NATIONAL BANK OF POLAND
WORKING PAPER
No. 146

Economic security of households and their savings and credits

Marek Kośny, Maria Piotrowska

Warsaw 2013

Marek Kośny – Wroclaw University of Economics; marek.kosny@ue.wroc.pl

Maria Piotrowska – Wroclaw University of Economics; maria.piotrowska@ue.wroc.pl

Acknowledgements

Authors would like to gratefully acknowledge the financial support from the National Bank of Poland. The opinions expressed in this article are those of the authors, and they do not reflect in any way those of the National Bank of Poland. We retain the responsibility for any remaining errors.

This research project was conducted under the NBP Economic Research Committee's open competition for research projects to be carried out by the NBP staff and economists from outside the NBP and was financed by the National Bank of Poland.

Design:

Oliwka s.c.

Layout and print:

NBP Printshop

Published by:

National Bank of Poland
Education and Publishing Department
00-919 Warszawa, 11/21 Świętokrzyska Street
phone: +48 22 653 23 35, fax +48 22 653 13 21

ISSN 2084–624X

http://www.nbp.pl

Contents

Abstract

Uncertainty associated with the future and the lack of full protection against the financial consequences of adverse events are the most important reasons of research on economic security of households. Literature distinguishes between two basic concepts: economic insecurity and economic security. Economic insecurity refers to the economic losses, whereas security is usually associated with certain conditions, the fulfillment of which is a guarantee of well-being of the individual.

The proposed interpretation of economic security combines both elements, including risk factors and risk protection. They are included in the scenarios of possible changes of the household's situation in the future. These scenarios cover all permissible combinations of future events – both positive and negative – allowing for an assessment of their financial implications.

Analyzes resented in the empirical part show that the main factor affecting the economic security of households, for which the work is the main source of income, is the stability of employment. Changes in the level of economic security to a large extent reflect the situation on the labor market. The impact of savings proved to be relatively small. It means that many households prefer current consumption, making economic security solely on job stability.

JEL Codes: D19, D31, I31, J28

Keywords: economic security, households, savings

1. Introduction

1.1. Protection against adverse events

Uncertainty associated with the future and the lack of full protection against adverse situations has become prerequisites for the study of the economic security of households. Loss of job, diseases, widowhood or aging can cause a decrease in the standard of living. The severity of the impact of these factors depends on the availability of resources that can help the household to survive economically difficult period. A list of such resources is wide and their choice has a significant impact on many decisions of households, both in the short and long term. The list includes a range of assets from precautionary savings, other capital assets through human capital (education, health) and social capital (family ties, charities) to public and private insurance and social transfers (in cash and in kind).

Precautionary savings seem to be the primary financial support in a difficult economic situation. An important contribution to the theory of precautionary savings brought Leland (1968), Skinner (1988), Zeldes (1989), Caballero (1991), Deaton (1991) and Carroll (1992). There are two terms – precautionary saving and precautionary savings – which meaning is not the same. The first one, precautionary saving (i.e. saving for a "rainy day"), means additional savings, resulting from the lower consumption. It is therefore a response of the current behavior (current expenses) to the risk of adverse events. Generally speaking, incentive for precautionary saving is the uncertainty of the future. The second term – precautionary savings – denotes additional savings, held at a given moment, which are the result of precautionary saving in the past. Precautionary savings are therefore an additional wealth, the additional resource that is treated as a buffer that can compensate for a decrease in income in the case of adverse events. In this way they allow households to maintain a stable level of consumption.

The importance of precautionary motive for saving is normally analyzed in the context of the life-cycle hypothesis (Friedman 1957) and the permanent income hypothesis (Ando and Modigliani 1963, Bewley 1977). Using the intertemporal choice model, they show that consumption and savings depend not only on the current income, but also on the present value of future income. Precautionary saving is

included in this model as a result of consumer choice on the optimal deployment of existing resources between the present and the future. Initially, two-period Leland model (1968) had been used and then extended, multi-period version, proposed by Sibley (1975) and Miller (1976). According to both hypotheses, rational individual (or household as a whole) prevents fluctuations by increasing or decreasing precautionary saving (saving and dis-saving). Thanks to adjustment of saving to changes in current income, individuals can maintain a constant level of marginal utility of consumption.

However, there are some factors affecting the intertemporal choice that induce consumers to behave contrary to the life-cycle model and permanent income hypothesis. These are: preference for increasing the standard of consumption, the need for the purchasing of status goods and lack of self-control, necessary for the implementation of long-term savings plans (behavioral models of wealth accumulation argue that saving requires active psychological and behavioral policies, to effectively reduce spending and increase savings – see, e.g., Browning and Lusardi 1996). These three factors result in reduction in precautionary saving in time.

Carroll and Samwick (1998) have shown the importance of precautionary saving using the buffer-stock models, developed by Deaton (1991), Carroll (1992), Carroll and Samwick (1997a). These models suggest that consumers define their optimal ratio of wealth to income, determined in such a way that if wealth is above the target, consumption will exceed the income and wealth will fall, but if wealth is below the target, the income will be higher than consumption, and wealth will increase. Carroll (1992), Carroll and Samwick (1997b) and Gourinchas and Parker (2002) confirmed this model using microeconomic data. Simulations based on the buffer-stock models suggest that a significant proportion of liquid assets of households whose head is less than 50 years, are the precautionary savings, aimed at protecting against the increased uncertainty. The results obtained by Carroll and Samwick (1998) are consistent with the parameterization of the life-cycle model, taking into account uncertainty of the future, which suggests that consumers below age of 50 save according to the buffer-stock model and then adjust their decisions on savings to the traditional life-cycle model.

On the one hand, empirical research confirm the importance of precautionary saving, on the other show that it is important for certain people in certain situations

(Browning and Lusardi 1996). Heterogeneity of the behavior of individuals with respect to consumption and savings makes it difficult to accurately quantify motives for precautionary saving. Assessment of the significance of these motives depends to a large extent on the methods used. Studies based on econometric methods were carried out by Carroll and Samwick (1997a), Engen and Gruber (2001), Gourinchas and Parker (2002), Cagetti (2003), Giavazzi and McMahon (2012). Surveys were used in the works of Kennickell and Lusardi (2005) and Kimball et al. (2005).

Literature offers much less empirical results obtained on the basis of macroeconomic data. Carroll et al. (2011) analyzed the impact of precautionary motive on the aggregate rate of saving in the United States. Wider research by Mody et al. (2012) assessed the importance of precautionary motive in explaining the increase in saving rates in 27 developed countries during the period 1980-2010. They believe that at least two fifths significant increases in household saving rates in the period 2007-2009 was motivated by precautionary saving.

Summing up, the empirical results presented in the literature suggest a wide range of possible precautionary savings, from 20 to 60 percent of the total savings. While Guiso et al. (1992) argue that the precautionary saving explains only 20 per cent of the net value of household savings, Dardanoni (1991) suggests that more than 60 percent of the savings is aimed at protecting against the risk in future.

So large discrepancies in the assessment of the importance of precautionary motive justify search for determinants of precautionary saving (and consequently the optimal level of precautionary savings). These issues have been analyzed by a number of researchers, using data for different groups of countries (see, for example, Schmidt-Hebbel et al. 1992, Edwards 1996, Masson et al 1998, Loayza et al. 2000, Mody et al. 2012). They studied the relationship between saving rates and several determinants: uncertainty of labor income, wealth to income ratios, structure of the state budget, demographic characteristics, loan terms, economic growth and financial risk. Although the results indicated a strong influence of specific shocks in the country (group of countries), but the uncertainty of income from work was always significantly positively associated with higher savings of households, taking into account all the other determinants as control variables (Mody et al. 2012). This suggests that uncertainty of income from work is crucial for precautionary saving.

The importance of precautionary saving may be reduced by alternative sources of economic security. They can affect society and the economy definitely positive. A well-functioning insurance market, which will reduce the need for precautionary savings, social capital, including family ties and charitable organizations could be given as examples. Controversial is, however, the impact of social assistance benefits. Social transfers stabilize the financial situation of households, but may discourage from self-protecting.

1.2. Definition and measurement of economic security

The economic security in microeconomic dimension influences the welfare of individuals, individual identity and behavior in the labor market and in macroeconomic dimension is the primary goal of the state and consumes a significant portion of public expenditure.

Lack of economic security in terms of income, employment, place of residence can be a big threat to individual identity. Decisions related to work and assets, taken under the influence of anticipated higher economic risks, have an impact on planned purchases of durable goods, including mostly flats and houses. Economic insecurity, resulting from the risk of unemployment, may lead the individual to strategies that are individually and socially inefficient (for example, reduced motivation, avoiding the risk of mobility in the labor market, the reluctance to deepen professional skills because in the future could not be demand for this type of work).

Twenty-first century has brought a wider research related to economic security. Initially, the researchers focused on economic risk. Hacker, in his well-known book "The great risk shift. The New Economic insecurity and the decline of the American Dream" (2006) stressed that for Americans income inequality has become less of a problem, and on the first plan came the fear for the future life of their families. The reason for this fear has become a very significant increase in the volatility of family income and the increase in risk associated with a decrease in the value of assets. The works of Hacker (2006, 2007) initiated a wave of empirical research on the trends of changes in income. Consequently, researchers began to shift attention from the risk in

the direction of economic insecurity, associated not only with the instability of income, but also instability of the labor market, instability of access to health insurance, instability of values of the properties, the uncertainty of pensions and so on. It resulted in several approaches to definition of economic (in)security and identification of its main sources.

The literature distinguishes between two terms: economic insecurity and economic security. Economic insecurity refers to the risk of economic loss, and economic security is usually associated with certain conditions, the fulfillment of which is a guarantee of well-being of the individual.

The researchers dealing with **economic insecurity** focus on the current occurrence of economic losses (for example, Hacker 2007) or anxiety and fear associated with the emergence of such losses in the future (for example, Osberg 1998). Osberg (1998, p. 17) defines economic insecurity as anxiety (fear) due to the inability to obtain protection against subjectively significant potential economic losses. This definition (see Osberg 1998, pp. 17-18) is consistent with the term "insecure", but consists of four elements that are difficult to explain on the basis of economics: 1) emotional state (anxiety, fear) due to predicted future threats, 2) qualitative distinction between the states "safe" and "unsafe", 3) subjective assessment of the probability of the loss and its cost, and 4) the presence of restrictions on the options available for individuals to avoid risk.

Concerns about the future are also emphasized in the definition of economic insecurity, in which it is understood as the individual perception of the economic misfortune (Dominitz and Manski 1997, Scheve and Slaughter 2004, Anderson and Gascon 2007). Economic misfortune is identified with the inability to purchase goods and services (by individuals or their families) and directly depends on income.

Hacker (2006, 2007) focuses on the current economic losses and links economic insecurity to the existence of three major risks that may affect the well-being of individuals:

- A large loss of income.
- A significant increase in health care costs that are not covered by health insurance.

- Lack of sufficient financial assets, which could reduce the risk due to the above mentioned two risks.

Economic security is usually determined by the conditions required for sense of security.

Beeferman (2002, p. 1) proposes a practical definition of what it means that people have a sense of economic security. They need assurance that in the short term they will be able to meet basic needs and in the long run – that they gain a well-paid job, will be able to improve the qualifications and will have sufficient financial resources to buy a flat or a house, start a business, start a new career and that these resources will allow them to survive the changes and crises in their lives and ensure a high quality of life when retired.

The report, "By a Thread: The New Experience of America's Middle Class" (2007) prepared jointly by the Demos: A Network for Ideas and Action, and The Institute on Assets and Social Policy at Brandeis University, an index of security of the middle class was based on responses to the question: what should have the middle class to feel safe in an economic sense? The answer is as follows:

- Financial assets sufficient to:
  - meet the basic needs in the case of job loss or serious illness,
  - provide a comfortable life in retirement and
  - help children to achieve economic security in future.
- Education needed to find a good job in a highly competitive market.
- Income, which ensure a high standard of housing and living
- Wide range, high quality health care for all members of the family.

International Labour Organization (www.ilo.org) in the ILO Socio-Economic Security Programme has adopted the definition of "economic security", which indicates a number of conditions, fulfillment of which can be identified with a sense of security. Economic security in this definition consists of two parts: the basic social security and work-related safety. Basic social security is defined as access to basic services in the

field of health, education, housing, information and social protection. Work-related safety consists of seven elements:

- Income security – refers to the current, perceived and expected income, both earned and received in the form of social benefits. Considered is the level of income (absolute and in relation to needs), income insurance, expectations regarding the current and future income – during the period of employment, after retirement and during disease.
- Representation security – refers to the rights of individuals as well as to the existence of competent and independent trade unions.
- Labor market security – occurs when the market generates opportunities of employment, giving adequate salary for the job.
- Employment security – protection against loss of income-giving work (protection against sudden dismissal, unjustified dismissal, etc.).
- Job security – refers to the ability to perform tasks compatible with the interests of workers, training opportunities, career development.
- Work security – obeying the safety rules and protecting from excessive stress.
- Reproduction-of-skills security – access to training opportunities, guaranteed leave.

1.3. Sources of economic insecurity

Identification of sources of economic insecurity depends on the horizon of analysis. In the short term economic insecurity is generated by the risk of significant economic losses due to illness, job loss, family breakdown or retirement. All of these risks are to a lesser or greater extent insured by the social insurance programs. In the long term there are additional risks of economic loss arising from:

- Structural changes in the whole economy and in particular areas, for example changes in the structure of industries due to the introduction of modern technology.

- Changes in institutions, which can affect functioning of capital, insurance and real estate markets, political system and economic or social decisions of the government.
- State of public finance – high deficit of public finance and public debt pose a threat to social benefits and pensions.

Analyzing risk factors for economic losses in the short term, lack of health insurance is considered one of major risks. Economic risks associated with the disease is partly the risk of loss of income, and partly the risk of large private spending on medical treatment (even in case of universal health insurance system).

Danger of losing a job is a central element of the concept of economic insecurity. Anderson and Gascon (2007, p. 3) point out that the economic insecurity is generated mainly by volatility in wages and employment, due to variability in the structure of the labor market. Employees with narrow specialties, who worked in specific companies or industries, may experience a significant loss of wage if the company is reorganized.

Lack of economic security can be caused by family breakdown as a result of the death of a spouse or divorce and, consequently, loss of income, or even part of the assets. Single parents are particularly vulnerable to economic insecurity because it increases the risk of serious financial problems in a case of job loss or illness.

Whether people are poor or not after retirement depends on their accumulated assets (inherited wealth, income of a spouse, their own savings, riskiness of investment strategies) and the amount of the pension (its height is affected both by the design of the pension system and by the individual decisions, made during the economic activity).

Summing up, in the short term protection against adverse situations are: a stable income from work or other sources (equity, real estate), insurance (private and social), liquid resources, including precautionary savings, human capital, social capital and common equity. In the long term, economic security can result also from ownership of less liquid assets (houses, flats, durable goods), but the most important components of economic security are the stability of geo-political situation and favorable demographic trends.

1.4. Measurement of economic insecurity

Number of measures of economic security have been proposed in the literature. They can be grouped according to their type:

- Two proposals, based on the definition of economic insecurity resulting from anxiety about the future economic losses caused by adverse situations and fear of the lack of adequate protection against such events:
  - the economic security index proposed by Osberg (1998), Sharpe and Osberg (2009),
  - a measure of the economic insecurity developed by Bossert and D'Ambrosio (2009).
- One proposal referring to the economic insecurity resulting from the fear of current economic losses:
  - the economic security index constructed by Hacker, Economic Security Index (ESI) (2006, 2007).
- Several measures of economic security, specifying conditions required for security of households (or individuals) from adverse events. These measures typically include assets, such as economic, human, social and even common capital:
  - The Middle Class Security Index, developed by Demos and the Institute on Assets and Social Policy at Brandeis University (2007),
  - number of indicators describing the ability to protect against adverse events, for example measures proposed by Beeferman (2002), Morrone et al. (2011), indicators suggested by the International Labour Organization (www.ilo.org).

Researchers agree on the list of the most important events that can generate economic losses – both current and in the future. These are: unemployment, sickness, old age, widowhood (divorce). Only Bossert and D'Ambrosio (2009) do not identify specific threats. Instead, they focus on what properties a measure of economic security should meet (axiomatic approach). However, they do not provide any empirical results.

Consensus on the identification of key risks does not imply single method of assessment. It is possible to adopt an objective (Osberg 1998, Sharpe and Osberg 2009) or subjective approach (for example, Dominitz and Manski 1997, Anderson and Gascon 2007), and to use macroeconomic (aggregated at the level of the whole population or groups of households) or microeconomic data (at the household or individual level).

Osberg (1998), who defines economic insecurity in the category of anxiety about the future, proposes usage of aggregate data. Starting with simple indicators as a measure of aggregate risk of health care costs (as a share of private spending on health care, after deduction of re-financing got from health insurance) in total personal income after taxes, to the more complicated, that are based on the probability of a adverse events. An example of this type of index is a measure of economic insecurity of incomplete families, equal to the product of percentage of married women with children in the number of adults in the population, the probability of divorce, the poverty rate among single parent families and the average depth of poverty among lone parent families.

When measuring both economic insecurity and economic security, microeconomic data from surveys is used.

Researchers equating economic insecurity with anxiety about the future make use of three types of subjective data that can be obtained on the basis of questionnaires:

- Answers to questions about the general level of economic risk. They allow determining the overall mood and direction of the change.
- Answers to questions about the causes of economic insecurity. The problem with this type of data is the aggregation of the intensity of fear.
- Answers to questions on the subjective assessment of the probability of adverse events such as job loss, health insurance (see, for example, Dominitz and Manski 1997, Anderson and Gascon 2007).

All three types of response, if used carefully, can be useful in the analysis of the economic insecurity.

Constructing the Economic Security Index (ESI) Hacker (2007) adopted an objective approach and used the survey data on income and assets, and data from the Consumer Expenditure Survey (to determine spending on health care). He also made use of household studies. ESI aggregates the various factors influencing the level of economic security in one measure. To identify individuals as economically secure, Hacker assumed that the maximum decrease in disposable income (due to the decrease in current income or increase in spending on health care), in the absence of sufficient financial assets, should not exceed 25%. He also defined what is meant by "sufficient financial assets" (Hacker, 2007, p 5).

The Middle Class Security Index developed by Demos and the Institute on Assets and Social Policy at Brandeis University (By a Thread: The New Experience of America's Middle Class, 2007) consists of five factors, which describe the economic security of the middle class. These factors are: assets, education, housing, budget and health care. Two thresholds have been defined for each of these factors: first one, optimal for ensuring economic security, and the second, which expresses the risk to economic security. Families with at least three factors at the optimal level were said to belong to the economically secure middle class. The calculation of the index used microeconomic data on expenditure and household income.

Beeferman (2002) assumes that economic security is guaranteed by having three types of assets: income assets (i.e. income-generating work), human capital assets and financial assets. He measures economic security on the basis of aggregated indicators, describing assets owned by households. A similar approach was also applied by Morrone et al. (2011).

Method of measuring economic (in)security partly depends on the way in which the results are to be used. Both usage of number of indicators, describing the scope of the economic (in)security, and the construction of a single measure can be justified. It may also be useful to apply subjective and objective indicators, because the fear of possible future economic loss is a subjective response to the objective events involving high risk.

Measures of economic (in)security, designed using various methods, have different interpretation. Osberg-Sharpe index is the weighted sum of the risks of economic losses, caused by four adverse events (unemployment, sickness, old age and

family breakdown). Hacker indicator shows the percentage of households which are at risk because of the economic instability of income. Measures based on assets allow determining the percentage of households which have enough assets to maintain consumption of basic goods unchanged or on slightly lower level.

A good measure of economic security should combine the past, present and future, as postulated Bossert and D'Ambrosio (2009). Osberg-Sharpe index has this feature, but Hacker's measure applies only to the present, taking into account changes in income in the past. Measures based on assets connect the present with the past. Measures of economic security are usually standardized, and vary in the range from zero to one.

2. Concept of economic security

Design of synthetic measure of economic security must address the problem of aggregation. If the measure is based on the definition of economic insecurity resulting from anxiety for economic losses in the future, risks generated by the various sources should be aggregated, as in the case of Osberg-Sharpe index. If the measure is based on current economic losses, the reference category for the indicator may be disposable income (as in Hacker's measure). In the case of measures expressing the conditions of economic security, researchers usually define sets of indicators. Taking into account the diversity of assets, it is difficult to determine the reference category, which would allow for the aggregation of potential reduction of losses, offered by individual assets.

Design of synthetic measure of economic security may raise doubts even if reference category is successfully defined. If the aggregated measure is built by addition or multiplication of indicators from various areas, aggregation can be considered risky. An illustration of this problem may be the construction of the Osberg-Sharpe index (2011). The components of this measure refer to four sources of risk:

- The risk of loss of income due to unemployment, equal to the product of the change in the unemployment rate, the percentage of the unemployed receiving benefits, and the average percentage of earnings replaced with these benefits.
- The risk of financial loss due to illness, equal to uninsured health care expenses (expressed as a percentage of disposable income).
- The risk of poverty of a single parent with a child, equal the product of the percentage of married women with children (in the number of adults in the population), the rate of divorce among married couples, the poverty rate among single parent households and the average depth of poverty among single parent households.
- The risk of poverty in old age, equal to the product of the poverty rate and the average depth of poverty experienced by households where the head has more than 65 years.

These four types of risk are aggregated into a single measure of economic security using weights. The weight of each risk is the relative size of the population affected by the threat.

The approach proposed in this paper uses – as the reference category – length of period for which the household, as the basic unit of consumption, is able to maintain consumption at a preset level. This approach to economic security is thus equated with the ability to guarantee the stability of consumption.

In order to finance consumption at the appropriate – for a given household – level, steady income is needed, regardless of its origin. In this sense, income will constitute an intermediate category. Within this intermediate category it is possible to make different factors directly comparable – both risk and safety factors. The actual influence of individual factors on the level of household economic security depends on their impact on the level of income or consumption. Generally speaking, if they cause the reduction in income or increase in expenses, they will be treated as risk factors. In the opposite situation, they will provide protection against risk, and will be referred to as safety factors. In fact, the classification of each factor to one of distinguished groups can be much more complex and depends, for example, on the horizon of the analysis. However, a measure defined on the basis of such a reference category would be a mixture of economic security and economic insecurity measures.

Definition of economic security based on household income and consumption requires a reference to one of the basic concepts in this area – poverty. In the case of poverty analysis, low level of consumption (income) is crucial to classify households as poor. Too low level of consumption implies certain negative consequences – including lack of opportunities to participate in social life, social exclusion, and even – in extreme cases – problems with ensuring the physical existence. In the context of economic security, essential is not the level of consumption, but its stability, i.e. the ability to sustain it at least at the current level. In this way, the analysis is complementary to the analysis of poverty.

Besides the assessment of the current situation, the behavior of individuals is affected by the prospects for change in the current situation. As indicated by Hacker (2011), for most people, much more important than the potential increase in income is to maintain its current level. This means that it is possible that poor households have a

higher level of economic security (stability of consumption) than non-poor households. Although this has no direct impact on their actual, material condition, it may be reflected in their mental condition. In particular, higher level of wealth may imply some kind of addiction to social and financial position, and the mere threat of loss can greatly affect an individual quality of life.

Proper assessment of the level of economic security is highly dependent on the extent of risk factors included in the analysis. Broader set of such factors results in a relative decrease in safety of poorer households (with a lower income, savings, etc.), which means a greater relative vulnerability of this group of households to risks common to all households (irrespective of their affluence, for example associated with certain groups of diseases). This is despite the fact that some risk factors (especially in the short term) concern mostly affluent households, because they have more assets (for example cars, real estates).

Assessment of economic security requires – in the first step – determination of the level of consumption, which will be considered as ensuring safety. Consumption at this level should allow most households to live at a level similar to the current one. Therefore, it is assumed that in the field of basic goods it will reflect the current level of consumption. Restrictions will apply to luxury goods (and perceived as a luxury) and to expenses aiming at increase in material assets (for example purchase of vehicles or some new equipment for flat or house). Such consumption increased by some fixed expenses of the household (especially repayment of loans) will be referred to as basic expenses.

There are two basic reasons for the focus on expenditure rather than income of households, when assessing their economic security. First, maintaining quality of life is associated with the level of expenses, not income. Actual utility of consumption depends on its structure (style), as well as on the prices paid for each good. Secondly, according to the permanent income hypothesis, consumption is much more stable over time than income and – in this sense – is more representative for medium- and long-term situation of household, as taking into account history of income changes in the past. If volatility was high, it is expected that it will be reflected in the expectations regarding the future financial situation by appropriate adjustment of the current consumption.

The primary source of financing basic expenses is current income – from a job or equivalent (pension, from capital, etc.). The stability of this kind of income takes into account both factors related to the characteristics of the individual and the overall economic situation. In case of loss of current income (or part of it), households can use its substitutes, including in particular:

- Assets – both liquid (for example savings and items that can be easily sold) and illiquid (difficult to sell items of property).
- Potential income, resulting from family ties and social relations (possibility to borrow money or getting other support).
- Payments from insurance companies.
- Allowances, benefits and other – offered both by the state and non-state institutions.

Depending on the situation of household, insurance payments, donations, benefits and other transfers may be a part of the current household income. Financing current consumption from sale of assets or credits (loans) usually denotes problems with current liquidity and, consequently, means low level of economic security. But potential different meaning of income sources does not affect in any way the generality of the discussion. Each source of income can be described in terms of amount of income from this source and probability of receiving this money (once or continuously in a given period). Various types of income and the estimated probability can be linked to specific individual in the household or household as a whole.

Risk factors reduce the expected amount of household income. Each of these factors is characterized by the amount by which it decreases household income (or increases the cost) and the probability of its occurrence. Depending on the type, risk factors may concern a particular person in a household, a household, or both an individual and a household. For example, the illness of one of persons earning income in the household can mean a reduction in his (her) income for a number of months. It may, however, also involve additional costs of medicines, medical care or rehabilitation (depending on the type of disease and the fact of having health insurance). In this case, the occurrence of such an event will affect both the overall household income and expenditure.

For proper identification of risk and safety factors, crucial is the horizon of analysis. In the short and medium term (2-5 years) basic safety and risk factors can be identified on the basis of the current situation and relatively simple forecasts. The most important is the current income (mainly from work and social security) and liquid assets (especially savings, but also easily transferable items of the property). In the slightly longer horizon, also less liquid assets (primarily real estates) should be included. It means that from the point of view of risk factors, the future (in short and medium term) can be treated as – appropriately adjusted – extrapolation of the present.

Assessment of economic security in the long run has a different character. A particular type of risk associated with the long-term analysis is the lack of sufficient funds after retirement. In this case, essential is the overall economic and social situation. Individual factors (characteristics, decisions made in the past) are of secondary importance. Assessment of economic security in such a horizon is possible (except for scenario analysis) only by the assumption that the future will be a predictable consequence of the present. Extrapolations of this type – by their nature – are burdened with a very high risk of error.

Differences between short-term and long-term analysis can be seen in the context of the current structure of expenditure. Some of current expenses, having – broadly defined – investment character, should be treated as a burden, reducing economic security in the short term. Incurred expenses of this type may, however, have a positive impact on economic security in the long run. The expenditure of this type include:

- any expenditure associated with the maintenance, upbringing and education of children,
- expenses on own education of workers, especially when they are incurred in the form of periodic payments,
- expenses associated with the development of their own business,
- additional expenses, related to the health prevention, proper nutrition, etc.

In the context of economic security in the long run, crucial may be the first group of expenditure. The ongoing demographic crisis may, in fact, lead to problems with the solvency of pension funds based on the principle of intergenerational solidarity.

3. Measure of economic security

The level of economic security is a feature of the household. Therefore, its basic assessment is done at the microeconomic level, while the estimate of the average level of security for the whole population requires aggregation of individual values.

The first step in assessment of the economic security of households is determining their basic expenses. This is done on the basis of the consumption pattern. Basic consumption generally covers expenditure on consumer goods not having the luxury character. Limiting consumption to goods classified as basic, implies decline in standard of living for those households which spend money on luxuries and some certain groups of goods – such as recreation, restaurants and hotels. Basic consumption covers expenses on food, clothing, housing (including rent and energy), education and health, sanitation, telecommunications, private vehicles, public transportation and so on, but it does not include investment in new flat (house) equipment and vehicles. Household consumption at a basic level allows maintaining the current level of consumption in many areas (reflects the current consumption of the household), but for some families may mean a decline in the standard of living.

Category of basic expenses, analyzed in the next of this paper, in addition to the basic consumption includes the current monthly repayments of loans and credits. Basic expenses are usually lower than the actual income of the household.[1]

The assessed level of expenditure is then adjusted by the amount of additional costs that the household will have to bear in the case of adverse events[2] (for example illness, material losses, equipment failure or consequences of mistakes). For any household, the total level of expenditure is given by:

$$c_{hA} = cb_h + \sum_{r=1}^{R} cr_{rh} rh_{rhA} \qquad (1)$$

where cb_h denotes basic expenses of the household h ($h = 1, \dots, H$), cr_{rh} – additional costs that the household will have to bear in the case of event r ($r = 1, \dots, R$). Value of

[1] As is apparent from the data collected, it is not necessarily the case. In the case of some households, current income is not sufficient to cover current expenses, even at a basic level.

[2] The assumption that future events are adverse can be easily waived by introducing the possibility of declaring negative changes in the level of expenditure. The same applies to changes in the level of individual income.

additional expenses is calculated as a difference between actual cost, resulting from this event, and insurance payments (both private and social). All possible scenarios of future situation of household h are described by the vectors $\mathbf{RH_{hA}} = (rh_{1hA}, \dots, rh_{RhA})$, where A identifies variant (scenario) of future situation. $rh_{rhA} = 0$ means that in scenario A event r will not occur for household h, and $rh_{rhA} = 1$ – that this event will occur. Set of all possible vectors $\mathbf{RH_{hA}}$ will be referred to as SA. If simultaneous occurrence of several events implies the total cost that is different from the sum of costs of these events, such combination of events should be treated as a separate event. The probability of an occurrence of event r in the horizon of analysis is equal to p_{rh} and may vary between households (depending on their characteristics).

This procedure applies to events (mostly adverse), which consequences influence household expenditure (for example expenses on medical treatment of the household members in the case of illness, the cost of repairing broken equipment and cover other losses). A different situation occurs when an event q ($q = 1, \dots, Q$) affects the level of income of a particular person in the household – job loss, wage reduction or loss of benefits. Then, vectors $RI_{hB} = (ri_{11hB}, \dots, ri_{QM_hhB})$ will mean the possible scenarios of the future situation of the household h, describing the occurrence of events q. Values of index B identify the scenario, indicating events q that are to occur for person m ($m = 1, \dots, M_h$) in household h. Set of all possible vectors RI_{hB} is denoted by SB. As before, $ri_{qmhB} = 0$ means that in scenario B an event q will not occur for a person m in household h and $ri_{qmhB} = 1$ – that this event will occur. Probability of event q is equal to p_{qmh} and the reduction in income, resulting from the occurrence of this event, is d_{qmh}.

In the case of events that affect both the level of expenditure and income of one or more persons in the household, some scenarios of future events are dependent on each other. In this case, some combination of scenarios A and B will not be considered, and the SAB will denote a set of all possible combinations of scenarios A and B. An example of such a situation may be a disease of one person in the household. It results in increase in the health care costs (related to the costs of medical treatment and the purchase of medicines), but also in decrease in the income level of this person, which is a consequence of the disease. In this case, scenarios assuming decrease in income and

no changes in the level of consumption, and increase in consumption in the absence of changes in the level of income will not be considered.

In the case of a joint occurrence of events affecting the level of personal income (q), and the level of household consumption (r), scenarios of future situation are identified, in which household income will be sufficient to cover basic expenses:

$$I_{hAB} = \begin{cases} 1\ jeśli\ \sum_{m=1}^{M_h}\left(y_{mh} - \sum_{i=1}^{Q} d_{qmh} ri_{qmhB}\right) \geq c_{hA} \\ 0\ jeśli\ \sum_{m=1}^{M_h}\left(y_{mh} - \sum_{i=1}^{Q} d_{qmh} ri_{qmhB}\right) < c_{hA} \end{cases} \quad (2)$$

where y_{mh} denotes current income of person m in household h. $I_{hAB} = 1$ denotes that the total income of the members of the household h is sufficient to cover the basic expenses of the household in case of joint occurrence of events from scenario A (in terms of possible changes in the level of household consumption) and B (in terms of possible changes in the income of all persons in this household).

Assuming the independence of events in the scenarios under consideration (any dependence can be eliminated by creation of a new event, including the combined occurrence of some other events) the probability of joint realization of scenarios A and B is given by:

$$p_{hAB} = \prod_{r=1}^{R}\left[{p_{rh}}^{rh_{rhA}}(1 - p_{rh})^{(1-rh_{rhA})}\right]\prod_{m=1}^{M_h}\prod_{q=1}^{Q}\left[{p_{qmh}}^{ri_{qmhB}}(1 - p_{qmh})^{(1-ri_{qmhB})}\right] \quad (3)$$

Probability of maintaining the total income of all household members at the level guaranteeing possibility of financing basic expenses is equal to:

$$p_h = \sum_{AB \in SAB} I_{hAB} p_{hAB} \quad (4)$$

where AB denotes joint realization of scenarios A i B. If there exist scenarios, in which income is not sufficient to finance basic expenses ($I_{hAB} = 0$), probability p_h is lower than 1. In such a case missing income of household h denotes expected value of income that should be earned in each scenario (where $I_{hAB} = 0$), to finance basic expenses. Value of missing income is given by:

$$MI_h = \sum_{AB \in SAB} \left\{ \left[c_{hA} - \sum_{m=1}^{M_h} \left(y_{mh} - \sum_{i=1}^{Q} d_{qmh} ri_{qmhB} \right) \right] \cdot (1 - I_{hAB}) p_{hAB} \right\} \quad (5)$$

Based on this information it is possible to determine the security level of the household according to the formula:

$$ES_h = \begin{cases} 1 & jeśli\ S_h \geq MI_h \\ p_h + (1 - p_h) \frac{S_h}{MI_h} & jeśli\ S_h < MI_h \end{cases} \quad (6)$$

where S_h denotes the value of assets, which could substitute the current household income. Measure ES takes values between 0 and 1. Multiplying this value by the length of the horizon of the analysis, we obtain an expected length of period, for which the household will be able to finance basic expenses.

The higher the value of ES, the greater the economic security, i.e. the household is able to finance its consumption (expenditure) for a longer period, using current income and assets (as substitute for current income). A value of 0, indicating a complete lack of economic security, occurs only when the basic expenses exceed the amount of income in each of the considered scenarios and the household does not have any assets that could substitute the current income. Value equal to the length of horizon of analysis ($ES = 1$) indicates that the expected value of the total income of the household members is not lower than the expected value of the expenditure. This does not mean, however, that the household will be able to finance their spending in each (even the worst) case. To do so, the current household income increased by the value of assets, would have to be higher than the maximum possible level of expenditure in all possible scenarios:

$$S_h + \min_{AB \in SAB} \sum_{m=1}^{M_h} \left(y_{mh} - \sum_{i=1}^{Q} d_{qmh} ri_{qmhB} \right) \geq \max_{AB \in SAB} c_{hA} \quad (7)$$

Additivity of the proposed measure allows the assessment of the average level of economic security in the scale of the population. Calculating the average value of ES for all households of a given group (national, social or occupational), an average length of the period is obtained.

The design of the measure allows taking into account many different risk factors, affecting both household consumption and income of individuals. In the case of a large number of possible scenarios, it is possible to determine the expected impact of some

events in a simplified form. Several rare events with similar financial consequences can be treated as a single event (assuming independence). In this case, the probability of such compound event would be equal to the sum of probabilities of individual events, while a change in income or expenses – to the average change for these events. Giving an approximately the same assessment of economic security, such procedure can significantly reduce number of analyzed scenarios.

4. Data

To assess the level of economic security of households in Poland were used data from two independent, mutually complementary sources.

The first one is the study Social Diagnosis (see Council for Social Monitoring 2012). This study is the most extensive, independent research on the situation of Poles and Polish households. In Social Diagnosis respondents are asked about the issues related to the material situation of their household (income, material status, savings, loans, etc.), economic activity, the health situation and their personal opinions on several current problems. The first round of this study took place in 2000. In the data for this year, however, there is no information on the individual income, which is required to estimate the level of economic security. Therefore, in the next of the paper, subsequent rounds are taken into account. They took place in years 2003, 2005, 2007, 2009 and 2011.

Social Diagnosis is a panel study – in subsequent rounds are involved all households with previous rounds, which have given their consent.[3] Sample size is on increase, and in subsequent rounds included 3 961, 3 851, 5 532, 12 381 and 12 386 households. Such sample size, coupled with the sampling method used in official surveys conducted by the Central Statistical Office, provides high quality of data collected in this study.

The second source of data, used to assess the economic security, is a data set from the household budget survey - the official survey of the Central Statistical Office. In contrast to Social Diagnosis, this study is focused on a specific issue – the structure of expenditure and the level of household wealth. Although the scope of the data collected in this study is much narrower than in the case of the Social Diagnosis, it contains very detailed information on the structure of consumption.

Household budget survey is conducted in Poland for decades, but in this analysis will be used only the data complementary to the Social Diagnosis – for years 2003,

[3] In subsequent rounds, the study covered approximately two thirds of households in the previous round. There are weights published for each household which make it possible to assess the impact of this method of construction of the sample on the final results. These weights were taken into account in the assessment of the level of economic security.

2005, 2007, 2009 and 2011. Survey sample size included, respectively, 32 452, 34 767, 37 366, 37 302 and 37 375 households.

Due to the complementarity of the two data sets, an analogous method of data collection and a similar set of basic variables, characterizing individual households and their members, an attempt has been made to combine data from both sets.[4] Most of the information necessary to assess the level of economic security is available in the Social Diagnosis, and this data set has been taken as the main one. Another argument in favor of this choice is that the unique information, available only in household budget survey data, concerns the structure of consumption. This structure – to the extent necessary to assess the level of economic security – is relatively similar for groups of households, distinguished with respect to the income level and some general characteristics of households.

The process of combining both data sets was based on stochastic assignment of records (household – especially their consumption patterns) from household budget survey to records (households) in the Social Diagnosis. In this sense, it can be seen as a form of data imputation.

To identify households with as similar as possible patterns of consumption, in both data sets households were divided into groups on the basis of the information about income (9 classes of income), the number of household members (5 classes), the ownership of items of property (a car, a personal computer with an internet access, a dishwasher and a cottage), characteristics of household members (age of a reference person – 5 classes and education level attained by this person – 6 classes), the source of income (6 classes), the demographic type of the household (5 classes) and place of residence (6 classes). Items of property have been chosen on the basis of the results of the estimation of econometric models, characterized in Appendix B.

Assignment of households from household budget surveys to households from the Social Diagnosis was carried out within so defined classes. For each household in the Social Diagnosis, households with the same (or similar – belonging to the same class in most of specified areas) characteristics was sought in the household budget survey. If only one household matched, direct assignment was made. If there were

[4] The method of combining these data sets is described in Kośny (2013).

more such households, the assigned household was chosen randomly.5 Perfect fit (all the characteristics were equal) took place – in subsequent years – for approximately 40-60% households. In the absence of households with identical characteristics, level of compliance was reduced by one level – successively demographic type of the household, education level of reference person, place of residence, source of income and age of the reference person). This reduction was performed until full compliance was obtained. Removal of one or two characteristics caused increase of assigned households to about 70-85%. Reduction by 5 levels (out of 11) increased the number of matched records to 99.5%.

Analysis presented in the empirical part was done for household which reported the income and declared work as a main source of income (income from employment, self-employment or agriculture). Due to the specificity of pensions as a source of income, retired people were excluded. The same concerns households declaring transfers and benefits as a main source of income. From the standpoint of economic security these group should be considered separately.

[5] Random selection of households could be replaced by average consumption structure for the group. Such a solution would, however, reduce the variance of variables in the resulting set.

5. Economic security of households in Poland

Due to the availability of relevant data, an evaluation of the economic security was performed for a two-year horizon. For such a period results can be interpreted as the expected number of months by which the household will be able to finance their basic expenses at the current level, or as a value between 0 and 1, indicating the part of the horizon of the analysis. In the next of the paper, results are presented in the second of these methods, due to the fact that most economic security measures, proposed in the literature, is expressed in this way (see, for example, Osberg and Sharpe, 2011).

Two-year horizon of analysis implies that the risk factors characteristic for longer periods (such as the stability of the state system, the stability of public finances and social security) will not be directly considered. On the asset side only savings, as the most liquid assets, will be taken into account.

According to the definition given in the previous section, basic consumption includes spending on:

- Food, clothing and footwear,
- Current maintenance of flat or house and energy,
- Health,
- Education,
- Public transportation and maintaining the possessed vehicles,
- Cleaning agents and
- Cigarettes and some kinds of alcohol.

In addition, the household must ensure funds for the repayment of current loans. Basic consumption and the repayment of loans, however, will be considered separately, in order to examine their relative impact on the economic security.

Information on the structure of household consumption – in the combined data set – come from household budget survey. The procedure of combining data sets, however, took into account a number of parameters closely related to wealth, assets and the structure of the household. Inside each class, distinguished on the basis of these characteristics, structure of consumption is expected to be similar. And such

structure of consumption was adjusted by the actual level of household income, declared in the Diagnosis of Social.

Estimated value of basic expenses were lower – from a dozen to more than thirty per cent – than the minimum income (that makes ends meet) declared in the Social Diagnosis as an answer to the single question. In the case of poorer households observed differences were larger, whereas for the wealthiest households this relationship was often reversed. This may indicate, on the one hand, the readiness of the wealthiest households to significant reductions in consumption, on the other hand – some expectations of the poorest households concerning the income growth. In the latter case, the problems with the current financing of consumption are directly reflected in the level of economic security, if the earned income is not enough to cover basic expenses.

It implies that the declarations regarding the minimum household income does not fully reflect category of basic expenses. Therefore, further analysis takes into account values resulting from the analysis of the structure of expenditure. And the potential impact of changes in the basic expenses on economic security will be presented in the sensitivity analysis.

Adverse events, affecting the future situation of the household, considered in the next part, will be limited to the loss of job. This risk does not apply to people currently living on benefits (which may improve their situation by finding a job) and people whose main source of income is a pension.[6] Limiting the analysis to the risk of job loss is partly justified by the situation of households in Poland. Universal health insurance limits – in most cases – the impact of the disease to partial or complete loss of current income from work. Chronic diseases, often involving considerable expenditure on medicines (especially for the elderly), are usually already reflected in the structure of household expenses. Disregarding other risks implies that estimates of economic security obtained in this way should be interpreted as the upper limit of their actual level. Taking into account other types of adverse events – both affecting the level of

[6] For pensioners, the probability of maintaining the individual income at the same level was set to 1. To better reflect the situation of this group of people, probability of surviving of people at a certain age should be taken into account, and – in the long run – also the risk of insolvency of the social security system.

household expenditure and income of its members – would result in decrease of economic security. In addition, due to the fact that many risk factors are common to households that are more and less affluent, it is expected that the relative situation of the poorer households will be worse after taking into account these additional factors.

Probability of having the job (income) was determined on the basis of estimation of parameters of the logistic regression function, given by:

$$ln\left(\frac{p_{mh}}{1-p_{mh}}\right) = \hat{\beta}_0 + \hat{\beta}_1 x_{1,mh} + \hat{\beta}_2 x_{2,\,mh} + \hat{\beta}_3 x_{3,\,mh} \qquad (8)$$

where p_{mh} is the probability that person m in household h will work full-time at the end of the two-year period. Values $\hat{\beta}_i$ denote estimates of unknown parameters, and $x_{i,mh}$ – values of variable X_i for person m in household h. In the final model, three variables were incorporated: X_1 – work in full-time (1 for persons working full-time and 0 for others), X_2 – ownership of the employer (1 for state-owned or municipal and 0 for private) and X_3 – health status (1 if health never interferes with daily activities and 0 otherwise). Other explanatory variables considered, including subjective assessment of the stability of sources of income (1 if respondent never felt that the source of income is unstable and 0 otherwise) and a subjective assessment of the financial situation (1 if financial problems never hinder one's life and 0 otherwise) proved to be insignificant. As the dependent variable were adopted answers to the question, whether a person is working full-time (1 for working full-time and 0 for others) concerning the situation of this person in the next round of the study (two years later).

Estimation of the parameters was done on the basis of the panel sub-sample from the Social Diagnosis (7 710 individuals in 2003-2005, 6 724 individuals in 2005-2007, 8 092 individuals in 2007-2009 and 17 280 individuals in 2009-2011). The estimation was carried using maximum likelihood method in a package SPSS. Fit of the model (based on a Nagelkerke's pseudo-R^2) was as follows: for 2003-2005 – pseudo-$R^2 = 0.53$, for 2005-2007 – pseudo-$R^2 = 0.48$, for 2007-2009 – pseudo-$R^2 = 0.61$, and for 2009-2011 – pseudo-$R^2 = 0.64$. Likelihood ratio values were equal to 6 415 for 2003-2005, 6 228 for 2005-2007, 6 267 for 2007-2009 and 12 677 for 2009-2011 and the percentage of correct classifications was equal to 84.6%, 81.6%, 85.9% and 87.3% in subsequent periods respectively.

Besides the explanatory variables approved for the final model, other sets of variables were considered as well. Similar level of fit was obtained when variables describing the ownership of employer and health status were replaced by variables characterizing the respondent – for instance, education and gender. However, adding these variables to the existing model did not improve the fit. For this reason, variables directly related to the work have been analyzed.

During the selection of explanatory variables, very interesting was lack of statistical significance of variables describing the subjective perception of their own economic situation – in case of both stability of income sources (in this case work, because the analysis concerned households declaring work as the main source of income) and stability of the financial situation (its negative assessment could provide an incentive to look for work by people currently not working). Despite the fact that the subjective assessment of their own situation strongly influences the decisions, this assessment does not appear to be plausible as a predictor of the future situation of individuals or households.

Table 1. Estimates of parameters of logistic regressions

Parameter	Estimates for the period			
	2003-2005	**2005-2007**	**2007-2009**	**2009-2011**
$\hat{\beta}_1$ (full-time work)	3.06	2.77	3.44	3.71
	(0.07)	(0.07)	(0.07)	(0.05)
$\hat{\beta}_2$ (employer's ownership)	0.81	0.96	1.12	0.97
	(0.11)	(0.12)	(0.13)	(0.09)
$\hat{\beta}_3$ (health)	0.50	0.72	0.96	0.76
	(0.07)	(0.07)	(0.07)	(0.05)
$\hat{\beta}_0$	-2.13	-1.72	-2.00	-2.00
	(0.05)	(0.05)	(0.05)	(0.04)

Standard errors in parentheses.

Source: own calculations

The results of the estimation of the model, given by equation 8, in subsequent periods are presented in Table 1.

Due to the lack of data about the situation in 2013, to estimate the level of economic security in 2011 will be adopted parameters obtained for the years 2009-2011. Situation on the labor market – which is the main factor affecting the value of the estimated parameters of the model – has not changed appreciably between 2009 and 2011, despite the economic downturn during this period led to a slight rise in unemployment.

Logistic regression model allows calculation of the probability of having full-time work at the end of the two-year period on the basis of the information about the current situation of a given person, according to the formula:

$$p_{mh} = \frac{\exp(\widehat{\beta}_0+\widehat{\beta}_1 x_{1,mh}+\widehat{\beta}_2 x_{2,\,mh}+\widehat{\beta}_3 x_{3,\,mh})}{1+\exp(\widehat{\beta}_0+\widehat{\beta}_1 x_{1,mh}+\widehat{\beta}_2 x_{2,\,mh}+\widehat{\beta}_3 x_{3,\,mh})} \tag{9}$$

Calculated probabilities allow an assessment of the impact of two types of events on the level of household economic security. The first one is the loss of full-time work – an adverse event $q = 1$, where $x_{1,mh} = 1$ and $p_{1mh} = 1 - p_{mh}$. The second one is finding the full-time work – a favorable event $q = 2$, where $x_{1,mh} = 0$ and $p_{2mh} = p_{mh}$.

Having information on basic expenses of a household, income earned by each of its members, and the probabilities of continuing, losing or gaining full-time work, identification of scenarios in which the household will be able to finance expenditures[7], requires determining changes in the level of income d_{qmh}. Based on panel data analysis in the two-year periods, it was found that the lack of change in the position of a person in the labor market (working full-time at the beginning and end of the period, or no full-time work at the beginning and end of period) implies that the income of the person remains at approximately the same level. [8] Significant differences were observed in the level of income in the case of finding or losing a job. The obtained values differ significantly from period to period, so in the further analysis it was assumed that finding the full-time work doubles the current income and losing the full-

[7] $I_{hB} = 1$ in the formula (2). Scenarios from the set *SA* will not be considered because they were not included any adverse events, affecting the level of household expenditure.

[8] In subsequent periods, there were small (few percent) differences in groups of both the workers and the unemployed.

time work results in the reduction of income by half. This means that $d_{1mh} = 0{,}5y_{mh}$ and $d_{2mh} = -y_{mh}$. These values approximately reflect the average change. The sensitivity of the level of economic security to changes in these parameters will be presented in the next section.

The collected information helps to determine – for each individual household – both probability p_h (see equation 4) of being able to finance the household expenses at a preset level c_h and the amount of missing income MI_h (see formula 5).

The final step in the estimation of economic security is to determine the level of liquid assets, which may periodically substitute current income. Due to the length of the horizon of the analysis and the lack of possibility of precise assessment (based on available data) of the value of fixed assets, liquid assets were reduced to savings. In the Social Diagnosis amount of savings is declared in brackets, in relation to the monthly household income. Value of savings for a given household, used in the further analysis, is calculated as a product of current income and the number of months equal to the mean of the limits of declared interval. For the first interval (below monthly income) multiplier was set to 0.5, for the second interval (between monthly and 3-month income) – to 2, for the third (between 3-month and 6-month income) – to 4.5 and for the fourth (between 6-month and 12-month income) – to 9. For the highest interval (above the annual income) multiplier was arbitrarily set to 18.

Estimates of economic security, obtained for each household on the basis of the formula (6), can be aggregated, allowing for an assessment of the average level for the entire sample. Mean values for the following periods are presented in Table 2.

Table 2. Average level of economic security

Year	2003	2005	2007	2009	2011
Mean	0.758	0.747	0.815	0.840	0.831
Median	0.904	0.939	0.996	1.000	1.000
Sample size	2066	1906	2930	6198	5635

Source: own calculations

The results indicate a relatively high level of economic security of households declaring income from work as main source of income. Direct impact on this result had a general economic situation which has improved significantly between 2003 and 2009. Interpreting the level of economic security as the expected length of time for which the household is able to finance its basic expenses, the length of this period ranged from just over 18 months in 2003 to more than 20 months in 2009.

Median, systematically higher than the mean, denotes that majority of households has economic security level higher than the mean. And the median equal to 1 for the years 2009 and 2011 indicates that more than half of households is characterized by this level of economic security. Commenting this result, it should be stressed once again that these results represent the upper limit for the actual level of economic security.

Table 3. Distribution of economic security

Economic security index	Share of households (%)				
	2003	2005	2007	2009	2011
0.0-0.1	14	15	12	11	12
0.1-0.2	2	4	2	2	3
0.2-0.3	0	2	1	1	2
0.3-0.4	0	1	0	0	1
0.4-0.5	0	1	0	0	0
0.5-0.6	2	1	0	0	0
0.6-0.7	2	2	0	0	0
0.7-0.8	10	8	2	1	1
0.8-0.9	15	14	7	6	7
0.9-1.0	53	54	74	78	73

Source: own calculations

Analysis of changes in the distribution of economic security of households, shown in Table 3, suggests that the increase in the average level was mainly due to the changes that have occurred in the upper part of the distribution. Almost unchanged remained the percentage of households in the lower part. This could indicate the limited impact of changes in the general economic situation on the situation of people with the lowest levels of economic security.

Table 4. Mobility of households' economic security

		Economic security level in 2005		
		0.00-0.25	0.25-0.75	0.75-1.00
Economic security level in 2003	0.00-0.25	**4%**	2%	10%
	0.25-0.75	2%	3%	9%
	0.75-1.00	13%	6%	**50%**
		Economic security level in 2007		
		0.00-0.25	0.25-0.75	0.75-1.00
Economic security level in 2005	0.00-0.25	**3%**	1%	15%
	0.25-0.75	2%	0%	9%
	0.75-1.00	9%	1%	**60%**
		Economic security level in 2009		
		0.00-0.25	0.25-0.75	0.75-1.00
Economic security level in 2007	0.00-0.25	**3%**	0%	12%
	0.25-0.75	0%	0%	2%
	0.75-1.00	9%	1%	**72%**
		Economic security level in 2011		
		0.00-0.25	0.25-0.75	0.75-1.00
Economic security level in 2009	0.00-0.25	**6%**	0%	8%
	0.25-0.75	0%	0%	1%
	0.75-1.00	8%	1%	**75%**

Source: own calcualtions

On the other hand, the mobility analysis indicates that the percentage of households permanently deprived of economic security is much lower than the percentage of households with a security level below 0.2 – see the data in Tables 3 and 4. This means that increasing polarization of the economic security caused increase in

safety of households with ES values between 0.7 and 0.9, but probability of significant decrease in the level of economic security remains relatively high.

Analysis of the distribution of the economic security of households also points to a significant polarization. This phenomenon results, on the one hand, from the improvement in the situation on the labor market, but also from the limited scope of this analysis. Other adverse events, which may lead to an increase in basic expenses or decrease in income, could decrease the overall level of economic security, but also reduce the polarization of the distribution, due to differences in income, savings and other assets. Achieving economic security at a level equal to 1 (or close to it) would be much more difficult.

Nevertheless, an increasing proportion of households with permanently high level of economic security – even in the period 2009-2011 – should be regarded as unequivocally positive phenomenon. It results from better (than in the beginning of this century) situation in the labor market, but also – to some extent – from the growth of savings.

As previously mentioned, the lack of household economic security does not mean its poverty and economic security does not exclude risk of poverty. Nevertheless, the level of household income is an important factor influencing the level of economic security. Data presented in Table 5 show an increase in the average level of economic security with an increase in household income. Households with total income not higher than the first quartile of the income distribution are characterized by much lower security. This group includes the majority of the poor households.[9] The highest average level of economic security can be observed for the richest households, but even high income does not guarantee full economic security.

In addition to income level, an important factor, determining the level of household economic security, is education. Table 6 presents the average levels of economic security, depending on the education of the reference person (head) of the household.

[9] The risk of poverty is usually estimated for the income (or expenditure) per person or equivalent unit, so the results presented here are not directly comparable to the analysis of poverty.

Table 5. Economic security of groups of households, distinguished with respect to their income level in 2011

Quartile of income distribution	1	2	3	4
Mean	0.667	0.839	0.879	0.936
Median	0.935	0.996	1.000	1.000
Sample size	1425	1393	1413	1404

Source: own calculations

Table 6. Economic security of groups of households, distinguished with respect to their heads' level of education in 2011

Household head's level of education	Higher	Secondary	Vocational	Primary and no education
Mean	0.879	0.842	0.800	0.754
Median	1.000	1.000	0.995	0.988
Sample size*	1313	1628	2143	543

* For some households data on head's education was missing

Source: own calculations

The presented results show that – as in the case of analysis of poverty – lack of formal education (or its low level) is an important risk factor in the context of economic security. At the same time, variation in income and the structure of education seems to be one of the most important factors affecting the relationship between the place of residence of members of the household and the level of economic security. Growing – along with an increase in the number of inhabitants – average level of economic security reflects both the growth in average income and in average level of education. One-sided test of independence χ^2 suggests rejection of the null hypothesis

about independence between place of residence and – separately – income and education level for $p < 0{,}001$.

The average levels of economic security for various types of places are presented in Table 7. The results are not fully comparable to those presented in Tables 2-6, due to the lack of information about the place of residence for approximately 30% of households.

Table 7. Economic security of groups of households, distinguished with respect to their place of residence in 2011

Place of residence	Town over 500 000 inhabitants	Town between 200 000 and 500 000 inhabitants	Town between 100 000 and 200 000 inhabitants	Town between 20 000 and 100 000 inhabitants	Town below 20 000 inhabitants	Village
Mean	0.888	0.841	0.835	0.844	0.837	0.810
Median	1.000	1.000	1.000	1.000	1.000	0.998
Sample size	336	431	229	731	570	1605

Source: own calculations

In contrast to previously characterized relationships, the relationship between the age of the head of the household and the household economic security is not monotonic. As shown by the data presented in Table 8, the highest average economic security is observed for households belonging to the oldest and youngest groups. While in the case of the youngest group it may be – as in the case of place of residence – related to education, which average level has increased significantly in recent years, the highest level of security in the oldest group should be interpreted in the context of stability of their situation. They usually do not raise children, and have reached an appropriate level of professional development. Also in this cross-section gaps in the answers are quite common (about 20%). It means that these results are not directly comparable to estimates presented earlier.

Table 8. Economic security of groups of households, distinguished with respect to their heads' age in 2011

Household head's age	Below 35	Between 35 and 44	Between 45 and 54	Between 55 and 64
Mean	0.860	0.858	0.835	0.872
Median	1.000	0.998	0.999	1.000
Sample size	690	1185	1612	1051

Source: own calculations

6. Impact of changes in parameters on estimates of economic insecurity

Because of the need to adopt certain assumptions when estimating the economic security of households in the preceding paragraph, it is necessary to analyze the impact of various factors on the results. Due to the relatively complex structure of the proposed measure, sensitivity analysis will use simulations. The results of these simulations are based on the controlled modification of certain variables for all households or parts of them (a random sample). In the latter case, the final outcome will depend not only on the input changes, but also the result of sampling of households for whom the change will take effect. All simulations use values obtained for year 2011 as a point of reference.

The first stage of analysis includes an assessment of the impact of the logistic regression estimates of the level of economic security. Results shown in Table 9 were obtained by calculating the value of ES with the data for year 2011. Probabilities of having, losing or finding a full-time work were estimated based on the values of the parameter estimates obtained from logistic regression model for all analyzed periods.

Changes in parameters of logistic regression reflect changes in the overall situation of the Polish economy, in particular, a fall in unemployment. In this sense, the difference between the level of economic security, estimated for subsequent years (see Table 2) and the results of the simulation (see Table 9) can be considered as an attempt to estimate the economic security changes between the given year and the year 2011, purified from the impact of changes in the labor market. The values of these differences are presented in the lower part of Table 9. Throughout the period – in years 2003-2011 – about half of the changes in the level of economic security (0.036) was due to improvement in the situation on labor market. The rest (0.031) was the consequence of an increased level of savings and higher levels of employment, which can be regarded as a change in the actual situation of households.

A direct relationship between the level of economic security and the employment rate is illustrated in Figure 1 (see also Table A1 in Appendix A). Employment reduction denotes the proportional reduction in the number of employees, working full-time. For example, a value of 50% means a hypothetical

situation in which half of those currently working lose their job, all others things being equal.

Table 9. Impact of logistic regression's estimates on assessment of economic security

		Parameters' estimates for period			
		2003-2005	**2005-2007**	**2007-2009**	**2009-2011**
Economic security level for the 2011 data	Mean	0.794	0.807	0.823	0.825
	Median	0.987	0.996	1.000	1.000
Difference between economic security level assessed for 2011 data and data for the starting year of the given period	Mean	0.036	0.060	0.008	-0.015
	Median	0.083	0.057	0.004	0.000

Source: own calculations

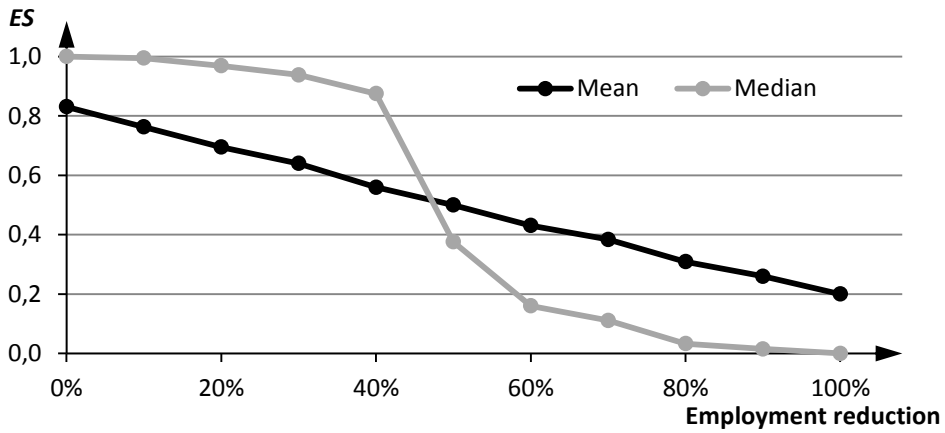

Figure 1. Impact of changes in employment rate

Employment reduction by 10% (compared to the initial number of full-time employees) causes an average decrease in the value of ES in the population by about 0.063. Because of the bimodal shape of the distribution and a significant concentration in the areas of high and low economic security, mode does not change on a regular

basis, as in the case of the average. Change in the relation between mean and median implies change in mode. In the current situation dominate households with a high level of economic security. But the situation changes with the decline in employment rate. The biggest change takes place when about 50% of currently employed lose their jobs, and those with a low level of economic security start to dominate in the population.

The range of observed changes indicates very large impact of the stability of the current income level on economic security. In this study, this stability is identified with stability of the work, but can be generalized to the stability of income from all available sources. In particular, it concerns different types of benefits. In certain circumstances – depending on the condition of public finance and social policy model – stability of benefits (including the amount of benefits received) can be higher than the stability of income from work. In such a case problem of development of unfavorable patterns of behavior can be interpreted as a consequence of too high level of economic security (stability) that does not create incentives to seek employment.

Figure 2 illustrates the effect of changes in the level of income, when a person loses a job (see also Table A2 in Appendix A).

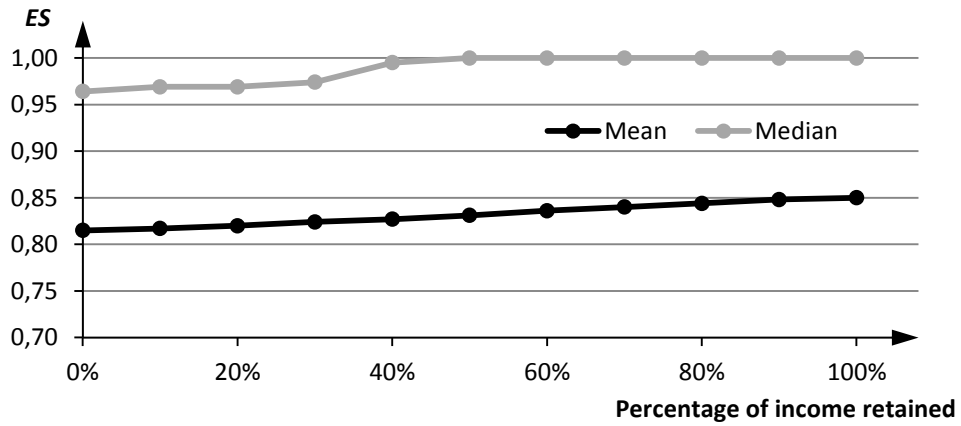

Figure 2. Impact of changes in income level in case of job loss

Results presented in the previous section were obtained by the assumption that income, retained in the case of job loss, is equal to 50% of an initial wage.

Consequently, in the situation of getting a job, income increases two times compared to the currently achieved. A similar relationship has been adopted for all levels of retained income,[10] presented in Figure 2.

With a change in the share of retained income by 10% (relative to the initial value of income), the average change in the value of ES is equal to 0.003. This indicates much smaller impact of changes in income, resulting from the job loss, for the overall level of economic security. Assuming the current level of risk of job loss, even total loss of income in the event of job loss would not result in significant change in the level of economic security in the scale of the whole population (decrease from 0.825 to 0.809). This result is a consequence of a relatively small group of people, whom it concerns. With the increase in the number of people in this group, relative importance of retained income would greatly increase.

For people permanently unemployed key factor, determining their income and the level of economic security of their households, is change in the amount of benefits that they receive at the beginning and at the end of the period. The basic model assumes that this amount will not change. Figure 3 shows the change in the average level of economic security in the case of a decrease in the level of benefits (see also Table A3 in Appendix A).

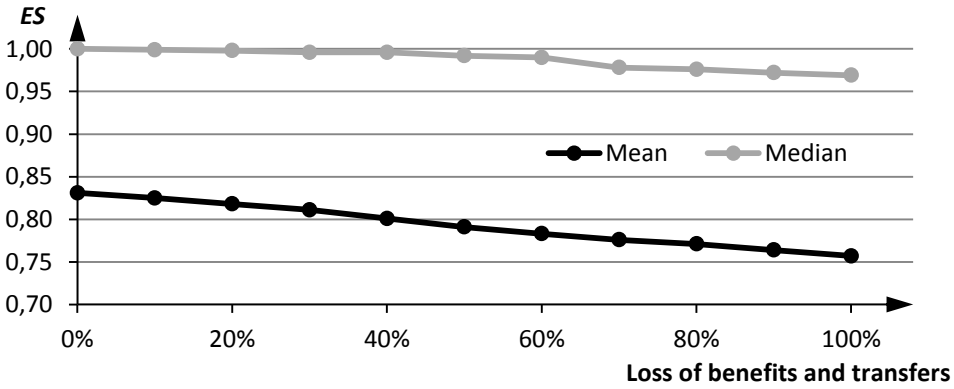

Figure 3. Impact of changes in benefits and transfers

[10] Except for the case when the amount of retained income is zero. In this case, it is assumed that getting a job would increase income twentyfold.

Reduction of benefits by 10% over the analyzed period (in relation to the initial values) entails the average decrease in the value of ES by 0.008. Similarly, as in the case of changes in the level of retained income, the size of the group of people sensitive to this change, is very limited. The impact of these changes is limited to households whose main sources of income are transfers and benefits. Precise assessment of the situation of this group of households would require a more detailed analysis with respect to the types of benefits, but it is not important for this study.

The last area of the assessment of the sensitivity of changes in the level of economic security is to determine the potential impact of changes in the basic expenses (excluding repayment of loans, what will be analyzed in the next section). In Figure 4 are shown changes in the value of ES when basic expenses increase or decrease (see also Table A4 in Appendix A).

Changing the basic expenses by 5% compared to the original level involves an average change in the value of ES by 0.023. The observed relationship is not linear and in case of increase in spending, the value of ES is decreasing faster and faster, what reflects the importance of basic expenses.

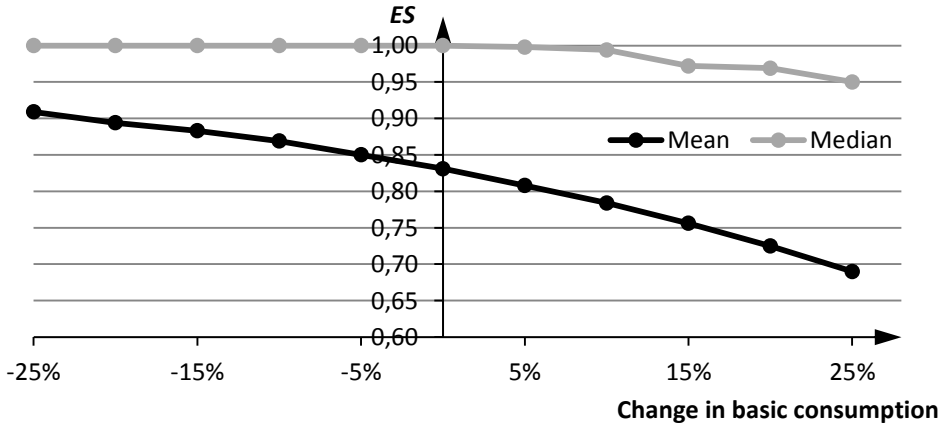

Figure 4. Impact of changes in basic consumption

The considered model assumes that the basic expenses remain unchanged in the horizon of analysis. In fact, however, in case of emergency (such as loss of work by one

or more persons in the household) it is possible to reduce not only development costs and spending on luxury goods, but also – to some extent – basic expenses. Assuming that this reduction could reach 25%, the average level of economic security would increase to 0.907. In the reverse situation, which can be interpreted as a consequence of an adverse event, average security level drops quite quickly – with an increase in the level of spending by 25% – up to 0.681. Approximately the same level of economic security would be obtained if subjective declarations on minimum income (required to "make ends meet") are taken into account instead of the estimates of basic expenses.

7. Savings, credits and economic security

A very important area in the analysis of household economic security is the value of savings. In most cases, these are the main liquid assets that can be used as a substitute for current income if the income level decreases or the level of spending increases. When a situation on the labor market is stable, expected relative importance of savings will be lower, but will grow with the increase in uncertainty in the future. To play an important role in shaping the economic security, savings must be sufficiently high.

Figure 5 presents the relationship between the level of savings and the average household economic security (see also Table A5 in Appendix A). Considered change assumes constant number of households with savings. A decrease by 100% corresponds to a situation where households do not have any savings and an increase by 100% that households with saving have doubled their value.

Any change in value of savings by 20% (compared to the current level) is associated with the average change in the value of ES by 0.005. Impact of a significant drop is relatively much higher than the corresponding increase. If savings are reduced to zero, the average value of ES drops to 0.787. This means that in the current situation, savings account for about 5% of the total value of ES. The relative importance of savings increase, however, with the worsening of the situation on the labor market. In the current situation, savings of some households exceed the level of the missing income. Loss of income for all persons currently working full-time would decrease the value of ES to the level of 0.197 (see Figure 1). In such a situation, the loss of any savings would further reduce this level to 0.091. [11] It means that savings account for maximum 13% of ES (0.106 in relation to the current value of 0.825).

[11] The remaining value results from impact of several factors. Firstly, the probabilities determined from the logistic regression model are never equal to zero. In addition, in case of pensioners and unemployed it was assumed that the probability of maintaining an income at the same level is set to 1.

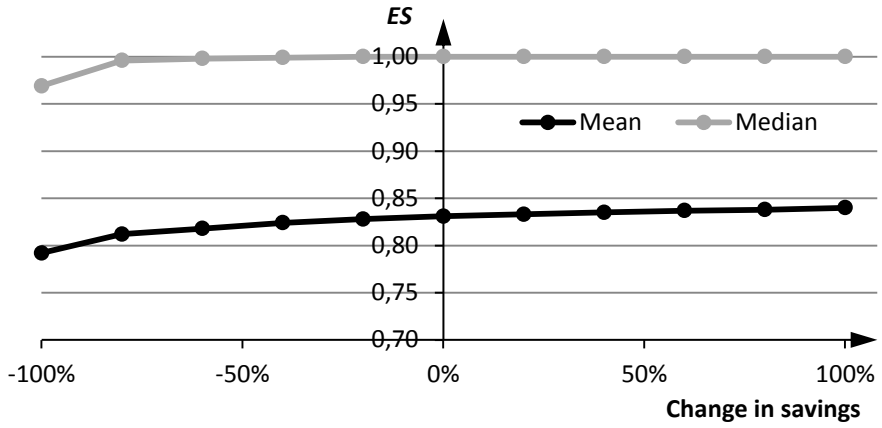

Figure 5. Impact of changes in savings

On the other hand, maximum increase in the value of savings – for households that already have savings – may lead to an increase in the average value of ES up to the level of 0.855.

In the same way, the potential impact of changes in the number of savers can be analyzed. To estimate it, the number of households with savings can be randomly reduced or increased by adding savings to randomly selected households (that currently do not have any savings). Savings assigned in this way are equal to the product of the value of the income of a given household and the average value of savings in the whole sample, expressed as a multiple of households' monthly income.

Change in the number of households with savings by, for instance, 20% would mean that the proportion of savers in population would increase to 43.2% from the initial share of 36%. The results of this analysis are shown in Figure 6 (see also Table A6 in Appendix A).

The change in share of households with savings by 20% (compared to the current number of savers) was associated with an average change of ES by the value of 0.007. The maximum level of the economic security that occurs in a situation, in which all households have savings at the level equal to the current average, would be .906. This means that in order to ensure the complete economic safety of all households, necessary would be increase both in the number of savers, and in the average level of savings.

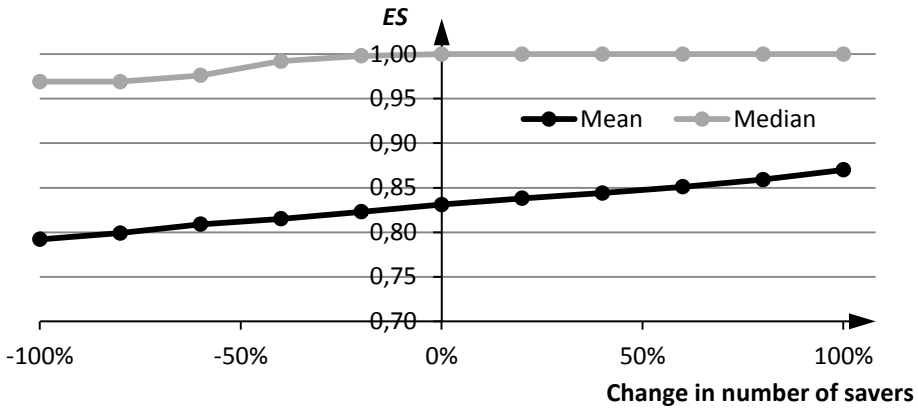

Figure 6. Impact of changes in share of households with savings

The next stage of the analysis concerns the assessment of the impact of loans and credits on the level of economic security of households. Due to their nature, expenses related to the repayment of current installments were separated from the group of basic expenses, and their changes are considered independently of changes in the level of basic consumption. Similarly as in the case of changes in the level of savings, in this case were considered proportional change in the burden of every household.

The relationship between the level of economic security and the amount of the installments of loans and credits is illustrated in Figure 7 (see also Table A7 in Appendix A).

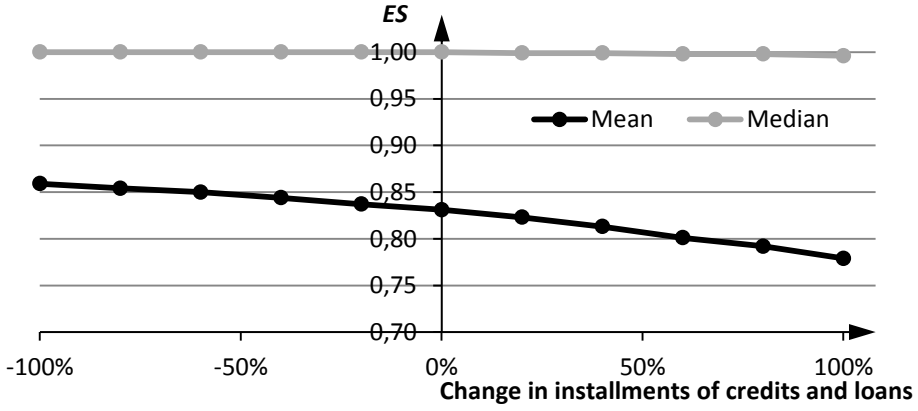

Figure 7. Impact of changes in installments of credits and loans

Changing the height of installments by 20% (compared to their current level) resulted in an average change in the value of ES by 0.008. Complete lack of installments would increase the level of economic security only by 0.028, to 0.853.

The observed changes in the level of economic security for the modified levels of savings and loans indicate that the relative importance of these factors for the economic security in the current situation is relatively small. Their relative importance would increase, however, in the case of worsening of the situation on the labor market. Savings would be also more important in the case of extending the analysis on additional risk factors, affecting the income or expenses.

The potential importance of savings is also much higher for low-income households. In the case of more affluent households that do not have problems with the solvency and creditworthiness, savings "for a rainy day" (being the form of insurance), can be replaced with a loans from friends or family, or bank credits. If problems are temporary and do not cause permanent loss of income, current income becomes the actual source of financing the increased spending. For poorer households that have limited opportunities to borrow money from financial institutions, friends and family, the only form of protection against the consequences of adverse events are savings. These households, however, rarely have any savings. This significantly reduces the level of economic security, but this was not reflected in this analysis due to the very limited number of adverse events.

The final stage of the analysis is to evaluate the relationship between the level of household economic security and the form and the purpose of savings and loans. For this purpose will be used φ coefficient, which is a measure of the dependence (calculated as the Pearson correlation coefficient) between the two binary variables. Due to the nature of the variables, φ coefficient is not – contrary to the Pearson coefficient of correlation – a measure of linear dependence only. Similarly, as in the case of the correlation coefficient, its value ranges between 0 (no dependence between variables – $\chi^2 = 0$) to 1 (fully dependent variables).

Table 10. The relationship between the level of economic security of households and the form of their savings in 2011

Form of savings	Share of households with certain kind of savings (%)		Relationship between economic security and form of savings (φ coefficient)	
	In the whole sample	Among households with savings	In the whole sample	Among households with savings
Cash	16.6	43.1	0.067**	-0.039
Deposits (in PLN)	26.5	68.6	0.123**	0.037
Bonds	1.1	2.8	0.023	0.008
Insurance policies	4.1	10.7	0.058**	0.041
Deposits (in foreign currencies)	1.6	4.2	0.015	-0.019
Investment funds	3.3	8.5	0.052**	0.037
Individual retirement account (IKE)	2.1	5.3	0.040**	0.028
Securities listed on the stock exchange	1.1	2.8	0.028*	0.017
Shares in private limited companies	0.9	2.4	0.027*	0.020
Investments in real estate	1.4	3.5	0.023	0.002
Investments in other (than real estate) properties	0.8	2.1	0.018	0.003

** The coefficient is significant at 0.01 (two-sided).

* The coefficient is significant at 0.05 (two-sided).

Source: own calculations

Based on the analysis, dependence[12] between the level of economic security and variables identifying the objectives of saving or borrowing in 2011 proved to be significant (at level 0.05) for:

[12] Measured with φ coefficient. Economic security was expressed as a binary variable: 1 for $ES > 0{,}5$ and 0 otherwise.

- saving aimed at financing holidays (positive correlation), security in old age (positive correlation) and current expenditures (negative correlation),
- borrowing money for the purchase of durable goods (positive correlation), the purchase of a house or flat (positive correlation), running costs (negative correlation), fixed charges (negative correlation) and repayment of debts (negative correlation) .

Each variable, indicating the purpose of saving or borrowing, took the value of 1 if the given purpose was indicated by the household and 0 otherwise. Calculations were performed separately for groups with, respectively, savings and loans.

Observed dependencies, although statistically significant, were very weak – values of the φ coefficient are generally not higher than 0.1. One of the reasons for this was the high proportion of households with a high level of safety, far exceeding the number of households with any savings or loans.

Similar results were obtained for assessment of the relationship between the level of economic security and forms of savings, distinguished with respect to their riskiness. Table 10 presents information on various forms of saving – their popularity and dependence (measured by the φ coefficient), between the level of economic security, and a given form of savings.

The most common forms of savings are cash and bank deposits (in PLN). Other forms, declared by more than 2% of the respondents are insurance policies, investment funds and individual retirement accounts (Indywidualne Konta Emerytalne, IKE). All these forms of saving are characterized by positive and statistically significant (at level 0.01) dependence on the level of economic security. In case of forms that are considered to be more risky – in particular securities, shares in companies, investments in real estate and other properties – this relationship was weaker and not always statistically significant.

This relationship may be a consequence of the relatively small savings of Poles and low popularity of riskier forms of saving. Therefore, the result should rather be interpreted as a growing – along with the increase in economic security – propensity to save than reluctance of economically secure households to riskier forms of saving.

Generally, all observed relationships – including those statistically significant – are very weak. Thus, despite their relative stability over time (similar results have been obtained in previous years), it is not possible to assess economic security on the basis of the analysis of forms of household savings.

8. Conlusions

The concept of economic security, considered in the paper, to a large extent reflects the stability of the economic situation of households as a separate category in relation to poverty. A low standard of living of poor households does not necessarily mean that their situation cannot be relatively stable. As suggested by the results of changes in the level of benefits (if the person declared them as the primary source of income for both the beginning and the end of the period), various types of benefits can be a stable source of income, thus ensuring a relatively high level of economic security, which may be one of the causes of poverty persistence. Due to the low income and lack of savings, poor households are more vulnerable to the consequences of adverse events (poverty may also imply the inability to borrow money from friends, family or the bank), but high stability of benefits may denote some economic security, even if achieved income is low.

The relationship between economic security and poverty is very different in a situation of extreme poverty, involving inability to finance current consumption of the basic level. Then poverty is accompanied by a complete lack of economic security. On the other hand, a high wealth, defined as high income or property, does not necessarily imply a high level of security. While savings have clearly positive influence on the economic security, maintaining the high income may be much more difficult than the low income.

Another problem, related to the economic security of households of different wealth, are different expectations concerning coping with a crisis situation. It is particularly evident in the case of serious illness. In the case of less affluent households, considered methods of medical treatment are limited to those offered in regional medical centers. For wealthier households expectations are higher, often involving treatment in foreign clinics and hospitals. And the expected increase in the potential cost of treatment is so large that the household may prove to be economically insecure regardless of their wealth. These factors were not considered in the empirical part, so it is hard to determine clearly their impact on the level of economic security. But the issue of economic insecurity goes beyond a clear division between the poor

and the rich. Having a large fortune (high income), households are often more dependent on the current income, wealth or general situation in the society.

Analysis presented in part empirical revealed that the main factor, affecting the economic security of households declaring work as a main source of income in Poland in the period 2003-2011, is the stability of employment and income, and ES values reflect the situation on the labor market. As a result of the general improvement of the economy, an increase in the average level of economic security has been observed (with an exception for a slight decline in 2011). This growth was accompanied by a significant increase in the polarization and decrease in mobility in the upper part of the distribution – in subsequent periods, an increasing number of households was economically secure for the two consecutive periods.

Relatively small was, however, impact of savings. Good situation on the labor market in Poland, increased (especially in the first part of the analyzed period) sense of job security. This change, coupled with a low level of savings, is a factor that might discourage further saving. If savings – due to their height – cannot act as a protection against consequences of adverse events and do not affect the quality of life in the long term (for instance, in retirement), this raises the natural question about the reasonableness of saving. In this situation, many households prefer current consumption, making economic security solely on job stability.

This phenomenon is well illustrated by precautionary saving. Saving for "random events" is the most popular objective, declared by the respondents in the Social Diagnosis – about 60% of savers, which is approximately 20% of the total sample. Since 2005, this percentage was steadily declining (2003 – 70.8% 2005 – 73.6% 2007 – 64.9%, 2009 – 59.7%) together with the improvement on the labor market. This decline has stopped in the last period, when uncertainty associated with the stability of work has increased (2009 – 59.7%, 2011 – 59.7%).

The presented analysis – in the empirical part – concerned the short period and selected risk factors. The proposed concept of economic security, however, enables broadening the analysis on additional areas, such as those related the health or changes in the family situation. Very interesting field for further research is also an issue of economic security in the long term, taking into account the stability of pension system.

References

Anders, R. G. and Gascon, Ch. S. 2007. The perils of globalization: Offshoring and economic insecurity of America worker, Working Paper Series 004A, Federal Reserve Bank of St. Louis

Ando, A. and Modigliani, F. 1963. The Life Cycle Hypothesis of Saving: Aggregate Implications and Tests. American Economic Review, 53(1):55-84

Beeferman, L. W. 2002. The asset index: Assessing the progress of states in promoting economic security and opportunity, The Heller School for Social Policy and Management, Brandeis University, mimeo

Bossert, W. and D'Ambrosio, C. 2009. Measuring Economic Insecurity Working Papers, 111, ECINEQ, Society for the Study of Economic Inequality.

Bewley, T. 1977. The permanent income hypothesis: A theoretical formulation. Journal of Economic Theory, 16(2): 252-292

Browning, M. and Crossley, T. 2001. The Life-Cycle Model of Consumption and Saving. Journal of Economic Perspectives, 15(3): 3-22

Browning, M. J., and Lusardi, A. 1996. Household Saving: Micro Theories and Micro Facts, Journal of Economic Literature, 34(4), 1797–855.

Caballero, R. J. 1991. Earnings Uncertainty and Aggregate Wealth Accumulation, American Economic Review, Vol. 81, 859-871.

Cagetti, M. 2003. Wealth Accumulation over the Life Cycle and Precautionary Savings, Journal of Business and Economic Statistics, 21(3), 339-353.

Carroll, Ch. D. 1992. The Buffer-Stock Theory of Saving: Some Macroeconomic Evidence, Brookings Papers on Economic Activity, 2, 62-156.

Carroll, Ch. D., and Samwick, A. 1997a. Buffer Stock Saving and the Life-Cycle Permanent Income Hypothesis, The Quarterly Journal of Economics, 112, 1-55.

Carroll, Ch. D., and Samwick A. 1997b. The Nature of Precautionary Wealth, Journal of Monetary Economics, 40(1), 41–71.

Carroll, Ch. D., and Samwick, A. 1998. How Important Is Precautionary Saving?, Review of Economics and Statistics, 80(3), 410–419.

Carroll, Ch. D., Slacalek, J. and Sommer, M. 2011. Dissecting Saving Dynamics: Measuring Credit, Uncertainty, and Wealth Effects, Work in progress.

Carroll, Ch. D., and Kimball, M. 2001. Liquidity Constraints and Precautionary Saving. NBER Working Paper Series 8496, National Bureau of Economic Research, Inc.

Dardanoni, V. 1991. Precautionary saving under income uncertainty: A cross-sectional analysis. Applied Economics, 23, 153–160.

Deaton, A. 1991. Saving and Liquidity Constraints, Econometrica, 59, 1121-1142.

Dominitz, J. and Manski, C.F. 1997. Perception of Economic Insecurity: Evidence from the Survey of Economic Expectations Public Opinion Quarterly, 61, 261-287.

Edwards, S. 1996. Why are Latin America's Saving Rates so Low? An International Comparative Analysis, Journal of Development Economics, 51, 5-44.

Engen, E. M. and Gruber, J. 2001. Unemployment Insurance and Precautionary Saving, Journal of Monetary Economics, 47, 545-579.

Friedman, M. 1957. A Theory of the Consumption Function. Princeton University Press.

Giavazzi, F. and McMahon, M. 2012. Policy Uncertainty and Household Savings, The Review of Economics and Statistics, forthcoming.

Gourinchas, P.-O. and Parker, J. A. 2002. Consumption over the life cycle, Econometrica, 70(1), 47-89.

Guiso, L., Jappelli, T. and Terlizzese, D. 1992. Earnings Uncertainty and Precautionary Saving. Journal of Monetary Economics, 30, 307-337.

Hacker, J. S. 2006. The Great Risk Shift: The New Economic Insecurity and the Decline of the American Dream. Oxford University Press.

Hacker, J. S. 2007. The New Economic Insecurity – And What Can Be Done About It, Harvard Law & Policy Review, 1, 111-126.

Hacker, J. S. 2011. Catch My Fall: Income Risk and the Welfare State in Rich Democracies, IARIW-OECD Conference on Economic Insecurity Paris, France, November 22-23, 2011.

Handcock, M. and Morris, M. 1999. Relative Distribution Methods in the Social Sciences, Springer, New York.

Jacobs, E. 2007. The politics of economic insecurity, The Brookings Institution: Issues in Governance Studies, 12, 1-13.

Kennickell, A. and Lusardi, A. 2005. Disentangling the Importance of the Precautionary Saving Motive. Working Paper, Dartmouth College.

Kimball, M. S., Sahm, C. R. and Shapiro, M. D. 2005. Imputing Risk Tolerance from Survey Responses, Manuscript, University of Michigan.

Kośny, M. 2013. Determinanty bezpieczeństwa ekonomicznego rodzin, mimeo.

Leland, H. E. 1968. Saving and Uncertainty: The Precautionary Demand for Saving, The Quarterly Journal of Economics, 82(3), 465-473.

Loayza, N., Schmidt-Hebbel, K. and Servén, L. 2000. What Drives Private Saving Across the World, The Review of Economics and Statistics, 82(2), 165-181.

Lusardi, A. 1997. Precautionary Saving and Subjective Earnings Variance, Economics Letters, 57, 319–326.

Lusardi, A. 1998. On the Importance of the Precautionary Saving Motive, American Economic Review Papers and Proceedings, 88(2), 449–453.

Masson, P. R., Bayoumi, T. and Samiei, H. 1998. International Evidence on the Determinants of Private Saving, The World Bank Economic Review, 12(3), 483-501.

Miller, B. L. 1976. The Effect on Optimal Consumption of Increased Uncertainty in Labor Income in the Multiperiod Case, Journal of Economic Theory, 13, 154–167.

Mody, A., Ohnsorge, F. and Sandri, D. 2012. Precautionary Savings in the Great Recession, IMF Working Paper, 42.

Morrone, A., Scrivens, K., Smith, C. and Balestra, C. 2011. Measuring Vulnerability and Resilience in OECD Countries, IARIW-OECD Conference on Economic Insecurity Paris, France, November 22-23, 2011.

Osberg, L. 1998. Economic Insecurity, SPRC Discussion Paper No. 88, Social Policy Research Centre, University of New South Wales.

Osberg, L. 2010. Measuring Economic Insecurity and Vulnerability as Part of Economic Well- Being: Concepts and Context, Economic Insecurity, Demography and Well-Being, 31st General Conference of IARIW, St-Gallen, Switzerland.

Osberg, L. and Sharpe, A. 2011. Measuring Economic Insecurity in Rich and Poor Nations, IARIW-OECD Conference on Economic Insecurity Paris, France, November 22-23, 2011.

Palumbo, M. G. 1999. Uncertain Medical Expensesand Precautionary Saving Near the End of the Life Cycle, Review of Economic Studies, 66(2), 395–421.

Rada Monitoringu Społecznego. 2012. Diagnoza społeczna: zintegrowana baza danych za lata 2000-2011, http://www.diagnoza.com (data pobrania: 12.12.2012).

Report By a Thread: The New Experience of America's Middle Class. 2007. Prepared together by Demos: A Network for Ideas & Action and The Institute on Assets and Social Policy at Brandeis University.

Scheve, K. and Slaughter, M. 2004. Economic insecurity and the globalization of production. American Journal of Political Science, 48(4), 662–674.

Sharpe, A. and Osberg, L. 2009. New Estimates of the Index of Economic Well-being for Selected OECD Countries, 1981 – 2007, CSLS Research Reports 2009-11, Centre for the Study of Living Standards.

Sibley, D. S. 1975. Permanent and Transitory Effects of Optimal Consumption with Wage Income Uncertainty, Journal of Economic Theory, 68–82.

Skinner, J. 1987. Risky Income, Life Cycle Consumption, and Precautionary Savings. NBER Working Paper 2336, National Bureau of Economic Research.

Skinner, J. 1988. Risky Income, Life Cycle Consumption, and Precautionary Saving, Journal of Monetary Economics, 22, 237-255.

Schmidt-Hebbel, K., Webb, S. B. and Corsetti, G. 1992. Household Saving in Developing Countries: First Cross-Country Evidence, The World Bank Economic Review, 6(3), 529-547.

Stiglitz, J. E., Sen, A. and Fitoussi, J.-P. 2009. Report by the Commission on the Measurement of Economic Performance and Social Progress, http://www.stiglitz-sen-fitoussi.fr.

Zeldes, S. P. 1989. Optimal Consumption with Stochastic Income: Deviations from Certainty Equivalence, Quarterly Journal of Economics, 104, 275-298.

Appendix A. Detailed information on simulated changes in economic security

Table A1. Expected impact of changes in employment rate in 2011

Decline in employment (relative to the current level)	Mean	Median
No change	0.831	1.000
10%	0.763	0.995
20%	0.695	0.969
30%	0.640	0.938
40%	0.560	0.875
50%	0.500	0.376
60%	0.431	0.160
70%	0.384	0.111
80%	0.309	0.033
90%	0.260	0.015
100%	0.200	0.000

Source: own calculations

Table A2. Expected impact of changes in income level in case of job loss in 2011

Decline in income level in case of job loss (relative to in-work income level)	Mean	Median
No change	0.815	0.964
10%	0.817	0.969
20%	0.820	0.969
30%	0.824	0.974
40%	0.827	0.995
50%	0.831	1.000
60%	0.836	1.000
70%	0.840	1.000
80%	0.844	1.000
90%	0.848	1.000
100%	0.850	1.000

Source: own calculations

Table A3. Expected impact of changes in benefits and transfers in 2011

Decline in benefits and transfers (share of benefits and transfers at the end of two-year period in benefits and transfers at the beginning of this period)	Mean	Median
No change	0.831	1.000
10%	0.825	0.999
20%	0.818	0.998
30%	0.811	0.996
40%	0.801	0.996
50%	0.791	0.992
60%	0.783	0.990
70%	0.776	0.978
80%	0.771	0.976
90%	0.764	0.972
100%	0.757	0.969

Source: own calculations

Table A4. Expected impact of changes in basic consumption in 2011

Change in basic consumption (relative to the current level)	Mean	Median
-25%	0.909	1.000
-20%	0.894	1.000
-15%	0.883	1.000
-10%	0.869	1.000
-5%	0.850	1.000
No change	0.831	1.000
5%	0.808	0.998
10%	0.784	0.994
15%	0.756	0.972
20%	0.725	0.969
25%	0.690	0.950

Source: own calculations

Table A5. Expected impact of changes in savings in 2011

Change in value of savings (relative to the current level)	Mean	Median
-100%	0.792	0.969
-80%	0.812	0.996
-60%	0.818	0.998
-40%	0.824	0.999
-20%	0.828	1.000
No change	0.831	1.000
20%	0.833	1.000
40%	0.835	1.000
60%	0.837	1.000
80%	0.838	1.000
100%	0.840	1.000
Infinite growth	0.861	1.000

Source: own calculations

Table A6. Expected impact of changes in share of households with savings in 2011

Change in share of households with savings (relative to the current level)	Mean	Median
-100%	0.792	0.969
-80%	0.799	0.969
-60%	0.809	0.976
-40%	0.815	0.992
-20%	0.823	0.998
No change	0.831	1.000
20%	0.838	1.000
40%	0.844	1.000
60%	0.851	1.000
80%	0.859	1.000
100%	0.870	1.000
Infinite growth	0.908	1.000

Source: own calculations

Table A7. Expected impact of changes in installments of credits and loans in 2011

Change in installments of credits and loans (relative to the current level)	Mean	Median
-100%	0.859	1.000
-80%	0.854	1.000
-60%	0.850	1.000
-40%	0.844	1.000
-20%	0.837	1.000
No change	0.831	1.000
20%	0.823	0.999
40%	0.813	0.999
60%	0.801	0.998
80%	0.792	0.998
100%	0.779	0.996
Infinite growth	0.536	0.921

Source: own calculations

Appendix B. Econometric models estimates, allowing for identification of items of property included in combining data sets from the household budget survey and Social Diagnosis.

In order to identify items of property, which are mostly related to the level of household expenditure, parameters of the following linear regression function were estimated:

$$ln(y_h) = \hat{\beta}_0 + \hat{\beta}_1 x_{1,h} + \hat{\beta}_2 x_{2,h} + \ldots + \hat{\beta}_n x_{n,h} \qquad \text{(B.1)}$$

where y_h denotes expenditure of household h, and variables $x_{i,h} \in \{0,1\}$ $(i = 1, \ldots, n)$ indicate that household h has an item of property (1), or it has not (0). Values $\hat{\beta}_i$ represent estimates of unknown parameters of the model. These parameters were estimated using the least squares method in SPSS.

Estimation of parameters was made for a set of data from the household budget survey. The aim of the estimation was to identify the items of property, which reflect the level of spending at most. The size and structure of expenditure are analyzed within household budget survey, however, are not included in the Social Diagnosis. The results of the estimation of model for subsequent periods are presented in Tables B1-B6.

Items of property with highest values of $\hat{\beta}_i$ estimates in subsequent years were included in the procedure for combining the data sets from the household budget survey and Social Diagnosis. The names of these items of property are written in bold. Items that are marked in italics could potentially be included in this process, but information about them was not available in the data set from the Social Diagnosis.

Table B1. Estimates of parameters for the year 2000

Variable	Item of property	Coefficient	Std. error	t	Significance
X_1	**Private car**	0,192	0,007	28,748	0,000
X_2	**Computer with internet access**	0,155	0,015	10,407	0,000
X_3	Colour TV set	0,149	0,016	9,293	0,000
X_4	**Company car**	0,132	0,022	6,058	0,000
X_5	**Cottage**	0,099	0,025	3,880	0,000
X_6	*Mobile*	0,097	0,008	12,704	0,000
X_7	**Computer without internet access**	0,086	0,011	7,739	0,000
X_8	**Dishwasher**	0,076	0,019	3,966	0,000
X_9	Washing machine	0,070	0,008	8,852	0,000
X_{10}	Second house	0,067	0,022	2,972	0,003
X_{11}	Camera	0,065	0,006	10,203	0,000
X_{12}	Vacuum cleaner	0,063	0,010	6,069	0,000
X_{13}	Refrigerator	0,047	0,016	2,975	0,003
X_{14}	Hi-Fi music system	0,042	0,007	6,280	0,000
X_{15}	Freezer	0,034	0,006	5,844	0,000
X_{16}	Video camera	0,031	0,014	2,242	0,025
X_{17}	Video cassette recorder	0,021	0,006	3,344	0,001
X_{18}	Device to receive satellite or cable TV	0,015	0,006	2,617	0,009
X_{19}	Printer	0,008	0,013	0,563	0,573
X_{20}	Electric polisher	0,007	0,018	0,376	0,707
X_{21}	Food processor	0,006	0,006	0,964	0,335
X_{22}	Radio-cassette	-0,006	0,006	-1,099	0,272
X_{23}	Black-and-white TV set	-0,008	0,012	-0,626	0,532
X_{24}	Sewing machine	-0,009	0,006	-1,559	0,119
X_{25}	Bike (without children's)	-0,013	0,006	-2,188	0,029
X_{26}	Garage	-0,015	0,007	-2,200	0,028
X_{27}	CD player	-0,019	0,009	-2,131	0,033
X_{28}	Gramophone	-0,042	0,017	-2,435	0,015
X_{29}	Employer's plot	-0,042	0,009	-4,455	0,000
X_{30}	Radio	-0,043	0,006	-7,551	0,000
X_{31}	Microwave oven	-0,045	0,007	-6,164	0,000
X_{32}	Motorcycle, scooter, moped	-0,046	0,013	-3,637	0,000
X_{33}	Garden plot	-0,057	0,010	-5,479	0,000
X_{34}	Agitator washing machine	-0,068	0,007	-9,892	0,000
X_{35}	Cassette-recorder	-0,072	0,010	-7,500	0,000
Stała		6,444	0,021	313,951	0,000

$R^2 = 0{,}392$, sample size $n = 36162$

Source: Kośny (2013)

Table B2. Estimates of parameters for the year 2003

Variable	Item of property	Coefficient	Std. error	t	Significance
X_1	**Private car**	0,226	0,007	33,017	0,000
X_2	Second house	0,207	0,022	9,502	0,000
X_3	**Dishwasher**	0,193	0,015	12,877	0,000
X_4	**Computer with internet access**	0,193	0,012	16,337	0,000
X_5	*Business mobile*	0,186	0,014	13,644	0,000
X_6	**Company car**	0,171	0,022	7,911	0,000
X_7	Coloutr TV set	0,128	0,018	7,061	0,000
X_8	*Private mobile*	0,122	0,006	20,181	0,000
X_9	Washing machine	0,119	0,009	13,483	0,000
X_{10}	Vacuum cleaner	0,112	0,012	9,652	0,000
X_{11}	Video camera	0,107	0,012	8,841	0,000
X_{12}	Camera	0,092	0,006	14,439	0,000
X_{13}	**Computer without internet access**	0,085	0,010	8,766	0,000
X_{14}	Garden plot	0,075	0,011	6,612	0,000
X_{15}	**Cottage**	0,075	0,022	3,411	0,001
X_{16}	Device to receive satellite or cable TV	0,075	0,006	13,113	0,000
X_{17}	Refrigerator	0,071	0,018	3,915	0,000
X_{18}	Hi-Fi music system	0,061	0,006	9,487	0,000
X_{19}	Freezer	0,060	0,006	10,225	0,000
X_{20}	Video cassette recorder	0,051	0,006	8,224	0,000
X_{21}	Food processor	0,048	0,006	8,444	0,000
X_{22}	Printer	0,047	0,011	4,461	0,000
X_{23}	CD player	0,042	0,009	4,798	0,000
X_{24}	Sewing machine	0,036	0,005	6,705	0,000
X_{25}	Garage	0,035	0,007	4,858	0,000
X_{26}	Radio-cassette	0,032	0,006	5,671	0,000
X_{27}	Motorcycle, scooter, moped	0,023	0,014	1,598	0,110
X_{28}	Radio	0,021	0,005	3,797	0,000
X_{29}	Microwave oven	0,017	0,007	2,647	0,008
X_{30}	Bike (without children's)	0,015	0,006	2,654	0,008
X_{31}	Black-and-white TV set	-0,003	0,017	-0,181	0,856
X_{32}	Agitator washing machine	-0,015	0,007	-2,052	0,040
X_{33}	Cassette-recorder	-0,017	0,012	-1,384	0,166
Stała		6,528	0,023	281,764	0,000

$R^2 = 0{,}405$, sample size $n = 32452$

Source: Kośny (2013)

Table B3. Estimates of parameters for the year 2005

Variable	Item of property	Coefficient	Std. error	t	Significance
X_1	**Private car**	0,213	0,006	32,814	0,000
X_2	**Computer with internet access**	0,198	0,009	21,801	0,000
X_3	*Company mobile*	0,194	0,012	15,580	0,000
X_4	**Dishwasher**	0,182	0,012	15,416	0,000
X_5	**Company car**	0,173	0,020	8,640	0,000
X_6	Washing machine	0,144	0,009	16,551	0,000
X_7	*Private mobile*	0,126	0,006	20,266	0,000
X_8	Lawn tractors with diesel	0,116	0,040	2,909	0,004
X_9	Vacuum cleaner	0,115	0,011	10,384	0,000
X_{10}	Refrigerator	0,098	0,017	5,869	0,000
X_{11}	Camera	0,096	0,006	15,771	0,000
X_{12}	**Cottage**	0,090	0,018	4,873	0,000
X_{13}	Video camera	0,085	0,011	7,960	0,000
X_{14}	DVD player	0,062	0,007	9,530	0,000
X_{15}	Device to receive satellite or cable TV	0,062	0,005	11,539	0,000
X_{16}	Garage	0,057	0,007	8,281	0,000
X_{17}	Computer without internet access	0,054	0,008	6,594	0,000
X_{18}	Freezer	0,053	0,005	9,719	0,000
X_{19}	Garden plot	0,052	0,010	5,032	0,000
X_{20}	Printer	0,048	0,008	5,769	0,000
X_{21}	Food processor	0,043	0,006	7,722	0,000
X_{22}	Sewing machine	0,042	0,005	8,086	0,000
X_{23}	Radio-cassette with CD player	0,041	0,006	6,714	0,000
X_{24}	CD player	0,039	0,009	4,567	0,000
X_{25}	Agitator washing machine	0,039	0,007	5,447	0,000
X_{26}	TV-set	0,036	0,021	1,710	0,087
X_{27}	Motorcycle, scooter, moped	0,030	0,013	2,360	0,018
X_{28}	Electric lawnmower	0,030	0,007	4,218	0,000
X_{29}	Hi-Fi music system	0,029	0,006	4,858	0,000
X_{30}	Video cassette recorder	0,026	0,006	4,624	0,000
X_{31}	Electric cultivator	0,019	0,060	0,319	0,749
X_{32}	Bike (without children's)	0,018	0,006	3,221	0,001
X_{33}	Petrol lawnmower	0,015	0,009	1,775	0,076
X_{34}	Radio-cassette	0,014	0,005	2,647	0,008
X_{35}	Microwave oven	0,000	0,006	-0,040	0,968
X_{36}	Radio	-0,003	0,005	-0,588	0,556
Stała		6,534	0,025	261,380	0,000

$R^2 = 0{,}405$, sample size $n = 34767$

Source: Kośny (2013)

Table B4. Estimates of parameters for the year 2007

Variable	Item of property	Coefficient	Std. error	t	Significance
X_1	*Business mobile*	0,242	0,012	20,121	0,000
X_2	**Private car**	0,223	0,006	34,360	0,000
X_3	**Computer with internet access**	0,175	0,008	21,499	0,000
X_4	**Dishwasher**	0,168	0,010	17,045	0,000
X_5	*Private mobile*	0,164	0,007	22,800	0,000
X_6	**Company car**	0,145	0,019	7,636	0,000
X_7	Washing machine	0,138	0,009	15,046	0,000
X_8	Digital camera	0,131	0,007	18,895	0,000
X_9	Vacuum cleaner	0,097	0,012	8,086	0,000
X_{10}	**Cottage**	0,089	0,018	4,800	0,000
X_{11}	Freezer	0,088	0,022	4,088	0,000
X_{12}	Computer without internet access	0,071	0,008	8,763	0,000
X_{13}	MP3 player	0,068	0,007	10,072	0,000
X_{14}	Device to receive satellite or cable TV	0,067	0,005	12,713	0,000
X_{15}	Camera-other	0,064	0,006	11,468	0,000
X_{16}	Video camera	0,064	0,010	6,602	0,000
X_{17}	Lawn tractors with diesel	0,058	0,038	1,515	0,130
X_{18}	Food processor	0,057	0,005	10,451	0,000
X_{19}	TV set	0,048	0,022	2,122	0,034
X_{20}	DVD player	0,047	0,006	8,436	0,000
X_{21}	Freezer	0,042	0,005	7,754	0,000
X_{22}	Garage	0,041	0,007	6,256	0,000
X_{23}	Hi-Fi music system	0,041	0,006	7,125	0,000
X_{24}	Radio-cassette with CD player	0,037	0,006	6,405	0,000
X_{25}	Petrol lawnmower	0,036	0,008	4,749	0,000
X_{26}	Garden plot	0,032	0,009	3,507	0,000
X_{27}	Sewing machine	0,031	0,005	5,947	0,000
X_{28}	Electric lawnmower	0,030	0,007	4,459	0,000
X_{29}	Printer	0,027	0,007	3,691	0,000
X_{30}	Home theater	0,026	0,007	3,475	0,001
X_{31}	CD player	0,020	0,008	2,597	0,009
X_{32}	Radio-cassette	0,019	0,005	3,617	0,000
X_{33}	Bike (without children's)	0,019	0,006	3,303	0,001
X_{34}	Electric cultivator	0,018	0,048	0,373	0,709
X_{35}	Agitator washing machine	0,015	0,007	2,134	0,033
X_{36}	Motorcycle, scooter, moped	0,014	0,011	1,285	0,199
X_{37}	Video cassette recorder	0,014	0,005	2,590	0,010
X_{38}	Microwave oven	0,005	0,005	0,824	0,410
X_{39}	Radio	-0,003	0,005	-0,679	0,497
Stała		6,068	0,327	18,567	0,000

$R^2 = 0{,}432$, sample size $n = 37366$

Source: Kośny (2013)

Table B5. Estimates of parameters for the year 2009

Variable	Item of property	Coefficient	Std. error	t	Significance
X_1	*Business mobile*	0,208	0,012	17,325	0,000
X_2	**Private car**	0,169	0,007	25,366	0,000
X_3	Washing machine	0,114	0,010	11,197	0,000
X_4	**Company car**	0,112	0,018	6,063	0,000
X_5	**Computer with internet access**	0,109	0,008	12,943	0,000
X_6	*Private mobile*	0,089	0,008	10,781	0,000
X_7	**Dishwasher**	0,080	0,008	9,919	0,000
X_8	Digital camera	0,061	0,007	9,177	0,000
X_9	**Cottage**	0,055	0,017	3,184	0,001
X_{10}	Vacuum cleaner	0,043	0,012	3,504	0,000
X_{11}	TV set - other	0,039	0,008	4,653	0,000
X_{12}	Computer without internet access	0,020	0,009	2,146	0,032
X_{13}	Device to receive satellite or cable TV	0,015	0,005	2,719	0,007
X_{14}	Video camera	0,014	0,009	1,499	0,134
X_{15}	Freezer	0,012	0,017	0,683	0,495
X_{16}	Camera - other	0,012	0,006	1,829	0,067
X_{17}	Comp. with broadband internet accesss	0,001	0,007	0,105	0,916
X_{18}	Food processor	-0,002	0,006	-0,375	0,707
X_{19}	Garage	-0,010	0,006	-1,607	0,108
X_{20}	Electric lawnmowe	-0,012	0,007	-1,850	0,064
X_{21}	CD player	-0,012	0,008	-1,650	0,099
X_{22}	Radio-cassette with CD player	-0,013	0,006	-2,091	0,037
X_{23}	DVD player	-0,014	0,006	-2,497	0,013
X_{24}	Petrol lawnmower	-0,018	0,007	-2,541	0,011
X_{25}	Garden plot	-0,019	0,009	-2,083	0,037
X_{26}	Printer	-0,021	0,007	-3,094	0,002
X_{27}	Sewing machine	-0,024	0,005	-4,405	0,000
X_{28}	Hi-Fi music system	-0,028	0,006	-4,974	0,000
X_{29}	Freezer	-0,032	0,005	-5,964	0,000
X_{30}	Agitator washing machine	-0,033	0,008	-4,306	0,000
X_{31}	Video cassette recorder	-0,037	0,006	-6,545	0,000
X_{32}	MP3 player	-0,038	0,007	-5,869	0,000
X_{33}	Electric cultivator	-0,041	0,039	-1,050	0,294
X_{34}	CRT TV set	-0,044	0,010	-4,598	0,000
X_{35}	Home theater	-0,047	0,007	-6,527	0,000
X_{36}	Microwave oven	-0,048	0,006	-8,602	0,000
X_{37}	Radio	-0,050	0,005	-9,221	0,000
X_{38}	Motorcycle, scooter, moped	-0,055	0,010	-5,575	0,000
X_{39}	Lawn tractors with diesel	-0,055	0,031	-1,797	0,072
X_{40}	Bike (without children's)	-0,055	0,006	-9,350	0,000
Stała		6,762	0,023	297,235	0,000

$R^2 = 0{,}457$, sample size $n = 37302$

Source: Kośny (2013)

Table B6. Estimates of parameters for the year 2011

Variable	Item of property	Coefficient	Std. error	t	Significance
X_1	*Business mobile*	0,233	0,012	19,657	0,000
X_2	**Private car**	0,227	0,007	34,826	0,000
X_3	*Private mobile*	0,161	0,009	17,326	0,000
X_4	**Computer with internet access**	0,151	0,020	7,607	0,000
X_5	**Company car**	0,147	0,018	8,081	0,000
X_6	Washing machine	0,137	0,011	12,518	0,000
X_7	**Dishwasher**	0,116	0,007	16,444	0,000
X_8	*Landline phone*	0,110	0,005	21,884	0,000
X_9	**Cottage**	0,108	0,018	5,961	0,000
X_{10}	TV set - other	0,106	0,007	15,209	0,000
X_{11}	Computer - laptop	0,096	0,006	15,686	0,000
X_{12}	Digital camera	0,095	0,006	15,106	0,000
X_{13}	Electric cooker with ceramic hob	0,077	0,009	8,376	0,000
X_{14}	Computer without internet access	0,073	0,016	4,675	0,000
X_{15}	Camera - other	0,060	0,007	8,392	0,000
X_{16}	Refrigerator	0,057	0,019	3,040	0,002
X_{17}	Device to receive satellite or cable TV	0,053	0,006	9,636	0,000
X_{18}	Vacuum cleaner	0,053	0,011	4,801	0,000
X_{19}	Comp. with broadband internet access	0,050	0,007	7,035	0,000
X_{20}	Video camera	0,049	0,009	5,748	0,000
X_{21}	Food processor	0,048	0,005	9,037	0,000
X_{22}	Printer	0,042	0,006	6,663	0,000
X_{23}	Bike (without children's)	0,040	0,005	7,544	0,000
X_{24}	Garden plot	0,039	0,009	4,194	0,000
X_{25}	Garage	0,038	0,006	6,415	0,000
X_{26}	Motorcycle, scooter, moped	0,038	0,010	3,943	0,000
X_{27}	MP3 player	0,036	0,006	5,799	0,000
X_{28}	DVD player	0,030	0,005	5,642	0,000
X_{29}	Hi-Fi music system	0,029	0,005	5,337	0,000
X_{30}	CRT TV set	0,027	0,007	3,809	0,000
X_{31}	Radio with CD player	0,020	0,006	3,221	0,001
X_{32}	Home theater	0,019	0,007	2,753	0,006
X_{33}	Sewing machine	0,017	0,005	3,187	0,001
X_{34}	Agitator washing machine	0,015	0,008	1,824	0,068
X_{35}	Freezer	0,013	0,005	2,424	0,015
X_{36}	CD player	0,012	0,008	1,472	0,141
X_{37}	Video cassette recorder	0,001	0,006	0,197	0,844
X_{38}	Microwave oven	0,000	0,005	0,076	0,939
X_{39}	Computer	-0,019	0,019	-0,977	0,329
X_{40}	Radio	-0,021	0,005	-4,174	0,000
Stała		6,720	0,023	291,790	0,000

$R^2 = 0{,}450$, sample size $n = 37099$

Source: Kośny (2013)