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## Article

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# An Allocation Analysis of Polish Household Savings Invested in Financial Assets, 2003 – 2014

Wiesław Dębski<sup>1</sup>, Bartosz Świdorski<sup>2</sup>

## ABSTRACT

This article addresses the allocation of Polish household savings that are invested in financial assets. As an economic category, these savings are very important in every country because they determine investments in the national economy, thereby influencing a country's further economic growth and development. From this point of view, investigating both the allocation of personal savings and their structure is essential because they change due to changing economic circumstances, changing situations in the world's financial markets, especially in the stock exchange markets, and the development of financial markets. The main purpose of this article is to analyze the changes in the allocation of savings in Polish households and the structure of their investment in financial assets. These changes, which are empirically observed, result from the circumstances of the national economy, which affect the behavior of investors in the stock market and determine the interest rate levels. The analysis is conducted on the basis of trend models with variations of parameters. The analysis has been carried out for the period Q4 2003 – Q3 2014.

## KEY WORDS:

savings of the Polish households, financial assets, analysis of allocation and its structure, trend models with variations of parameters

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## Introduction

The savings of households are a very important economic category in any economy and influence its development. The allocation of these savings is particularly essential, thus making it the subject matter of this paper. Personal savings have a direct impact on economic investment. The allocation of these

savings attests to the inflow of capital to those sectors (branches) of the economy that, based on the savings investor's evaluation, are capable of showing the highest rates of return on the investment, i.e., they are the most profitable. Such sectors are frequently also the most innovative of the economy and, in turn, exert the most profound influence on economic growth, thus also determining its development. The allocation and *de facto* investment of household savings in the economy may occur through the banking sector (indirect investment) or the financial market (direct investment). In Poland, the overwhelming majority

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of personal savings is allocated through the banking sector, which is done primarily through bank deposits, which the bank later uses for lending. Although the financial market develops as a result (in the midst of the second decade of the 21st century, the Polish financial market is considered quite well-developed), more and more of the savings are allocated directly, i.e., investments made in shares or debt securities of companies. A certain amount of personal savings is also allocated indirectly through the financial market, which is done through various types of mutual fund agencies, such as investment, pension, and capital funds that are managed by life insurance undertakings. Numerous factors determine the allocation of household savings and its structure; however, first and foremost, they are contingent upon economic and demographic factors and on the psychological attributes of an investor, though we do not examine the latter two factors. Among the economic factors, those that directly shape the economy are the most important because they also influence the stock market and interest rate levels (although the basic interest rate is set by the central bank of Poland, its level is largely dependent on economic circumstances).

The chief purpose of this paper is to analyze the allocation of personal savings to financial assets in Poland and the changes to the structure of this allocation. The analysis was based on quarterly financial accounts that were drafted by the National Bank of Poland in the period 2003Q4-2014Q3. The analysis assumed a macroeconomic perspective, which is econometric in character, and was conducted based on a trend model with a variety of parameters, which were estimated using the ordinary least squares (OLS) method. The analyzed period encompassed times of prosperity and economic slowdown, the latter of which was caused by the financial crisis starting in 2007, as well as the period of recovery from this crisis. During this period, changes in the country's economic circumstances led primarily to changes in the stock market and interest rates, which exerted a direct influence on the structure of the allocation of household savings invested in financial assets. Using sample cases, the main objective of this study is to determine the extent of those changes. The intention is to determine the extent of the decreasing proportion of household savings being allocated to bank depos-

its and debt securities, the extent of the simultaneous growth of the proportion of these savings being allocated to shares and mutual funds, and vice versa. The present study is a continuation of research initiated by Dębski (2009) and Dębski and Świdorski (2011). Research on the allocation of personal savings to various assets has also been carried out by several authors, including (Bergstresser & Poterba, 2004; Brennan & Xia, 2002; Campbell, Chan, & Viceira, 2003; Gomes & Michaelides, 2005; Horneff et al., 2009; Milevsky & Young, 2007; Shoren & Sialm, 2004) and in Poland (Anioła & Gołaś, 2012a; Rytelawska & Kłopotcka, 2010).

## 1. Household savings – methodological aspects

In macroeconomics, household savings are defined as the difference between a household's available personal income and its expenditure on ongoing consumption. These are the ongoing savings of the population, which represent an increase in the total personal savings in a given year and are a resource because they are the sum of both the ongoing savings and the aggregated savings from the past. The total household savings may be composed of tangible assets in which the household has invested, such as real estate, art, gold, and jewelry, and the household's financial assets, such as cash, bank deposits, securities, and shares in mutual funds. This paper analyzes the structure of the allocation of household savings in financial assets and the changes to this structure by examining the financial market's approach to allocating these savings and the corresponding changes to the approach. Over time, the structure of allocation undergoes changes that are due to not only the changing circumstances of the market but also the use of personal savings as a resource. In a given period (a quarter or a year), a change may occur in the consequences of withdrawing part of one's savings from the financial market and allocating them to purchase tangible assets, or vice versa. In a given period, a household's total savings may also become smaller if they are withdrawn from investment and devoted to ongoing consumption.

The theory of economics that is supported by numerous empirical studies argues that the fundamental factor determining the amount of a household's ongoing savings is the household's propensity to save, which

is most frequently seen as the ratio of these savings in a given year to the disposable income, a measure that is also referred to as the savings rate. An individual's (household) propensity to save results predominantly from the willingness to defer current consumption until a later date. The relevant economic literature pays particular attention to the motives behind saving that inspire an individual, their psychological traits that encourage saving, or demographic factors. Although this paper does not address the microeconomic perspective, we cite examples of the following relevant papers: (Anioła & Gołaś, 2012b; Börsch-Supan, 2003; Brandstaetter & Gueth, 2000; Canova, Rattazzi, & Webley, 2005; Duesenbury, 1952; Fisher & Montalto, 2010; Kirsanova & Sefton, 2007).

Many researchers have examined the propensity to save from a macroeconomic perspective by looking at the entire population (all households). These studies were dependent on manifold factors, entertained by various theories on saving. An overall review may of the research has been provided by Rytelewska (2008) and Beverly and Sherraden (1999), among others. The theories clearly indicate that the basic factor determining an increase in ongoing savings, which is a direct consequence of a household's propensity to save, is the population's personal disposable income (as already noted by J. Keynes (1985, p. 122)), which is directly expressed in the yearly national income. The personal disposable incomes of the population is equal to the personal incomes minus taxes paid (see Carroll, 2001). Regarding theories about savings that measure the dependence of personal savings on personal incomes, the most prominent ones are the income theory by Keynes (1985), the life-cycle hypothesis by Modigliani (Modigliani & Brumberg, 1955), and the permanent income hypothesis by Friedman (1957). Countless economists have conducted research in this regard, including (Bunting, 2009; Han & Sherraden, 2009; Liberda, 2000; Sherraden, Schreiner, & Beverly, 2003).

Interest rates are another important factor that influences the increase in household savings. In models accounting for personal savings, the interest rate is typically expressed as the real interest rate of bank deposits, which can be seen in models of the national economy (Welfe, 2013) or in models of the national economy's financial sector (Dębski, 1990; Łapińska-Sobczak, 1997). When this rate increases, more funds

are placed in various types of bank accounts, and fewer funds are allocated to the financial market's equity instruments, such as shares of companies or mutual funds. In turn, a decrease in this rate causes a reverse effect, i.e., a decrease in the proportion of savings placed in banks and an increase in the proportion of savings allocated to shares and investment funds.

Moreover, the precautionary motive should be mentioned as one of the factors that stimulates an increase in household savings, as already noticed by Keynes (1985). The consequence of this motive is intentional saving, whether for the purpose of buying a house or apartment, securing retirement funds, educating children, or otherwise, as well as cashless transactions that directly influence the amount of funds that the population holds in its bank accounts. An additional factor stimulating household savings is the monetary policy of the central bank. An expansionary program that leads to the intensification of commercial bank lending will result in greater investments, which will result in an increase in personal incomes and household savings. In turn, if the central bank pursues a restrictive policy, the results will be inverse.

In Poland, the savings rate in the period under examination ranged between 7.7% (2003) and 10.0% (2007) and started to fall gradually, reaching 6.4% in 2008, 6.3% in 2010, and 3.7% in 2013. As research shows (Anioła, Gołaś, 2012a, p. 27; Rytelewska, 2008, p. 417), the rate in the period 2003-2007 was higher than those of the United States, Great Britain, Canada, and many other countries; however, countries such as Germany, France, and Italy had an interest rate higher than Poland's. Beginning in 2008, the savings rate in Poland began to decline. In the countries belonging to the Euro Area, the rate was higher in the whole period under analysis, at approximately 14%.

There is no doubt that in any country whose chief function is to mobilize capital, the development of the financial market contributes to an increase in personal savings and to changes in the structure of their allocation. Greater savings leads to economic growth, which leads to an increase in savings by contributing to an increase in people's personal incomes (feedback in the economy). Over the past 25 years, following the country's political transformation, the development of Poland's financial market has been accompanied by significant changes to the structure

of household savings. As demonstrated by Dębski (2009), the proportion of personal savings that is allocated to the banking sector has gradually declined during this period, and the proportion of these savings that is allocated through the financial market has risen. This shift occurred as a result of a structural transformation of the Polish economy, which led to the establishment of a stock exchange, as well as mutual funds, such as investment, pension and capital funds that are managed by life insurance undertakings. Considerable development of these practices has undoubtedly contributed to a substantial increase in long-term savings of households in Poland.

## 2. Discussion of empirical results

### 2.1. Household savings in Poland and their allocation to financial assets between 2003 and 2014

Household savings, apart from the money intended for the purchase of various tangible assets, may be allocated to a diverse range of financial assets. This article analyzes the structure of those assets, which might be bank deposits, various types of securities or equity interests, and/or investments made through a mutual funds agency. Table 1 presents the overall level of household savings accumulated in the types of financial assets enumerated above, along with the respective allocation of these assets in the period 2003-2014.

Table 1 demonstrates that at the end of 2003, the household savings allocated to all types of financial assets in Poland amounted to PLN 401.5 billion, which was 47.5% of the Gross Domestic Product (GDP). In the first quarter of 2008, this amount rose to PLN 843 billion and was almost 70% of the GDP. Thus, the increase is twofold and very significant. Considering the increase in prices (the CPI index) in this period, which amounted to 12.5%, an actual increase of 86.6% was achieved. In turn, as a proportion of the GDP, the financial assets held by the population grew by over 20 percentage points (pp.). Such a substantial increase in the value of household savings that were allocated to financial assets was a consequence of that period's prosperous economic circumstances, including the flourishing stock market, because the stock index WIG (the main Warsaw

stock exchange index) rose from 20820.1 (at the end of 2003) to 66077.7 (at the end of the second quarter of 2007), which was a multiplication of 2.9 times. Beginning in the second quarter of 2008, the amount of financial assets held by the population began to fall, reaching PLN 639 billion at the end of the first quarter of 2009. Beginning in the second quarter of 2009, the assets began to grow again (although there was a slight reduction during the second, third, and fourth quarters of 2011), until the end of 2013, when they reached PLN 1203.3 billion, which was 72.4% of the GDP. This indicates that at the end of 2013, the proportion of financial assets held by households in Poland exceeded the proportion from the end of the first quarter of 2008 by slightly more than 2 pp.

In comparison to the end of 2003, the level of personal savings allocated to financial assets at the end of 2013 tripled in nominal value; if inflation is considered, the increase amounts to 127.4% (the WIG index rose by 146% at that time). Thus, the increase in financial assets held by the population that occurred during that period was very significant. Even if unquoted shares and other equity interests (i.e., assets that are subject not to market but to accounting valuation) are excluded from the total sum of the population's financial assets, at the end of 2003, the level of the population's remaining financial assets amounted to PLN 238.3 billion, which constituted 28.2% of the GDP. At the end of 2013, these financial assets reached PLN 913.3 billion, which was nearly 55% of the GDP and represented an increase of 26.8 pp. As a result, the nominal growth rate reached 283%; the real one was 191%. Thus, these increases were greater than the total of the financial assets, which certainly denotes a rise in the population's interest in allocating its savings to various types of market financial instruments.

During the first quarter of 2014, the level of household financial assets fell to PLN 1084 billion due to a reform of the pension system (approximately 50% of the funds invested in treasury bonds by open-ended pension funds were shifted to the Social Insurance Company (ZUS), which meant that those funds were withdrawn from the financial market). At the end of the study period (2014Q3), the size of the assets was PLN 1111.4 billion, which constituted a nominal increase of 176.8% and, compared to the end of 2003, a real increase of nearly 110%.

**Table 1.** Allocation of financial assets of households (in PLN billion)

Period	Cash	Deposits	Debt securities	Quoted shares	Unquoted shares and other equity interests	Shares and other equity interests	Shares in investment funds	Life insurance and annuity entitlements	Pension entitlements	Total financial assets
1	2	3	4	5	6	5 + 6	7	8	9	10
2003Q4	46.2	62.8	11.6	11.6	163.2	174.8	30.7	30.1	45.4	401.5
2004Q1	46.7	63.5	11.6	13.1	182.7	195.8	32.5	31.2	50.5	431.7
Q2	46.8	63.5	11.8	12.5	184.7	197.2	29.6	32.3	52.5	433.7
Q3	46.2	63.8	12.6	14.6	188.3	202.9	29.1	33.5	57.3	445.4
Q4	46.5	65.4	11.6	19.1	205.9	225.0	30.2	35.2	63.0	476.9
2005Q1	46.6	70.7	11.3	18.5	214.8	233.3	33.6	35.6	69.0	500.2
Q2	48.8	75.0	10.7	18.0	214.3	232.2	37.2	37.9	74.6	516.4
Q3	49.8	76.7	10.7	21.7	232.2	253.9	44.5	39.7	84.0	559.2
Q4	51.3	83.5	9.9	24.9	228.2	253.2	51.6	41.2	88.5	579.1
2006Q1	52.9	88.3	10.1	29.8	227.5	257.3	60.9	43.4	97.6	610.5
Q2	58.3	94.9	9.1	31.1	194.1	225.2	62.3	45.9	101.0	596.6
Q3	60.9	98.6	8.7	37.0	209.1	246.1	69.1	48.2	109.1	640.8
Q4	63.4	109.4	8.8	50.5	213.5	264.0	79.6	51.8	120.7	697.5
2007Q1	65.1	116.8	8.6	56.8	259.7	316.5	94.9	56.1	132.2	790.3
Q2	68.1	119.4	8.0	69.6	280.7	350.3	113.0	60.0	143.4	862.1
Q3	70.1	125.7	8.3	65.5	277.0	342.4	112.8	60.3	144.8	864.4
Q4	71.3	137.6	7.6	59.8	248.6	308.5	109.9	61.2	145.7	841.8
2008Q1	72.4	147.3	7.8	53.7	271.6	325.3	85.4	61.1	143.7	843.0
Q2	76.2	154.0	7.3	43.2	203.0	246.1	76.2	65.2	141.9	766.9
Q3	76.9	152.8	8.2	40.0	213.8	253.8	65.6	68.5	145.1	770.8
Q4	84.1	144.5	9.0	28.4	157.0	185.4	53.5	66.2	143.5	686.3
2009Q1	84.5	156.2	8.0	26.5	111.3	137.9	45.9	64.1	142.5	639.0
Q2	86.7	168.3	7.2	34.1	144.7	178.7	55.0	62.5	158.6	717.0
Q3	84.0	173.3	6.6	39.3	172.7	212.0	59.6	64.7	174.2	774.4
Q4	83.9	185.1	6.2	41.1	179.3	220.4	66.2	65.6	185.6	813.0
2010Q1	83.3	192.7	9.9	46.0	216.1	262.1	67.4	65.9	199.1	880.4
Q2	88.1	206.0	7.7	44.5	171.3	215.8	62.4	65.4	200.8	846.2

**Table 1.** Allocation of financial assets of households (in PLN billion) (Continued)

Period	Cash	Deposits	Debt securities	Quoted shares	Unquoted shares and other equity interests	Shares and other equity interests	Shares in investment funds	Life insurance and annuity entitlements	Pension entitlements	Total financial assets
Q3	86.7	208.7	7.3	50.2	210.8	261.0	67.2	69.4	217.5	917.8
Q4	87.8	225.7	6.9	52.1	179.7	231.8	70.3	71.6	229.7	923.8
2011Q1	87.5	231.5	7.0	55.3	198.6	253.9	70.8	71.9	237.5	960.2
Q2	90.3	230.9	6.1	50.5	179.5	230.0	70.3	73.0	245.8	946.4
Q3	95.3	226.7	7.2	40.8	183.2	224.0	60.9	68.4	230.9	913.5
Q4	97.7	233.4	7.9	39.6	180.2	219.7	58.8	67.4	233.6	918.5
2012Q1	95.6	233.9	8.1	40.7	214.9	255.7	62.9	70.8	247.2	974.4
Q2	99.6	234.9	8.2	36.6	208.8	245.4	62.8	72.8	250.9	974.6
Q3	98.9	230.3	10.2	35.7	238.1	273.7	63.4	72.9	262.8	1012.1
Q4	98.5	236.6	9.1	37.9	251.1	289.0	67.8	74.4	280.9	1056.3
2013Q1	102.2	254.1	5.0	37.3	262.7	300.0	70.6	74.4	281.2	1087.6
Q2	108.7	269.4	5.0	38.1	246.6	284.7	74.6	73.2	284.5	1100.0
Q3	109.2	274.3	4.7	43.2	296.5	339.7	79.1	75.3	304.8	1187.0
Q4	110.3	278.6	4.4	45.5	290.0	335.4	85.6	76.3	312.6	1203.3
2014Q1	113.0	282.3	4.2	45.2	310.5	355.7	87.3	76.0	165.6	1084.0
Q2	117.0	285.3	4.4	44.6	293.6	338.2	90.9	77.1	166.3	1079.2
Q3	120.4	284.6	4.2	44.2	311.8	356.0	94.7	78.8	172.8	1111.4

Source: (NBP, 2015)

Taking into account the structure of household savings allocated to financial assets, which is presented in table 2, one may note that the biggest component is composed of shares and other equity interests, i.e., equity financial instruments. The smallest portion of these instruments are decidedly shares that are quoted in the organized market (the regulated market and the alternative trading system in Poland). At the end of 2003, the percentage of those instruments was 2.89; it started to slowly climb up to 8.07% (2007Q2) and then fell to reach less than 4% at the end of the third quarter of 2014. Although such a significant improve-

ment in the market circumstances accounts for the increase in this proportion during the first period and the decrease during the first years of the financial crisis is also justified, the decrease in this proportion that occurred between 2012 and 2013 is difficult to rationalize because the WIG index rose by 15% at that time and the rediscount rate of the central bank was declining.

The proportion of shares unquoted in an organized market and other equity interests is unquestionably higher than the proportion of shares quoted in that market. Altogether, the percentage of both these items in the period under examination was



approximately 45%. It was the highest at the end of 2004 (47.18%) but started to fall and reached 21.58% (2009Q1); it rose again to a level slightly above 32% in 2014. During this period, the rise in the proportion of household savings invested in unquoted equity instruments should be associated with a relatively good and constantly improving situation in the Polish market.

The second largest component in the structure of household savings allocated to financial assets is deposits, which includes funds that are placed in accounts of monetary financial institutions and cash accounts in brokerage offices. At the end of 2003, the level of deposits was 15.63%. Small reductions, including some fluctuations, began to occur, and by the end of the second quarter of 2007, this proportion amounted to 13.85%. This decline was indubitably connected with the ongoing improvement in the stock market and a decrease in interest rates (the WIG index rose 2.9 times, whereas the rediscount rate of the central bank (NBP) fell from 7% (2004Q4) to 4.25% (2007Q1)). The rise in the stock market index and the decrease in the interest rate on bank deposits made it more attractive to allocate funds to securities, in comparison to bank deposits, which resulted in a portion of the deposits being moved directly to the stock exchange (as demonstrated above) or to mutual funds. Following the outbreak of the financial crisis and as the circumstances on the stock exchange were deteriorating (the WIG index fell by 8.6% at the end of 2007Q3 compared to the level at the end of 2007Q2 and by 63.6% at the end of 2009Q1) and the rediscount rate was increasing (starting from 2007Q2 and in the second and third quarters of 2008, it reached 6.25%), the proportion of bank deposits held by households began to rise and reached 24.44% at the end of the first quarter of 2009. This proportion began to decline again, reaching 21.89% at the end of the first quarter of 2010, while the rediscount rate fell to 3.75%, which then remained around the level of 24% or slightly higher during the period 2010Q2–2012Q2. At that time, the rediscount rate increased to 5%, and the stock market suffered some turbulence, especially in the second half of 2011. The percentage of deposits then fell to 22.40% (2012Q4). In 2014, it climbed back to the level of approximately 26%, which resulted from decreased interest rates (the rediscount rate slumped to 2.25%), although it is difficult to explain this fact because the WIG index rose by 15.6% in

that period. If cash is added to the deposits, it may be noted that the percentage of both of those components of the total financial assets held by households in 2014 was approximately 35%, which was the largest proportion in the study period. In contrast, the proportion of cash and deposits among the total financial assets that were reduced by unquoted shares and other equity interests in 2014 was approximately 51%.

The investment of personal savings in debt securities (both short- and long-term) constituted the smallest proportion among the other possibilities of allocation to financial assets. This portion was the highest between 2003 and 2004, when it amounted to approximately 2.7%. At that time, the rediscount rate of the NBP was relatively high, ranging from 5.75% (2003Q4) to 7.0% (2004Q4), and it then began to gradually fall until it reached 0.37% (2014Q3). As mentioned above, a clearly positive correlation with the decreasing rediscount rate is unmistakable.

The means of allocation of personal savings to financial assets discussed so far may be jointly referred to as a direct investment, i.e., it is made single-handedly by a household. The funds invested in such a way represented a proportion of the total savings allocated to financial assets during the study period, ranging from slightly more than 62% at the end of 2003, to approximately 47% in the first quarter of 2009, and then to 58% at the end of the third quarter of 2014, which indicates that the investment amount followed first a downward and then an upward trend. If the proportion of personal savings held in cash, which was quite stable during the study period because it oscillated approximately 10% (one exception is the period 2007Q1–2008Q1, when it was approximately 8%) is added to that, it may be stated that the remaining portion of the savings was allocated in an indirect manner, i.e., through capital, pension, and investment funds – mutual funds.

The household savings that were allocated to investment funds as a proportion of the total financial assets during the study period were subject to the most violent fluctuations as the circumstances of the stock market were changing, which is normal because these investment funds invest large portions of their funds in the stock exchange. Thus, this proportion first increased from slightly over 7.5% (2003Q4) to slightly over 13% (in the three last quarters of 2007); it then began to fall gradually until it reached 6.26% (2012Q3)



**Table 2.** Structure of the allocation of financial assets held by households (in percentages)

Period	Cash	Deposits	Debt securities	Quoted shares	Unquoted shares and other equity interests	Shares and other equity interests	Shares in investment funds	Life insurance and annuity entitlements	Pension entitlements	Total financial assets
1	2	3	4	5	6	5 + 6	7	8	9	10
2003Q4	11.51	15.63	2.87	2.89	40.66	43.55	7.64	7.51	11.30	100.0
2004Q1	10.81	14.70	2.68	3.03	42.32	45.35	7.54	7.22	11.69	100.0
Q2	10.78	14.65	2.72	2.88	42.59	45.47	6.82	7.45	12.10	100.0
Q3	10.37	14.32	2.83	3.28	42.27	45.55	6.54	7.53	12.87	100.0
Q4	9.74	13.72	2.42	4.00	43.19	47.18	6.34	7.38	13.21	100.0
2005Q1	9.32	14.14	2.26	3.69	42.95	46.64	6.72	7.12	13.79	100.0
Q2	9.44	14.53	2.08	3.48	41.49	44.97	7.20	7.33	14.44	100.0
Q3	8.91	13.71	1.91	3.88	41.52	45.40	7.95	7.11	15.02	100.0
Q4	8.86	14.42	1.70	4.31	39.41	43.72	8.90	7.12	15.28	100.0
2006Q1	8.66	14.47	1.65	4.88	37.27	42.14	9.98	7.11	15.99	100.0
Q2	9.78	15.91	1.53	5.21	32.54	37.74	10.43	7.69	16.93	100.0
Q3	9.51	15.39	1.36	5.78	32.63	38.40	10.78	7.52	17.03	100.0
Q4	9.08	15.68	1.27	7.24	30.60	37.84	11.41	7.42	17.30	100.0
2007Q1	8.24	14.78	1.09	7.18	32.86	40.05	12.01	7.10	16.73	100.0
Q2	7.90	13.85	0.93	8.07	32.56	40.63	13.10	6.96	16.64	100.0
Q3	8.11	14.54	0.96	7.57	32.04	39.62	13.05	6.98	16.75	100.0
Q4	8.46	16.34	0.91	7.11	29.54	36.65	13.06	7.27	17.31	100.0
2008Q1	8.59	17.47	0.93	6.37	32.22	38.59	10.13	7.25	17.05	100.0
Q2	9.94	20.08	0.95	5.63	26.47	32.10	9.94	8.50	18.50	100.0
Q3	9.98	19.82	1.06	5.19	27.73	32.92	8.51	8.88	18.83	100.0
Q4	12.26	21.06	1.32	4.14	22.88	27.02	7.80	9.64	20.90	100.0
2009Q1	13.22	24.44	1.25	4.15	17.42	21.58	7.19	10.03	22.30	100.0
Q2	12.09	23.47	1.01	4.75	20.18	24.93	7.67	8.71	22.13	100.0
Q3	10.84	22.38	0.85	5.08	22.30	27.38	7.70	8.35	22.50	100.0
Q4	10.32	22.77	0.76	5.06	22.05	27.11	8.15	8.07	22.82	100.0
2010Q1	9.46	21.89	1.12	5.23	24.55	29.77	7.65	7.49	22.61	100.0
Q2	10.41	24.35	0.91	5.26	20.24	25.50	7.38	7.73	23.73	100.0

**Table 2.** Structure of the allocation of financial assets held by households (in percentages) (Continued)

Period	Cash	Deposits	Debt securities	Quoted shares	Unquoted shares and other equity interests	Shares and other equity interests	Shares in investment funds	Life insurance and annuity entitlements	Pension entitlements	Total financial assets
Q3	9.45	22.73	0.79	5.47	22.97	28.44	7.32	7.57	23.69	100.0
Q4	9.50	24.43	0.75	5.64	19.45	25.09	7.61	7.75	24.86	100.0
2011Q1	9.11	24.11	0.73	5.76	20.68	26.44	7.38	7.49	24.74	100.0
Q2	9.54	24.40	0.65	5.34	18.97	24.31	7.43	7.71	25.97	100.0
Q3	10.43	24.82	0.79	4.46	20.06	24.53	6.66	7.49	25.28	100.0
Q4	10.63	25.41	0.86	4.31	19.61	23.92	6.40	7.34	25.43	100.0
2012Q1	9.82	24.01	0.84	4.18	22.06	26.24	6.45	7.27	25.37	100.0
Q2	10.22	24.10	0.84	3.76	21.42	25.18	6.45	7.47	25.74	100.0
Q3	9.77	22.76	1.00	3.52	23.52	27.05	6.26	7.20	25.96	100.0
Q4	9.32	22.40	0.86	3.59	23.77	27.36	6.42	7.04	26.59	100.0
2013Q1	9.40	23.37	0.46	3.43	24.15	27.58	6.49	6.84	25.86	100.0
Q2	9.88	24.49	0.46	3.46	22.42	25.88	6.78	6.66	25.86	100.0
Q3	9.20	23.11	0.39	3.64	24.98	28.62	6.66	6.34	25.67	100.0
Q4	9.17	23.15	0.37	3.78	24.10	27.87	7.12	6.34	25.98	100.0
2014Q1	10.42	26.05	0.38	4.17	28.64	32.81	8.05	7.01	15.27	100.0
Q2	10.84	26.44	0.40	4.13	27.20	31.34	8.43	7.14	15.41	100.0
Q3	10.83	25.60	0.37	3.97	28.05	32.03	8.52	7.09	15.55	100.0

Source: authors' estimations based on NBP, 2015

and then increased again to 8.52% (2014Q3). This fluctuation demonstrates that investment funds lose relatively more than stock exchange indices do in a bear market as the phenomenon of mass withdrawal and relocation of money from these funds to banks takes place. In contrast, placing household savings in pension funds (open-ended pension funds, employee pension funds, individual pension accounts, and pension schemes) was rising in importance, predominantly because saving in pension funds was compulsory. Therefore, the proportion of these savings allocated to pension funds grew steadily from 11.30% (2003Q4) to

25.98% at the end of 2013, with a small slump during the bear market in 2007. At the beginning of 2014, this proportion was slightly over 15% because a reform of Poland's pension system was implemented, which involved withdrawing approximately 50% of the funds that the open-ended pension funds had invested in treasury bonds, transferring them to the Social Insurance Company (ZUS), and gradually relocating to this institution the funds that were held by people who were 10 years under the retirement age. Moreover, compulsory participation in open-ended funds was abolished. The household savings allocated to life

insurance undertakings (mainly through capital funds and life annuity contracts) made up approximately 7% of the total financial assets of the population during the study period (this proportion was a bit higher between 2008 and 2009 and even reached 10% at the end of the first quarter of 2009).

## 2.2. Analysis of changes to the structure of savings allocated to financial assets

The changes made to the structure of savings allocated to financial assets in Poland occurring throughout the study period (2003Q4-2014Q3) were analyzed using an econometric trend model with variations of parameters. The model was as follows:

$$Y_t = a + bT + cU + dUT + \varepsilon_t$$

$$\text{or} \quad \ln(Y_t) = a + b \ln(T) + cU + dU \ln(T) + \varepsilon_t$$

where

$Y_t$  – a given component of financial assets expressed in percentages in period  $t$ ,

$T$  – time variable (trend),

$U$  – dummy variable taking the value 1 from the period of parameter change up to 2014Q3 and the value 0 in the remaining periods,

$\varepsilon_t$  – random term in period  $t$ ,

$a, b, c, d$  – structural parameters.

Both a linear model and a power model were tested and estimated using the classic method of least squares. The period of variation in parameter was determined iteratively (with the trial and error method) based on the criterion of minimum residual sum of squares in the estimated model. In most of the estimated models, this period was the first or second quarter of 2008, which was when the latest financial crisis began. A change in the structure of household savings allocated to financial assets could have been expected with a high degree of certainty in this period. Determination of this period (which divided the sample into two sub-samples) served to appropriately define the dummy variable,  $U$ , that belonged to the set of explanatory variables of the model presented above. Variation in the parameters of the model, especially the one standing by the time variable, was tested in this way.

The trend model presented above was employed to analyze changes to the structure of allocation of per-

sonal savings to financial assets, as enumerated in the quarterly financial accounts that were drafted by the National Bank of Poland as follows: cash, deposits, debt securities, quoted shares, unquoted shares and other equity interests, shares and other equity interests (a sum of the two preceding items), shares in investment funds, life insurance and annuity entitlements, and pension entitlements. The estimation results for the model of these components with the OLS method are presented in table 3.

The results suggest that when the financial crisis began in the global economy in 2007-2008, quite substantial changes occurred in the structure of household savings that were allocated to financial assets in Poland. In general, the thesis confirms that both in a period of prosperity, with a decrease in interest rates, and during a bull market, the proportion of savings allocated to shares quoted on the organized market and to investment funds increases and the proportion of savings allocated to deposits and debt securities and the proportion of cash in the total financial assets both decrease. In contrast, in the period of adverse circumstances and during a bear market, i.e., when the investment risk rises as well and the interest rates go up, the proportion of personal savings allocated to deposits and debt securities and the proportion of cash both grow, but the proportion of savings allocated to shares quoted on the organized market and investment funds decreases.

For instance, based on the results shown in table 3, it may be concluded that the proportion of household savings allocated to shares quoted on the organized market in the period 2003Q4-2007Q4 rose on average by 0.3428 percentage points (pp.) each quarter and that at the beginning of 2008Q1, it started to go down by an average of 0.0742 pp. on a quarterly basis (0.3428-0.4170). For the proportion of savings allocated to investment funds, the result was similar. In the period 2003Q4-2007Q4, it grew on a quarterly basis by an average of 0.4607 pp. Beginning in 2008Q1, it began to decline by 0.0598 pp. (0.4607-0.5205). The proportion of unquoted shares and other equity interests in the population's total financial assets behaved differently: it fell on quarterly basis by an average of 0.9463 pp. between 2003Q4 and 2008Q4 and then started to grow by an average of 0.3116 pp. (1.2579-0.9463). As indicated in table 2, this proportion began

**Table 3.** Estimation results for the trend model (variables expressed in percentages)

Name of variable	Period of variation in parameters	Function	a (pval)	b (pval)	c (pval)	d (pval)	R <sup>2</sup>	DW (pval)
Cash	2008Q2	power	2.470 (0.000)	-0.120 (0.000)	0.353 (0.096)	-0.027 (0.666)	0.561	0.911 (0.000)
Deposits	2008Q2	power	2.663 (0.000)	0.018 (0.316)	-0.159 (0.337)	0.173 (0.001)	0.943	1.295 (0.002)
Debt securities	2008Q1	linear	3.066 (0.000)	-0.137 (0.000)	-1.426 (0.000)	0.109 (0.000)	0.960	1.145 (0.000)
Quoted shares	2008Q1	linear	1.885 (0.000)	0.343 (0.000)	4.989 (0.000)	-0.417 (0.000)	0.800	0.687 (0.000)
Unquoted shares and other equity interests	2009Q1	linear	45.921 (0.000)	-0.946 (0.000)	-33.647 (0.000)	1.258 (0.000)	0.933	1.103 (0.000)
Shares and other equity interests	2008Q4	linear	48.142 (0.000)	-0.659 (0.000)	-27.871 (0.000)	0.866 (0.000)	0.927	1.280 (0.001)
Shares in mutual funds	2008Q1	linear	5.234 (0.000)	0.461 (0.000)	4.119 (0.000)	-0.520 (0.000)	0.795	0.407 (0.000)
Life insurance and annuity entitlements	2008Q2	power	2.012 (0.000)	-0.013 (0.347)	1.375 (0.000)	-0.384 (0.000)	0.767	1.007 (0.000)
Pension entitlements	2014Q1	linear	11.538 (0.000)	0.406 (0.000)	-1.963 (0.951)	-0.270 (0.715)	0.959	0.432 (0.000)

Source: authors' estimations.

a, b, c, d – estimates of structural parameters of the model,

p-val – minimum significance level that allows the hypothesis on the lack of significance ( $\alpha=0$  for the linear function) of the parameter under analysis to be rejected,

R<sup>2</sup> – coefficient of determination,

DW – estimate of Durbin-Watson statistic.

to grow quite significantly at the beginning of 2012Q3. In contrast the proportion of personal savings allocated to debt securities in the total financial assets decreased by an average of 0.1370 pp. in the period 2003Q4-2007Q4. Beginning in 2008Q1, the reduction was limited to 0.0277 pp. (0.1370-0.1093). In turn, the estimated model for deposits revealed that their proportion in the total financial assets of households between 2003Q4-2008Q1 rose on a quarterly basis at a rate of 0.0181% (this result may be a slightly mislead-

ing value due to the statistical insignificance of this interpretation). Next, the proportion started to increase to a higher rate of 0.1725 pp., which is in agreement with the thesis formulated above that the proportion of personal deposits should have grown in the period in which the financial crisis occurred and that investment risk increased substantially. It is worth noting that this proportion clearly rose between 2013 and 2014 (see table 2), i.e., in the period when the rediscount rate of the NBP was very low. The reason for these circumstances

may only be the high investment risk that was caused by political factors, i.e., the war in Ukraine.

In contrast, the proportion of funds allocated to pension entitlements in the period under examination behaved differently from the proportions of household savings allocated to financial assets discussed above. This occurred because such allocations are long-term investments with no possibility of withdrawing funds, to which contributions are increasingly larger on systemic and compulsory bases. However, a change in the structure of the allocation of savings has been noted in this case as well. The change was brought about at the beginning of 2014, when the reform of open-ended pension funds was implemented, as mentioned above. The presented results demonstrate that the proportion of household savings allocated to all pension funds in the period 2003Q4-2013Q4 grew on a quarterly basis by an average of 0.4061 pp. Beginning in 2014Q1, the increase was reduced by 0.2704 pp. (as mentioned above, this decline was a consequence of both the withdrawal of approximately 50% of the contributions from open-ended pension funds and the abolishment of mandatory contributions to those funds). The proportion of savings allocated to life insurance (life insurance policies) and annuity entitlements decreased in the period 2003Q-2008Q1 at a quarterly rate of 0.0132%, which is a statistically insignificant interpretation. Starting in 2008Q2, the decrease deepened by 0.3836 pp. When evaluating the data in column 8 of table 2, one may note that this proportion was decreasing throughout virtually the entire period of analysis, with the exception of 2008Q2-2009Q2, when it increased significantly.

Regarding a general substantive-statistical interpretation of the estimated models, it may be stated that it is positive in most cases because the signs of the estimated structural parameters are correct from an economic point of view. Further, with the exception of a small number of cases, their interpretations are statistically significant, which may be inferred from the p-val values placed under the structural parameter estimations provided in table 3. The coefficients of determination ( $R^2$ ) are also relatively high as an estimation of variables expressed as a percentage proportion; apart from three cases, the Durbin-Watson (DW) statistics indicate the non-existence of autocorrelation of the random term.

## Conclusion

This examination has demonstrated that as the financial market and economic circumstances developed in Poland, the structure of allocation of household savings to financial assets underwent quite significant changes between 2003 and 2014. The analysis revealed that changes to this structure had a relatively strong dependency on the current market circumstances. The study showed that along with the improvement of the economic condition in Poland, which led, among other things, to an increase in the stock market share prices and a decrease in interest rates, the proportion of personal savings allocated to shares quoted on an organized market and mutual funds increased, and the proportion of savings allocated to deposits and debt securities decreased. However, in adverse economic circumstances that led to a bear market and an increase in interest rates, the proportions discussed above displayed contrasting behavior. Thus, the structure of the allocation of household savings to financial assets in the period under examination underwent changes. In Poland, such a change occurred with the commencement of the global financial crisis in 2007-2008. Empirical research has shown the depth of those changes in regards to the particular components of household savings that are allocated to financial assets.

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