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THE LEVEL OF WEALTH AND THE FINANCIAL CONDITION OF HOUSEHOLDS IN RELATION TO THE RESULTS OF CONSUMER SURVEYS

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ABSTRACT. It is assumed in this article that the prognostic value of qualitative indicators of consumer sentiment depends, to a large extent, on changes to consumers' wealth, which is connected with the situation in the labour market. Therefore, the main aim of the analysis is to verify the relationship of consumer survey results with the level of wealth and the financial condition of households. It is assumed that the predictive power of individual indicators of consumer opinions regarding the development of consumption is indirect, describing, among other things, the earning activities of the respondents. The calculations, which took into account time lags, econometric causality, and the construction of models of stepwise regression, indicate that Polish respondents evaluate their wealth and the economic condition of the country from the perspective of the situation in the labour market.

JEL Classification: D10, D12, E27

Keywords: consumer opinion, individual indicators, forecasting consumption.

Introduction

The values of such indicators as the Consumer Confidence Index or the Index of Consumer Sentiment are generally considered to be indications regarding the consumer activity of households. The predictive usefulness of such data is one of the most frequently discussed topics (Ludvigson, 2004, p. 29). The focus of interest is usually on the strength and type of the relationships between the qualitative series and fluctuations in consumption (Souleles, 2004, p. 40; Dees, Brinca, 2013, pp. 6-9). The main goal of many previous studies into synthetic indicators of consumer confidence was to test their predictive usefulness in the context of various categories of expenditure, including expenditure on durable goods (Howrey, 2001, p. 175; Souleles, 2004, p. 40). However, mathematical and statistical analyses of the relationship between quantified consumers' answers and the estimates of effective demand do not always render the expected results. This applies to the strength of the interdependencies, their direction, as well as time lags. For example, the results of a study of a well-known synthetic index – the Michigan Consumer Sentiment Index (CSI) – have shown

that it is characterized by the surprisingly low strength of its relationship to the volume of durable goods purchases (Kwan, Cotsomitis, 2004, p. 139).

One of the key questions that appear in scientific publications relates to the information content of confidence indicators – whether they contain any additional information beyond that which is already contained in the quantitative variables (Fuhrer, 1988). Some analyses show that this is indeed the case (Carroll, Fuhrer, Wilcox, 1994, p. 1397; Ludvigson, 2004, p. 29). Various tests show, however, that a lot depends on the wording of the questions asked, the size of the sample, the method used, as well as the quantification of the responses and the construction of the indices (Bram, Ludvigson, 1998, pp. 60-61; Das, van Soest, 1997, p. 138).

In the context of the information content it is worth considering the possible causes of the prognostic usefulness of sentiment indicators. In other words, is consumer confidence an independent factor that not only makes it possible to predict consumer spending but is also its cause? Or does perhaps the prognostic value of qualitative indicators in relation to consumption stem from the fact that they are a reflection of certain economic phenomena, which can cause the volume of purchased goods to increase or decline (Carroll, Fuhrer, Wilcox, 1994, p. 1398; Fuhrer, 1993, pp. 34-35)?

This article has adopted the latter perspective, by assuming that consumers' spending depends on their income, which in turn is related to the situation on the labour market and overall economic activity (Lovell, Tien, 2000). Thus it is assumed that the prognostic value of qualitative indicators of consumer sentiment depends to a large extent on changes to consumers' wealth, which is related to, among other things, their earnings (Bram, Ludvigson, 1998, p. 69). From this point of view, the indicators of consumer confidence cannot be predictors of consumption as well as its direct cause (Howrey, 2001, pp. 198, 204-205). Rather, they are a set of opinions on the overall economic situation, and in particular, assessments based on the current and predicted income of households. In this sense, the indicators can predict changes in consumer spending only indirectly, through the information which they contain relating to income. It is worth noting that adopting this point of view assumes non-compliance with the basic version of the permanent income hypothesis (PIH). If all consumers behaved in accordance with the assumption of the basic PIH model, consumption would follow the random-walk process so that it would be impossible to predict it on the basis of any information previously known to consumers (Mehra, Martin, 2003, p. 52; Dees, Brinca, 2013, p. 2; Acemoglu, Scott, 1994, p. 5).

The adopted approach is similar to the interpretation of prognostic usefulness whereby sentiment might predict spending without being an independent causal force (Mehra, Martin, 2003, p. 53). On the other hand the results published by Carroll, Fuhrer and Wilcox suggest that at least part of the predictive power of sentiment appears to operate through a direct channel (Carroll, Fuhrer, Wilcox, 1994, p. 1399; Kwan, Cotsomitis, 2004, p. 142). Also, Blanchard supposes that consumption cycles are caused by household sentiments (Blanchard, 1993, p. 274). The main aim of this article is to verify the predictive usefulness of consumer survey results in relation to the level of wealth and the financial condition of households[1]. The calculations were carried out in subsequent stages which consisted in determining cross correlations, taking into account time lags, testing econometric causality, and models of stepwise regression with a forward selection procedure. The greatest predictive power of consumer opinion was observed in relation to macroeconomic variables such as the unemployment rate, the number of the registered unemployed, and in particular, the average employment.

[1] It is worth noting that in the IPSOS survey only one question is directly related to consumption. Other such surveys are similar in this respect.

1. Data series and their transformations

The statistical material used for the analyses was obtained from the market research company IPSOS[2]. The database was considered to be a valuable source of information because compared to the alternatives available in Poland it has the longest value series (quantified responses have been collected and made available since December 1991).

Although IPSOS publishes five different kinds of synthetic indicators, in this analysis simple balance series were used. Considering the aim of this analysis it would be wrong to refer to synthetic indices that combine opinions on such diverse issues as the financial situation of the household and the overall economic situation of the country (See: Curtin, 2007, p. 13). Probably, this is the reason why composite confidence indicators are often characterized by a weak correlation with macroeconomic data compared to the relationships shown by individual indicators (Jankiewicz, 2013; Kwan, Cotsomitis, 2004, p. 140).

The set of consumer opinion indicators was supplemented with three additional variables that were constructed using balance statistics (where: *d* – diagnosis and *f* – forecast) relating to the need for purchasing durable goods – *dc*, the accumulation of savings – *ds, fs* and describing the value of household assets *dw* and *fw*. If they are treated as percentage changes and set together properly, what will be obtained is the elasticity of consumption (*dc/dw*) and savings (*ds/dw*; *fs/fw*) – their sensitivity to the change in the value of household assets (Bürkl, 1996, p. 41). In this case, it has been assumed that quantification of opinion on consumers' material well-being, rather than on their financial situation, is a better measure of the resources at their disposal. The first category is more capacious, and this seems more in line with "net worth" defined by Modigliani as the total value of financial and non-financial assets minus the balance of debt (Ando, Modigliani, 1963, pp. 47-78).

Finally, the development of the *dc/ds* coefficient, which was treated similarly in Bürkle's work as the elasticity of substitution between savings and consumption, was also included (Bürkle, 1996, p. 41). If the value of this ratio exceeds a level of 100, the propensity to consume outweighs the propensity to save. A drop below this level indicates that there are more respondents who are willing to save than those who are convinced of the need for purchasing durable goods.[3]

Some of the variables published in the official statistics were selected; they describe the situation on the labour market including average wages, the number of unemployed, average employment plus the unemployment rate. One of the questions in the IPSOS survey directly refers to inflation expectations and therefore the two price indices of consumer goods and services were also taken into account (with the following base values: the previous month = 100, the corresponding month of the previous year = 100).

Eventually, the aggregates of GDP and private consumption in the household sector were selected as well. The first one was included in the set of analysed data because the two questions in the consumer survey concern the overall economic situation in the country. The second one was chosen in order to test the prognostic value of individual indicators of consumer opinion in relation to fluctuations in consumption.

Selecting the form of the data series is one of the key decisions that need to be taken at the preparation stage for the analysis of the relation between the business tendency survey or consumer opinion survey data and official statistics (Bram, Ludvigson, 1998, p. 63). The wording of most questions in the survey on consumer opinion imposes a diagnosis of the current situation in comparison with the situation prior to the previous 12 months, or requires

[2] http://www.ipsos.pl/en

[3] A description of how these elasticity indicators were changing in the subsequent stages of transformation can be found in: Jankiewicz, J. (2014), Propensity for saving and consumption during the period of transformation in Poland: findings based on the consumer tendency survey, *Actual Problems of Economics*, No 2, pp. 122-129.

a forecast of one year. As a result, it is considered reasonable to present the macroeconomic data in the form of annual relative change. Indices of this type are dimensionless quantities, thereby making it possible to compare phenomena in time and space. Moreover, the transformation of data series increases the likelihood of transforming their fluctuations into a stationary process.

In order to alternatively illustrate the fluctuations of macroeconomic variables, reference is made to the concept of economic cycle fluctuations as percentage deviations from the long-term stochastic trend. This type of procedure is justified particularly in developing economies when a clear upward trend is observed in many macroeconomic series (Artis, Marcellino, Proietti, 2004, p. 2). Separating the cyclical component of a time series requires its prior decomposition (Zarnowitz, 1984, p. 4). To filter out (or to isolate) the seasonal and irregular components, the Census II/X-11 method was performed.[4] The fluctuations in the form of percentage deviations from the stochastic trend could then be separated from the Henderson curve (Kasperowicz, 2012, p. 67). The latter was specified using the Hodrick-Prescott filter (Hodrick, Prescott, 1997). The latter procedure requires that the time series have a sufficiently large number of observations. In the case of quarterly data, there should be at least 32 observations, which correspond to the usually accepted maximum length of the business cycle (Mills, 2003, pp. 94-95; Gazda, 2010, p. 44). Due to the number of observations in the analysed time series, there were no formal obstacles to using the decomposition procedure adopted for the further testing of linear relationships.[5] It is also worth noting that the method of obtaining and quantifying the business tendency survey as well as the consumer opinion survey data means that they do not reflect trends and are at least partially cleansed of seasonality (Business Tendency Surveys: A Handbook, 2003, p. 9). Therefore, it has been assumed that in order to provide adequate comparability between qualitative data and official statistics, the macroeconomic series had to undergo the aforementioned transformations (Klein, Moore, 1981, p. 167; Jankiewicz, 2007, pp. 102-105).

Methodology for identifying the strength and direction of relationships

It was decided that the purpose of the article would be better achieved through a multistage procedure. An analysis of cross correlations made it possible to measure the strength of the linear relationships, but also the identification of time lags which exhibit the strongest relationships. The Pearson $r_{(j)}$ correlation coefficients were calculated for $j \in \{0; \pm 1; \pm 2; \ldots \pm 8\}$ for the quarterly data, and $j \in \{0; \pm 1; \pm 2; \ldots \pm 24\}$ for the monthly data. It was assumed that lags exceeding two years would not be applied in the analysis performed, because then the essence of the interdependence in the examined data might disappear.6

Due to the limited availability of historical values for some macroeconomic variables, the measurements were carried out for the data series covering the years 1995-2013. The results for price indices of consumer goods and services are an exception, as they only include data for the years 2000-2013. The state of the Polish economy in the 1990s was the reason why the sample was limited. The beginning of the economic transformation was marked by very high inflation, and despite a gradual improvement in this respect negative phenomena

[4] The series converted into relative increases had also been subjected to this procedure.
[5] After carrying out all the necessary transformations the number of observations in monthly series ranged from 200 to 220 (the exceptions being the consumer price indices – 168 observations); while the quarterly data consisted of 60 to 70 observation.
[6] The horizon of analysis (questions about the last or the next 12 months) imposed in the Consumer Opinion Survey justifies testing the power of relationships between the series with annual or even longer time shifts. At the same time, the average length of the business cycle and its phases suggests that the scope should be limited to two years.

persisted through to the end of the last decade of the 20th century. This is illustrated by *Figure 1*.

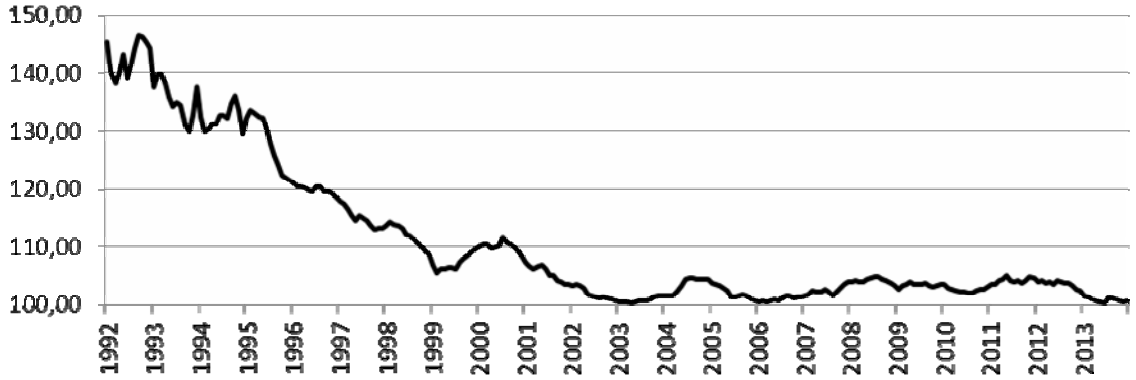


Figure 1. Price indices of consumer goods and services – Corresponding period for the previous year = 100
Source: CSO.

As a result of shortening the data series, the strength of the linear relationship between them and consumers' forecast of inflation increased from -0.33 to -0.66 for the *cpp* variable (price indices of consumer goods and services – previous period=100) and from -0.33 to -0.55 for the *cpc* variable (price indices of consumer goods and services – corresponding period of previous year=100).

The next step in achieving the goals put forward was to refer to the concept of econometric causality. As in many other studies of this type, it is assumed that if the quantified consumer opinion Granger-causes macroeconomic variables, it can be concluded that such series have some prognostic value. Thus, in each case, the maximum lag was chosen in the range from 0 to 24 for the monthly series, and from 0 to 8 for the quarterly ones.

In the procedure used, it was checked whether this regression model:

$$M_t = \alpha_0 + \alpha_1 M_{t-1} + ... + \alpha_k M_{t-k} + \beta_1 X_{t-1} + ... + \beta_k X_{t-k,} \qquad (1)$$

explains and predicts the described variable better than this model:

$$M_t = \alpha_0 + \alpha_1 M_{t-1} + ... + \alpha_k M_{t-k} \qquad (2)$$

where the series of macroeconomic percentage deviations from the trend or annual relative changes were the described variable M_t. Household opinion indicators are X_t. In this case, the null hypothesis takes the following form: H_0: $\beta_1 = \cdots = \beta_k = 0$, which means that X_t Granger-causes M_t (Granger, 1969).

By taking into account the critical value of statistics – F, the H_0 hypothesis can be verified. However, in this case, the probability generated along with the test statistics was considered. It is assumed that Granger causality occurs between a pair of variables if the p-value is lower than the level of significance, which was 5% in respect of the analyses done.

The tests performed allowed the identification of the maximum delay for the X_t variable treated as the cause of M_t. Then, using these results, the multiple regression equations were estimated. Thereby, for example, an indication of the Granger test delay of 12 periods suggested the need to include in the regression equation the twelve series of the describing variable with a delay of 1, 2, ..., 12 periods; but also without a time lag:

$$Y_t = \alpha_0 + \alpha_1 Xi_t + \alpha_2 Xi_{t-1} + \cdots + \alpha_{k+1} Xi_{t-k} \qquad (3)$$

where:
Y_t – the value of a macroeconomic variable in period t,
α – the equation coefficient (for a statistically insignificant series its value is zero),
Xi_{t-k} – the value of the variable i for pre-k quarters (or months),
k – the maximum lead of independent variables for quarters (or months).

In each case, the stepwise regression with forward selection procedure made it possible to isolate the most significant lag of a given qualitative variable.

Eventually, a regression model was constructed for any macroeconomic quantity by placing a group of variables describing the previously selected opinion indicators along with the selected time lags. Again, the stepwise regression procedure was used which allowed for a reduction in the set of possible determinants to a maximum of two or three:

$$Y_t = \beta_0 + \beta_1 X1_{t-j1} + \beta_2 X2_{t-j2} + \cdots + \beta_n Xn_{t-jn} \qquad (4)$$

where:
Y_t – the value of a macroeconomic variable in period t,
β – the equation coefficient (for statistically insignificant series its value is zero),
$Xn_{,t-j}$ – the independent variable n prior to j quarters (months).

Due to the character of the describing variables and the method of the analysis performed, special attention was paid to the phenomenon of multicollinearity in the estimated models. A formal method for detecting the presence of multicollinearity that is widely accepted is the use of variance inflation factors (VIF) or tolerance (1/VIF) (Kutner, Nachtsheim, Neter, Li, 2004, p. 408). These factors measure how much the variances of the estimated regression coefficients are inflated as compared to when the predictor variables are not linearly related. It was assumed that the tolerance for a given variable should not drop below a value of 0.2, which meant that a 20% variance in a given independent variable was not explained by all the remaining independent variables (Menard, 2002, p. 76; Kutner, Nachtsheim, Neter, Li, 2004, pp. 408-409). Thus, the VIF calculated on this basis should not exceed a value of 5.

Cross correlations

Table 1 presents which time lags of consumer opinion indicators exhibit the strongest relationships with the macroeconomic time series. The cross-correlation coefficient $r_{xy}(k)$ represents the correlation between the two series X and Y, where X (here consumer opinion indicator) is lagged by k observations (months or quarters).

The analysis of cross correlations first allows the drawing of conclusions on the predictive power of consumer opinion indicators. The highest correlation coefficients occur between individual indicators and the situation in the labour market:
– diagnosis of the financial situation of households and the unemployment rate (r=-0.89) and average employment (r=0.93),
– forecast of savings accumulation and the unemployment rate (r=-0.88) and average employment (r=0.93),
– diagnosis of wealth and the average employment (r=0.83).

Table 1. Linear relationships and time lags between consumer opinion indicators and fluctuations in macroeconomic indicators

Macroeconomic indicators	**Individual survey questions** *The highest values for cross-correlation coefficients are given in parentheses; time shifts (in m or in q) are given below*													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	dgs	fgs	fun	dw	fw	df	dc	fp	fs	ds.	dc/ds	dc/dw	ds/dw	fs/fy
gd_c	(0.67) 0	(0.68) 0	(0.54) 0	(0.45) 0	(0.44) +1	(0.49) 0	(0.75) 0	(-0.40) -1	(0.48) -5	(-0.28) 0	(0.69) 0	(-0.15) +2	(-0.72) 0	(0.53) -7
con_c	(0.53) +5	(0.47) +5	(-0.48) -8	(0.51) +4	(0.55) +5	(0.61) +3	(0.44) +2	(-0.48) 0	(0.57) +5	(0.34) 0	(-0.26) -5	(-0.39) +5	(0.48) -8	(0.47) +5
gw_c	(-0.21) -6	(-0.20) -4	(-0.21) -11	(-0.24) -8	(-0.23) -5	(-0.19) -7	(-0.22) -24	(-0.42) -3	(0.21) +24	(0.24) +24	(-0.20) +24	(0.29) -6	(0.25) -10	(0.20) +24
unep_c	(-0.51) +7	(-0.46) +9	(-0.56) +10	(-0.56) +8	(-0.53) +10	(-0.44) +10	(-0.46) +7	(0.30) +5	(-0.41) +11	(-0.24) +12	(0.23) -24	(0.35) +8	(0.40) +5	(-0.28) +12
uner_c	(-0.81) +16	(-0.69) +15	(-0.76) +20	(-0.77) +13	(-0.77) +15	(-0.89) +12	(-0.71) +11	(0.31) +10	(-0.88) +11	(-0.41) +4	(0.29) -21	(0.49) +16	(0.66) +24	(-0.79) +7
pem_c	(0.78) +16	(0.65) +15	(0.67) +19	(0.72) +14	(0.72) +15	(0.93) +13	(0.62) +14	(-0.32) +2	(0.93) +11	(0.44) +9	(0.21) +24	(-0.50) +15	(0.59) -24	(0.88) +8
gd_i	(0.62) +6	(0.52) +8	(-0.54) -8	(0.65) +5	(0.61) +6	(0.65) +4	(0.53) +2	(-0.47) 0	(0.68) +4	(0.45) +2	(-0.28) -8	(-0.52) +5	(0.58) -8	(0.61) +4
con_i	(0.64) 0	(0.71) 0	(0.47) 0	(0.41) +1	(0.42) +2	(0.56) 0	(0.79) 0	(-0.48) 0	(0.49) 0	(-0.26) 0	(0.70) 0	(-0.11) +3	(-0.66) 0	(0.08) -6
gw_i	(0.44) +9	(0.47) +9	(-0.41) -24	(-0.34) -24	(-0.33) -24	(0.43) +9	(0.49) 0	(-0.44) -5	(0.54) +10	(-0.15) -3	(0.36) 0	(0.38) -18	(-0.38) +6	(0.55) +11
unep_i	(-0.77) 0	(-0.67) +1	(-0.83) +2	(-0.71) -1	(-0.67) +2	(-0.60) -12	(-0.62) -2	(-0.30) +24	(-0.61) -20	(-0.39) -24	(-0.38) +1	(0.46) -1	(0.81) +1	(-0.56) -23
pem_i	(0.71) 0	(0.52) +2	(0.87) +2	(0.83) 0	(0.79) +1	(0.66) -2	(0.44) -2	(-0.28) -24	(0.64) -21	(0.53) -24	(-0.19) -24	(-0.77) +1	(-0.61) +1	(0.59) -24
cpp	(-0.45) -19	(-0.33) -12	(-0.48) -17	(-0.41) -18	(-0.36) -19	(-0.36) +24	(-0.53) -16	(-0.66) 0	(0.34) +17	(0.39) +18	(-0.30) +20	(0.34) -24	(0.49) -15	(0.36) 0
cpc	(-0.50) -16	(-0.37) -24	(-0.55) -13	(-0.48) -14	(-0.43) -14	(-0.49) -24	(-0.54) -11	(-0.55) +4	(-0.41) -24	(0.28) +19	(-0.21) -8	(0.49) -24	(0.54) -11	(0.39) 0

Source: Own calculations based on IPSOS and CSO data.

Explanations: "**–**" = lagging character of the opinion indicator; "**+**" = leading character of the opinion indicator; **_c –** H-P cycle; **_i** = annual relative changes; **macroeconomic data**: **gd –** gross domestic product; **con –** individual consumption expenditure of household sector; **gw –** average monthly gross wages and salaries in enterprise sector, grand total, **unep –** registered unemployed persons in thousands; **uner –** registered unemployment rate in %; **pem –** average paid employment in enterprise sector; **cpp –** price indices of consumer goods and services – previous period=100); **cpc –** price indices of consumer goods and services – corresponding period of previous year=100); **indicators of consumer sentiment**: **dgs –** diagnosis of the general economic situation; **fgs –** forecast of the general economic situation; **fun –** forecast of unemployment; **dw –** diagnosis of the value of household assets; **fw –** forecast of the value of household assets; **df –** diagnosis the financial situation of household, **dc –** the need for purchasing durable goods, **fp –** forecast of inflation, **ds –** diagnosis of accumulation of savings, **fs –** forecast of accumulation of savings.

As expected, the indicator of employment forecasts has the strongest correlation with the number of registered unemployed (r=-0.83) and average employment (r=0.87). Additionally, it exhibits leading characteristics in relation to these data. It should be noted, however, that the results vary depending on the modifications of the macroeconomic

variables. The leads for the individual indicator in relation to relative change are rather short, exhibiting strong relationships.

Much bigger leads appear in relation to the percentage deviations from the trend, but this happens at the expense of a lower value for the linear relationship. No objections can be raised to the marks accompanying the Pearson coefficients, as the qualitative indicator of the unemployment forecast is constructed in such a way that an increase in its value will describe an improvement in the labour market.

It is also worth noting that the quantified assessment of the overall economic situation is most strongly correlated with the rates of unemployment (r=-81) and average employment (r=0.78). The relationship of this indicator with the GDP aggregate has significantly less power (r=0.67 with percentage deviations from the trend and r=0.62 with relative change).

The calculations seem to confirm the thesis put forward at the beginning of this article. On this basis it may be presumed that the respondents assess their wealth and the economic condition of the country mainly from the perspective of the situation in the labour market.

Granger causality

In accordance with the idea that the future cannot be the cause of the past, it was assumed that if the X_t variable Granger-cause the M_t variable, X_t changes should occur prior to the fluctuations in M_t (Gujarati, 1995, p. 621). Starting from the largest time lag, the test was repeated iteratively until there was no reason to reject the null hypothesis that no causal link exists. The results reflecting the maximum gap between the variables, which subsequently made it possible to construct the forecasting models, are shown in *Table 2*. The test results were obtained by means of quarterly series consisting of 64 to 75 observations, as well as monthly ones ranging from 204 to 227 observations (in the case of inflation – 168 observations).

Table 2. The maximum time lags for which indicators of household opinion are Granger-causes of the macroeconomic variables

Macroeco-nomic indicators	**Individual survey questions** p-values are given in parentheses													
	dgs	fgs	fun	dw	fw	df	dc	fp	fs	ds.	dc/ds	dc/dw	ds/dw	fs/fy
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
gd_c	8 (.034)	7 (.016)	6 (.013)	5 (.033)	7 (.004)	7 (.016)	7 (.042)	-	8 (.017)	7 (.007)	7 (.013)	1 (.011)	7 (.039)	7 (.020)
con_c	7 (.034)	8 (.025)	2 (.024)	3 (.032)	6 (.032)	8 (.004)	2 (.005)	8 (.044)	7 (.012)	-	-	-	1 (.005)	2 (.020)
gw_c	-	-	-	-	-	-	-	-	-	13 (.042)	-	9 (.030)	-	-
unep_c	24 (.018)	7 (.044)	11 (.043)	24 (.013)	3 (.014)	2 (.032)	20 (.041)	-	2 (.043)	24 (.013)	3 (.002)	22 (.033)	24 (.000)	-
uner_c	24 (.000)	24 (.011)	18 (.035)	24 (.020)	24 (.024)	24 (.010)	24 (.000)	-	22 (.031)	24 (.015)	1 (.000)	-	18 (.021)	6 (.033)
pem_c	24 (.000)	24 (.004)	24 (.003)	24 (.000)	24 (.011)	24 (.002)	24 (.031)	-	24 (.002)	24 (.004)	24 (.010)	24 (.010)	5 (.034)	18 (.027)
gd_i	5 (.009)	4 (.025)	5 (.037)	-	8 (.006)	7 (.035)	3 (.038)	8 (.026)	7 (.013)	7 (.038)	3 (.023)	8 (.037)	-	-
con_i	2 (.014)	2 (.000)	2 (.045)	8 (.034)	8 (.004)	4 (.042)	7 (.015)	8 (.022)	2 (.004)	-	2 (.013)	-	2 (.004)	-
gw_i	22 (.039)	20 (.041)	1 (.019)	15 (.034)	1 (.001)	2 (.003)	2 (.004)	17 (.004)	17 (.034)	24 (.004)	24 (.001)	20 (.028)	18 (.045)	17 (.044)
unep_i	24 (.000)	23 (.033)	24 (.000)	24 (.000)	24 (.002)	24 (.013)	24 (.001)	-	16 (.004)	15 (.018)	14 (.045)	24 (.013)	24 (.025)	1 (.004)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Pem_i	24 (.000)	24 (.004)	24 (.002)	24 (.010)	24 (.012)	24 (.004)	24 (.005)	5 (.045)	24 (.000)	19 (.035)	10 (.033)	24 (.002)	8 (.035)	23 (.024)
cpp	24 (.003)	23 (.003)	24 (.004)	24 (.003)	24 (.003)	24 (.004)	24 (.001)	24 (.005)	24 (.035)	-	16 (.035)	24 (.001)	24 (.011)	21 (.031)
cpc	1 (.000)	1 (.001)	1 (.002)	1 (.001)	1 (.001)	24 (.011)	1 (.003)	24 (.044)	4 (.035)	1 (.034)	-	1 (.002)	3 (.022)	4 (.041)

Source and note as in *Table 1*.

The Granger test results confirmed the previously revealed significant relationships between large portions of the examined data series. At the same time, there were no causal relationships for most individual indicators with the *gw_c* variable, which had already signalled very low values of linear coefficients. The same can be said about the relationships between the statistics of consumption and the three indicators (*ds, dc/ds, dc/dw*).

At the last stage of the search for the most significant time lags between the variables, multiple regression models with stepwise regression with forward selection procedure were used (3). This time, a model with one, most significant lag regarding the describing variable was specified for each pair of data.

The multiple regression models

The calculations carried out so far were characterized by the use of pairs in respect of the data examined – the selected macroeconomic variable was described in each case by means of only one independent variable (with different lags). This principle concerned both cross correlations and econometric causality testing. In the next step of the analysis, an attempt was made to construct models that would estimate the simultaneous impact of the previously isolated potential determinants of variability in the macroeconomic series. To achieve this goal, multiple regression equations were formulated (4), using the stepwise regression procedure to eliminate subsequent variables and their lags which proved to be statistically insignificant. As a result, adequately reduced regression equations were obtained.

In the specification procedure of the presented models, those series of the individual opinions which did not exhibit any leading quality in relation to the dependent variable were also taken into account. It was assumed that in spite of their coincidental character, their prognostic usefulness consisted in their being published well in advance compared to official statistics. The results of regression modelling are given in *Table 3*.

Table 3. Multiple regression models with selected descriptive statistics

	Dependent variable	Intercept	Var01	Var02	Var03	Summary
	1	**2**	**3**	**4**	**5**	**6**
t-statistics are given in parentheses, all magnitudes corresponding to p-values less than 0.05; F-stat tests the overall significance of the regression model						
1	gd_c	93.49 (123.57)	0.14* $\mathbf{fs_{t-3}}$ (8.82)			R^2=0.54, Adjusted R^2=0.53 F-stat=77.71, no.obs.= 67
2	gd_c	91.32 (94.89)	0.1* $\mathbf{fs_{t-3}}$ (5.04)	0.05* $\mathbf{dw_{t-5}}$ (3.32)		R^2=0.60, Adjusted R^2=0.59 F-stat=50.19, no.obs.= 66
3	gd_c	96.13 (178.81)	0.05* $\mathbf{dgs_{t-5}}$ (7.57)			R^2=0.46, Adjusted R^2=0.45 F-stat=57.32, no.obs.=67
4	gd_i	-1.81 (-3.66)	0.08* $\mathbf{fun_t}$ (11.28)			R^2=0.66, Adjusted R^2=0.65 F-stat=127.26, no.obs.=67
5	gd_i	-9.63 (-6.85)	0.07* $\mathbf{fun_t}$ (12.71)	0.1* $\mathbf{dc/ds_t}$ (5.81)		R^2=0.77, Adjusted R^2=0.76 F-stat=111.58, no.obs.=66

	1	2	3	4	5	6
6	con_c	77.81 (28.57)	0.24* $\mathbf{df_{t-3}}$ (8.19)			R^2=0.49 Adjusted R^2=0.49 F-stat67.01, no.obs.=69
7	con_i	-18.26 (-7.85)	0.21* $\mathbf{dc_t}$ (9.33)			R^2=0.56 Adjusted R^2=0.55 F-stat=87.06, no.obs.=68
8	con_i	-22.52 (-9.49)	0.16* $\mathbf{dc_t}$ (5.74)	0.05* $\mathbf{fp_{t-6}}$ (3.71)	.06* $\mathbf{dc/ds_t}$ (2.37)	R^2=0.67 Adjusted R^2=0.65 F-stat=43.72, no.obs.=66
9	gw_i	-14.11 (-7.19)	0.38* $\mathbf{fs_{t-10}}$ (9.22)			R^2=0.30 Adjusted R^2=0.29 F-stat=85.03, no.obs.=202
10	unep_c	107.52 (130.34)	-0.11* $\mathbf{fun_{t-10}}$ (-10.15)			R^2=0.32 Adjusted R^2=0.32 F-stat=102.96, no.obs.=214
11	uner_c	566.84 (43.85)	-4.99* $\mathbf{df_{t-11}}$ (-36.29)			R^2=0.86 Adjusted R^2=0.86 F-stat=1316.9, no.obs.=208
12	uner_c	519.03 (53.74)	-3.34*$\mathbf{df_{t-11}}$ (-22.45)	-1.05*$\mathbf{dc_{t-14}}$ (-14.62)		R^2=0.93 Adjusted R^2=0.93 F-stat=1439.2, no.obs.=207
13	uner_c	135.84 (63.26)	-0.54*$\mathbf{fun_{t-18}}$ (-18.67)			R^2=0.63 Adjusted R^2=0.62 F-stat=348.72, no.obs.=208
14	pem_c	-11.09 (-4.45)	1.18* $\mathbf{df_{t-12}}$ (44.69)			R^2=0.91 Adjusted R^2=0.91 F-stat=1997.6, no.obs.=202
15	pem_c	26.32 (6.32)	0.68* $\mathbf{df_{t-12}}$ (12.59)	0.22* $\mathbf{fs_{t-10}}$ (10.27)		R^2=0.94 Adjusted R^2=0.94 F-stat=1568.0, no.obs.=201
16	pem_c	11.02 (3.55)	0.86* $\mathbf{df_{t-12}}$ (21.03)	0.18* $\mathbf{fs/fw_{t-7}}$ (21.04)		R^2=0.94 Adjusted R^2=0.94 F-stat=1491.1, no.obs.=201
17	unep_i	-116.80 (-22.35)	0.74* $\mathbf{ds/dw_t}$ (22.43)			R^2=0.70 Adjusted R^2=0.70 F-stat=503.45, no.obs.=211
18	unep_i	-50.26 (-4.94)	0.43* $\mathbf{ds/dw_t}$ (8.27)	-0.25* $\mathbf{fun_{t-3}}$ (-7.36)		R^2=0.77 Adjusted R^2=0.76 F-stat=342.20, no.obs.=210
19	pem_i	-7.98 (-25.13)	0.11* $\mathbf{fun_{t-2}}$ (26.26)			R^2=0.76 Adjusted R^2=0.76 F-stat=689.42, no.obs.=221
20	cpp	101.21 (427.81)	-0.01* $\mathbf{fp_t}$ (-4.25)			R^2=0.11 Adjusted R^2=0.11 F-stat=18.07, no.obs.=143
21	cpc	111.81 (83.15)	-0.09* $\mathbf{fp_t}$ (-6.47)			R^2=0.21 Adjusted R^2=0.20 F-stat=41.91, no.obs.=162

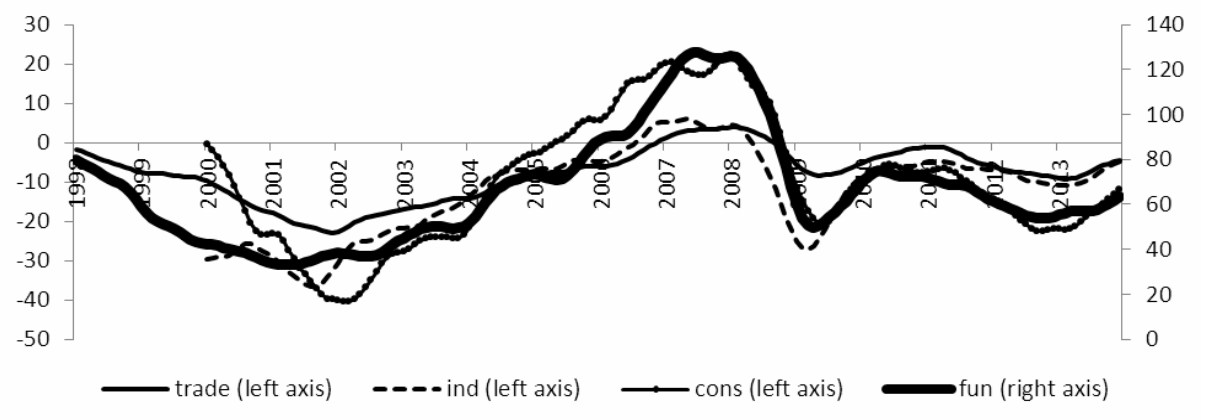
Source and note as in *Table 1*.

The coefficients of determination for models with one explanatory variable differ significantly from each other. The indicators of consumer opinion best describe the data that characterize the labour market. This applies to the unemployment rate, the number of registered unemployed (only in terms of relative change), and in particular, average employment in the form of percentage deviations from the trend. In the latter case, the diagnosis of the financial situation of households describes 91% of the variability in macroeconomic data series.

As has already been shown in the analysis of linear relationships, household opinion indicators exhibit a leading character mainly in relation to the variables presented in terms of percentage deviations from the trend. The time lags of determinants that were introduced into the regression models lasted 10-12 months on average.

Household expectations regarding unemployment also have a leading character in relation to the situation in the labour market (model 13). However, it would be difficult to presume that forecasts formulated by the respondents were based on econometric models or statistical analysis. Representatives of households describe the situation observed in their immediate surroundings, so it concerns themselves, their families and friends. Most of them are either salaried employees or businessmen. In most cases, redundancies do not happen suddenly and without warning, and information appears about possible layoffs long before they are executed. This thesis is confirmed by the very strong relationship between household

expectations about unemployment and employment forecasts formulated by businessmen in BTS research and aggregated in the form of "balances" (with values of correlation coefficients between 0.88 and 0.92). To illustrate this more clearly, *Figure 2* shows forecasts made by representatives of various industries and sectors about employment and household expectations about unemployment. All the data series (originally presented as percentage points) were transformed into the Henderson curve form.



Note: trade – expected employment in trade,
ind – expected employment in construction,
cons – expected employment in industry,
fun – household's expectation of unemployment.
Figure 2. Unemployment forecasts formulated by households along with expectations about employment in industry, commerce and construction
Source as in *Table 1*.

Contrary to expectations, forecasts of the unemployment rate do not play a significant role in the model describing the variability in unemployment (model 16). If there are some evaluations of the current and future financial situation of households among the independent data, the variable becomes statistically insignificant and its redundancy rises above acceptable limits. The individual employment forecast indicator itself explains as many as 62% of the variation in the unemployment rate in a typical estimation using the classical least square method.

The data series consisting of the quantification forecasts and diagnosis of the microeconomic situation (*fs- forecast of accumulation of savings* and *dw- diagnosis of the value of household assets*) proved to be most useful in describing the macroeconomic *gd_c* variable. The diagnosis of the general economic situation indicator reflects its leading character in relation to the macroeconomic aggregate, but this means it is possible to describe "only" 46% of the variability (model 3). The indicators of consumer opinion (*fun* and *dc/ds*) best describe the GDP magnitude when the latter one is in the form of annual relative change (*gd_i*).

The indicators that proved to be useful in forecasting consumption include the following: the indicator of the financial situation of households (*df*), the price forecast (*fp*), the opinion on the merits of purchasing durable goods (*dc*), and the elasticity rate of the substitution between savings and consumption (*dc/ds*). The values of the determination coefficients for models No. 6-8 indicate, however, that these are not the only sources of variation in consumption in Poland.

The indicator of the household price forecast proved to be the best determinant for both price indices. The constructed models explain only a small part of the variability in both

indices, which means that the set of describing variables should be supplemented by other determinants. The coincidental character of the qualitative variable determines its low predictive power.

Conclusions

In this paper, the predictive power of consumer opinion survey results was verified in the context of the development of the wealth value and the financial situation of households, which was combined with the situation in the labour market. Thus, it was assumed that the predictive power of individual indicators of consumer opinions regarding the development of consumption was indirect, describing, among other things, the earning activity of the respondents.

The calculations were carried out in subsequent stages which consisted in determining cross correlations, taking into account time lags, testing econometric causality, and models of stepwise regression with a forward selection procedure.

The calculations seem to confirm the thesis put forward at the beginning of this article. On this basis it may be presumed that Polish respondents do indeed assess their wealth and the economic condition of the country mainly from the perspective of the situation in the labour market.

This is evidenced, among other things, by a stronger correlation between their evaluation of the general economic situation with unemployment rate or average employment rather than the evolution of the GDP aggregate. Moreover, the greatest predictive power of consumer opinion was observed in relation to macroeconomic variables such as the unemployment rate, the number of the registered unemployed, and in particular, the average employment. In the latter case, the diagnosis of the financial situation of households describes 91% of the variation in this data.

The individual indicators are characterized by little or no predictive power in relation to average wages and inflation. This was confirmed through successive steps of the analysis. In subsequent stages of research on the predictive power of household opinion, the information content of quantitative answers to the consumer opinion survey should be measured by introducing these answers into forecasting models along with selected quantitative variables.

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