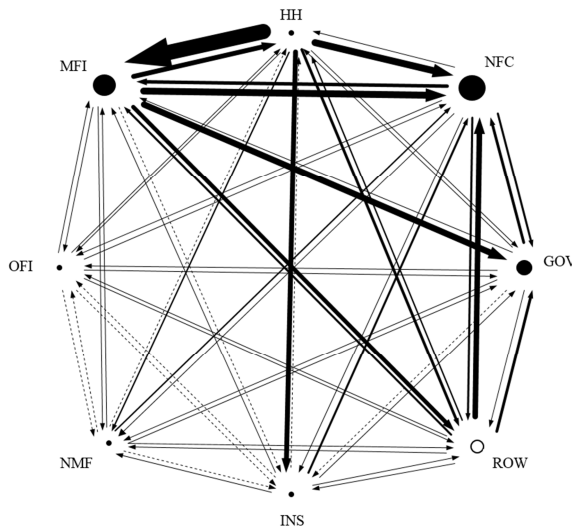


Figure 8. Increase in intersectoral financial flows induced by the increase in households' net lending



HH — households and non-profit institutions serving households; NFC — non-financial corporations; GOV — general government; ROW — rest of the world; INS — insurance corporations and pension funds; NMF — non-MMF investment funds; OFI — other financial institutions; MFI — monetary financial institutions..