

Mieczysław Kowerski

Influence of Idiosyncratic and Macroeconomic Factors on Consumer Economic Sentiment of Lubelskie Region (Poland)

Abstract

In this article, using micro – macro logit models, based on the analysis of approximately 7 thousand questionnaires collected between the second quarter of 2001 and the first quarter of 2006 (20 quarterly surveys) it has been shown that the consumer economic sentiment in the Lubelskie region (voivodeship) depends on both individual features of consumers (idiosyncratic variables) and macroeconomic factors. The models were built according to the idea: “from general to specific modelling”. The maximum likelihood method was applied for estimation of structural parameters of specified logit models.

If pseudo R^2 coefficient is assumed as a criterion the most effective was a model with two idiosyncratic explanatory variables (average number of persons in surveyed household and Income per capita in surveyed household), three macroeconomic explanatory variables (dynamics of the number of the employed in enterprise sector, dynamics of the number of job offers per 1000 registered unemployed and interest rates of 3-year consumer credits) and with a dummy variable describing polish accession to EU. This model was used to simulate changes in the growth of economic sentiment probability. Consumers with the highest values of idiosyncratic variables during accession shock period, when macroeconomic variables are biggest, face the greatest probability of economic sentiment improvement. Regardless of macroeconomic condition and the time, the probability of economic sentiment improvement for consumers with best individual situation exceeds 0.58. When macroeconomic variables values shift from lowest to highest regardless of idiosyncratic variable values, the increase in probability of economic sentiment improvement does not exceed 0.2925. It proves that idiosyncratic variables affect economic sentiment changes to a greater extent than macroeconomic variables.

Key Words: Regional consumer surveys, Consumer economic sentiment, Micro – macro logit models

JEL Classification: C25, D12, R2

1. Introduction

Research has shown that consumer economic sentiment indices could be satisfactorily used as predictors of economic activity. Most often they anticipate changes in macroeconomic variables such as gross domestic product, value of industrial production, inflation or unemployment rates, and therefore can serve as economic policy instruments.⁵⁴

Besides the influence of consumer economic sentiment indices on economic activity, there also exist reverse relations – macroeconomic factors influencing economic sentiment of individual consumers. Economic sentiment indices reflect consumers' perception of economic phenomena. Naturally, consumer economic sentiment also depends on consumers individual (idiosyncratic) features. Therefore, it seems justified to simultaneously analyse the influence of both factor groups on consumer economic sentiment. This approach is rarely applied⁵⁵, however, it can be very useful in estimating the perception of macroeconomic phenomena by consumers. Also, it can help create instruments for regional development policy.

This paper is an attempt to put a valuation on the influence of idiosyncratic and macroeconomic factors on consumer economic sentiment in the least developed of the NUTS2 level regions in the EU – the Lubelskie voivodeship. Using data from quarterly surveys the concept of micro – macro logit modelling was applied to analyse the influence of idiosyncratic and macroeconomic factors on consumer economic sentiment in the Lubelskie region between the second quarter of 2001 and the first quarter of 2006.

2. Lubelskie region

The Lubelskie region (voivodeship) is located in the south-eastern part of Poland and borders on Belarus and Ukraine. The region is spread over the area of 25114 sq km with the population of 2181000. It is the most sparsely populated and the least urbanised region countrywide. There are on average 87 people per sq km (122/km² for the country). Cities of the region are inhabited by only 47% of all the residents. It is an

⁵⁴ A wide biography of this trend in research and interesting results from investigations of empirical validity of consumer sentiment indices for anticipating economic activity over a period of quarterly data of about thirty years, from the beginning of the 1970s to 2002, can be found in: Roberto Golinelli and Giuseppe Parigi, (2004).

⁵⁵ An example can be found in: N. S. Souleles, (2001).

agricultural region where traditional and prolifically slow industries prevail (food processing, timber, fertilizer production, hard coal output and metal industries). The region's migration balance is negative. People living on agriculture double the average number for Poland. There are also plenty of people (more than average for the country) who live on pensions.

The Lubelskie region is least developed region on NUTS2 level in European Union. In 2003 the GDP per capita for the region was as large as 32% of the EU average⁵⁶ and 70,3% of the average for Poland.

The region displays far worse macroeconomic indicators than the country average. Industry and building efficiency is one third lower than the Polish average and monthly salaries in basic sectors of the economy are lowered by 15% in comparison with the national average.

The economic situation, social and occupational structures are likely to have a significant impact on consumer economic sentiments in the region.

3. Data sources

Data on consumer economic sentiment from the Lubelskie region came from quarterly personal – in-home interviews, which had been conducted every quarter since the second quarter of 2001⁵⁷. Each interview surveyed 350 households⁵⁸.

Households from 22 out of 24 poviats (counties) participated in the survey. The questionnaire consisted of two parts – diagnoses and forecast. In the diagnoses part there were questions concerning consumers' financial situation, expenditures on consumer goods, savings, and opinions about the economic condition of the Lubelskie region and its labour market in the last quarter. Forecast questions related to the same indicators in the next quarter.

The results were calculated and applied in two ways:

First the economic condition test⁵⁹ was carried out to determine the economic sentiment index. The index is an average of balances between positive and negative answers given to every single question. The index assumes values ranging from –100

⁵⁶ Eurostat news release 63/2006, 18 May 2006, Eurostat Press Office, <http://eurostat.cec.eu.int>.

⁵⁷ To the end of 2004 the research project was financed only by the College of Management and Public Administration in Zamość. Since the beginning of 2005 it has been co-financed from the budget of the project *Unemployment Prevention System in the Underdeveloped Areas Stimulating the Competitive Capacity of the SME Sector* which is carried out within the EQUAL Program.

⁵⁸ Within the Project a survey of entrepreneurs is also carried out.

⁵⁹ Business Tendency Surveys-A Handbook, (2003).

to 100. Values below 0 indicate that pessimistic economic sentiment prevails, whereas values above zero show optimistic trends. Between the second quarter of 2001 and the first quarter of 2006 this test was applied to 20 surveys. Approximately 7000 responses have been collected so far.

Secondly, survey results provide substantial data that help estimate consumer individual diagnosis and forecast indices in the upcoming quarters. For every question respondents chose from three possible answers: situation deteriorated (value -1); situation has not changed (value 0); situation improved (value +1). Diagnosis responses allow determining diagnostic index of individual consumer economic sentiment, whereas forecast responses facilitate in the calculation of the prognostic index for economic sentiment. Consequently, index values range between -4 and 4. These values are used in determining artificial explanatory variables:

$D_{it} = 0$ if diagnostic economic sentiment index for i th consumer in quarter t reaches negative value and 1 otherwise.

$P_{it} = 0$ if prognostic economic sentiment index for i th consumer in quarter t reaches negative value and 1 otherwise.

Cases which resulted in 0 index values are not included in further research.

Economic sentiment surveys have also allowed to collect idiosyncratic variables data on individual consumers (income per capita in a household, average number of people in a household). Quarterly values of basic macroeconomic indices, which describe social and economic conditions of a voivodship in the period between the second quarter of 2001 and the first quarter of 2006, are derived from national statistical resources.

4. The concept of micro – macro models of consumer economic sentiment

Most contemporary economic research is dominated by the division into microeconomics and macroeconomics. As a result, most available economic models have either a microeconomic or a macroeconomic focus (Herault N., 2005, p.1). The economic reality, however, is the result of the permeation of microeconomic and macroeconomic phenomena. Therefore, a proper description of many economic phenomena requires a combination of micro- and macro- models. The consumer economic sentiment which depends on both consumer individual characteristics and macroeconomic factors is an example of such phenomenon.

The concept of linking micro and macro models can be implemented with various degrees of complexity depending on the type of established interaction [Baekgaard H., 1995, p.1]. Generally the feedback can go in both directions but the most common form of linkage goes from macro to micro.

This approach applies to examination of social and economic phenomena. Using micro – macro logit models, the crucial role of educational qualifications for a successful labour market entry in twelve European countries in mid – 1990 has been proven (Gangal M., 2000). The “micro – macro logit models” concept was applied by Bernd Hayo (1999) to valuation of the micro and macro determinants of public support for market reforms in Eastern Europe. The concept was introduced into dynamic microsimulation models of the Australian population (DANAMOD) which enabled an investigation into effects of governmental policy relating to individuals (students, unemployed and others) (Robinson M., H. Baekgaard, 2002). Micro – macro models helped analyse reasons for bankruptcy of Swedish companies in the nineties as well (Jacobson K.C.T., J.L.K. Roszbach, 2004). Papers by Hans Baekgaard (1995) and Nicolas Herault (2005) provide examples of applications micro – macro models to the valuation of labour market.

There are increasingly many papers on the application of logit models to the valuation of individual consumer decisions. Richard T. Curtin’s work (2000) is characteristic of this trend of investigations. The author presents binary logit models of the purchase plan of Russian consumers where the value of consumer sentiment index is one of the explanatory variables which has positive and significant impact on dependent variable. These models, however, have only microeconomic character and they do not include macroeconomic variables.

In this paper the relations between consumer economic sentiment ($D_{it}(P_{it})$ variable) and idiosyncratic and macroeconomic variables were modelled with the use of the micro – macro logit models in the following manner⁶⁰

$$\text{Logit}\{D_{it}(P_{it})\} = \ln \frac{P_{it}}{1 - P_{it}} = \alpha_0 + \alpha_1 t + \sum_{j=1}^k \beta_j Z_{ijt} + \sum_{l=1}^m \gamma_l X_{lit} + \delta U + \sum_{p=1}^r \lambda_p Q_p + \varepsilon_{it}, \quad (1)$$

where:

Z_{ijt} – j th independent idiosyncratic variable describing individual features of i th consumer in quarter t ,

⁶⁰ Author prepared methodology with the help of M. Gruszczyński (2002) book.

X_{it} – i th independent macroeconomic variable describing a chosen macroeconomic index in quarter t ,

U – a dummy variable describing the accession shock phenomenon, assuming the value of 1 in I, II and III quarters of 2004, and 0 in all other quarters,

Q_p – dummy seasonal variable assuming the value 1 in quarter p , and 0 in other quarters,

ε_{it} – random disturbance,

t – the quarter number, $t = 1, 2, \dots, 20$.

The models were built according to the idea: “from general to specific modelling”. It means that at the beginning the model with all “potential” explanatory variables was built and two features were checked: significance of parameters (with 5 percent significance level) and coincidence of parameters.

The coincidence rule is (Hellwig Z., 1976)

$$\text{sign}r_j = \text{sign}a_j, \quad (2)$$

where:

r_j – correlation coefficient between dependent variable and j th independent variable

a_j – parameter of j th independent variable.

If all parameters are significant and coincident the procedure is finished and the variables which are in the model are defined as explanatory. If any parameter is insignificant or does not observe the coincidence rule the corresponding variable is removed from the model and the model is estimated again. The procedure of removing always commences with coincidence parameters. In the case of several insignificant parameters the model drops a variable parameter with the lowest absolute value of t – Student statistic. The procedure is continued until a model with all significant and coincident parameters is built.

The maximum likelihood method was applied for estimation of structural parameters of specified logit models (Greene W. H., 2003, pp. 468 – 524). The likelihood function was maximized with the quasi – Newton method.

The significance of parameters was estimated with the asymptotic t – Student test. To estimate the impact of all explanatory variables on binary response the likelihood – ratio test based on *chi*-squared distribution with the degree of freedom equal to the number of explanatory variables was applied (Greene W.H., 2003, p. 678). As a measure of goodness of fit the likelihood ratio index called McFadden (pseudo) R – squared was used (McFadden D., 1974). Additionally the goodness of fit was valued

by the percentage of correctly classified respondents (count R – squared) (Maddala G.S., 1992). The odds ratio was also computed (Agresti A., 1996, p. 20).

Estimated values of β parameters carry information about the direction and force of the impact of idiosyncratic variables (factors) on the changes of consumer economic sentiment index, while estimated values of γ parameters carry information about the direction and force of the impact of macroeconomic variables (factors). δ parameter reports on the influence of accession shock on consumer economic sentiment index, while λ parameters indicate seasonality of the consumer economic sentiment.

The estimated logit model allows for the calculation of the probability that $D=1$ or $P=1$ (improvement of consumer sentiment index). When interpreting estimated logit models one can use the following equation (Gruszczyński M., 2002, p. 60)

$$\frac{\partial \hat{P}}{\partial X_i} : \frac{\partial \hat{P}}{\partial X_j} = \frac{a_i}{a_j}. \quad (3)$$

This means that although the derivative of probability with respect to a specific explanatory variable is a function of all explanatory variables, the ratio between the derivatives depends only on the values of these parameters. The ratio between the parameters of variables X_i and X_j denotes how much larger the probability reaction \hat{P} to a unit increase in the variable X_i is when compared to the reaction of the probability \hat{P} to a unit increase in the variable X_j .

Estimated models were used to simulate probability of improvement of consumer economic sentiment in the Lubelskie region.

5. Micro – macro models of consumer economic sentiment in the Lubelskie region

In the analysed period pessimistic sentiment prevailed among consumers. Only in the second and third quarters of 2004 more than half of the respondents declared improvement of their economic sentiments. Increasing tendency in positive moods may have resulted from accession shock in the period right before and after Polish accession to the EU. It was also worth to emphasize that by the end of 2005 there reappeared a long-term improvement in the sentiments in the region.

5.1. Models of diagnostic consumer economic sentiment

5.1.1 Model variables specification

Two idiosyncratic variables, thirteen macroeconomic variables and artificial variables describing accession shock phenomenon and sentiment seasonality were taken into account to estimate diagnostic consumer economic sentiment fluctuations.

Table 1 Results of t tests for independent samples by groups

	Variable	Average 0	Average 1	t statistic	p value
Z ₁	Average number of persons in surveyed household	3,57	3,21	10,15	0,0000
Z ₂	Income per capita in surveyed household	2,80	3,72	-31,08	0,0000
t	The number of quarter	9,54	10,95	-8,31	0,0000
X ₁	Changes in the number of employed persons in enterprise sector ⁶¹ at the end of the quarter (previous quarter = 100) in %	-0,79	-0,31	-8,39	0,0000
X ₂	Changes in the number of registered unemployed persons at the end of the quarter (previous quarter = 100) in %	0,16	-0,36	3,78	0,0002
X ₃	The number of job offers within the quarter (in thousands)	8,79	9,26	-6,86	0,0000
X ₄	Changes in the number of job offers per 1000 unemployed at the end of the quarter (previous quarter = 100) in %	32,48	44,88	-4,67	0,0000
X ₅	Average monthly gross wages and salaries in the enterprise sector during the quarter in thousands PLN	1,93	1,94	-5,79	0,0000
X ₆	Quarterly retail sales in enterprise sector in bn PLN (current prices)	1,50	1,52	-4,87	0,0000
X ₇	Quarterly sold production of industry in bn zł (current prices)	3,52	3,62	-7,93	0,0000
X ₈	Quarterly sales of construction and assembly production in bn PLN (current prices)	0,42	0,40	3,60	0,0003
X ₉	Investments within the quarter in bn PLN (current prices)	0,33	0,33	1,39	0,1659
X ₁₀	Changes in the number of dwellings completed within the quarter (previous quarter = 100) in %	10,54	7,90	1,91	0,0563
X ₁₁	The number of dwellings with legal construction permits within the quarter in thousands	1,09	1,12	-2,10	0,0356
X ₁₂	The rate of interest for three year consumer credits in %	18,04	17,43	8,66	0,0000
X ₁₃	Consumer discomfort index (total of the rates of inflation and unemployment) in % ⁶²	21,18	20,98	3,96	0,0001

⁶¹ According to Polish Classification of Activities (PKD) enterprise sector includes units which carry out economic activities in the following areas: forestry, mining and quarrying, manufacturing, construction, wholesale and retail trade, hotels and restaurants, transport, storage and communication, real estate activities, computer and related activities, collection and treatment of sewage and of other waste recreational, cultural and sporting activities and other service activities.

	Variable	Average 0	Average 1	t statistic	p value
U	Accession shock	0.11	0.20	-8.34	0.0000
Q ₁	Dummy seasonal variable taking value 1 in the first quarters and value 0 in other quarters	0.23	0.26	-2.42	0.0157
Q ₂	Dummy seasonal variable taking value 1 in the second quarter and value 0 in other quarters	0.25	0.26	-0.77	0.4438
Q ₃	Dummy seasonal variable taking value 1 in the third quarter and value 0 in other quarters	0.26	0.26	-0.38	0.7036
Q ₄	Dummy seasonal variable taking value 1 in forth quarters and value 0 in other quarters	0.27	0.22	3.55	0.0004

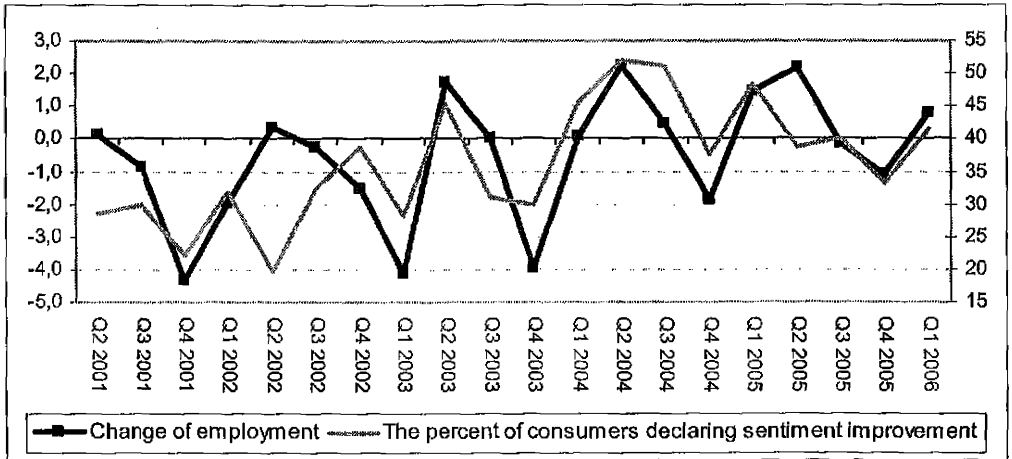
The results of t-Student tests of average differences proved that it is idiosyncratic variables that best diversify economic sentiment in the Lubelskie region. Consumers of less populated households with higher incomes expressed much better sentiments. 11 out of 13 macroeconomic variables considerably diversify, in a statistical sense, consumer economic sentiment. Average differences in 10 cases meet the expectations. Improvement of consumer sentiment depends on positive labour market changes (increase in job offers, unemployment drop, rise of average monthly salaries), intensification of company activity (industrial production growth and sales growth in enterprise sector), as well as lower interest rates for consumer credits and inflation. The impact of construction, however, does not meet the expectations. Average value of sales of construction and assembly production is higher for pessimistic than optimistic sentiments, which is clearly counter-intuitive.

Macroeconomic relations reinforce the above observations. Correlation indicators between respondents expressing improvement of the sentiment in particular quarters and macroeconomic variable values are mostly congruous with what was expected.

The correlation indicator between the percent of respondents showing improved sentiment in comparison with the previous quarter and dynamics of the number of employed in the enterprise sector at the end of the quarter (previous quarter = 100) is 0.617.

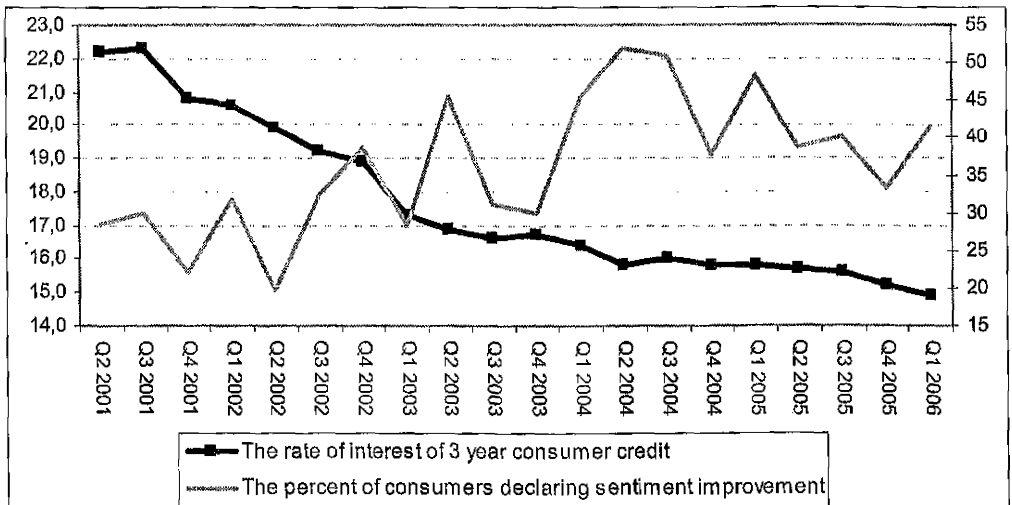
⁶² The concept of consumer discomfort index was proposed by A.M. Okun (1962).

Figure 1 Correlation between the percentage of consumers declaring improvement of economic sentiment and the changes in the number of the employed in enterprise sector at the end of the quarter (previous quarter = 100) in % in the period from the second quarter 2001 to first quarter 2006



Correlation coefficient between the percentage of respondents showing improved economic sentiment in comparison with the previous quarter and the 3-year interest rate of consumer credits is 0.639.

Figure 2 Correlation between the percentage of the consumers declaring improvement of economic sentiment and the rate of interest for three year consumer credits in % in the period from the second quarter 2001 to first quarter 2006



5.1.2 *Micro-macro models of diagnostic consumer economic sentiment*

Estimated micro-macro logit models confirm the impact of both factor groups (idiosyncratic and macroeconomic) on diagnostic consumer economic sentiment.

The IA model (see Table 2) has all statistically significant parameters and pseudo R^2 that stands at 0.1492. The IA model was construed with two idiosyncratic variables, a trend and an artificial variable which reflects accession shock phenomenon. The average accuracy that this model allows is 71.66%. Economic sentiment improvement in the analysed period was confirmed by a positive and statistically significant value of the trend parameter. Positive and statistically significant value of δ parameter denotes that the periods immediately preceding and following Polish EU accession made consumer economic sentiments in the Lubelskie region undoubtedly better (Kowerski M., 2005). The results seem surprising as people in the Lubelskie region were the least EU supportive in the country's referendum.

To improve estimated models the idiosyncratic variables need to be completed by macroeconomic variables.

Models IB and ID turn out most effective if pseudo R^2 coefficient is assumed as a criterion. In an analysis to come the focus will be on the IB model as it reaches slightly higher count R^2 value (71.82%). Besides idiosyncratic variables (Z_1, Z_2), the description of IB model also comprises the following macroeconomic variables:

- dynamics of the number of the employed in enterprise sector (X_1) – positive,
- dynamics of the number of job offers per 1000 registered unemployed (X_4) – positive,
- interest rates of 3-year consumer credits (X_{12}) – negative.

Accession shock phenomenon, which features in the model as a statistically significant and positive parameter value with U variable, was also confirmed. IB model proves as well that economic sentiment improvement probability largely depends on individual consumer income.

The model as a whole is statistically significant, which becomes evident from Wald's statistically significant statistics χ^2 . A relatively low value of pseudo R^2 is typical for models based on large sets of microdata. A low value of pseudo R^2 does not make it insignificant and does not exclude the model from the list of proper conclusion-drawing tools (Gruszczyński M., 2002, p. 55).

IB model was additionally used to simulate changes in the growth of economic sentiment probability. The explanatory variables were divided into three groups:

- idiosyncratic variables (Z_1, Z_2),

Table 2 Micro – macro model estimation results of the diagnostic economic sentiment index (n = 5035)

Variable	Model IA		Model IB		Model IC		Model ID		Model IE		Model IF		Model IG		Model IH	
	coefficient	p-value	coefficient	p-value	coefficient	p-value	coefficient	p-value	coefficient	p-value	coefficient	p-value	coefficient	p-value	coefficient	p-value
Constant	-3.6234	0.0000	-2.1514	0.0000	-2.1176	0.0000	-2.2489	0.0000	-2.0492	0.0000	-4.8100	0.0000	-4.0756	0.0000	-3.9215	0.0000
Z ₁	-0.0615	0.0302	-0.0607	0.0337	-0.0627	0.0277	-0.0612	0.0316	-0.0593	0.0317	-0.0633	0.0261	-0.0632	0.0268	-0.0633	0.0264
Z ₂	0.8660	0.0000	0.8801	0.0000	0.8825	0.0000	0.8787	0.0000	0.8874	0.0000	0.8740	0.0000	0.8748	0.0000	0.8741	0.0000
I	0.0306	0.0000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
X ₁	-	-	0.0799	0.0000	0.0792	0.0001	0.0966	0.0000	-	-	0.1117	0.0000	0.1086	0.0000	0.11078	0.0000
X ₂	-	-	-	-	-	-	-	-	-0.0257	0.0004	-	-	-	-	-	-
X ₃	-	-	0.0008	0.0485	0.0009	0.0170	-	-	0.0013	0.0006	-	-	-	-	-	-
X ₄	-	-	-	-	-	-	-	-	-	-	0.7745	0.0317	-	-	-	-
X ₅	-	-	-	-	-	-	-	-	-	-	-	-	0.4987	0.0415	-	-
X ₆	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1735	0.0376
X ₇	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
X ₈	-	-	-0.0654	0.0000	-	-	-0.0597	0.0000	-0.0767	0.0000	-	-	-	-	-	-
X ₉	-	-	-	-	-0.0579	0.0048	-	-	-	-	-	-	-	-	-	-
U	0.6787	0.0000	0.4591	0.0000	0.5966	0.0000	0.4739	0.0000	0.4765	0.0000	0.5290	0.0000	0.5378	0.0000	0.4995	0.0000
Q _t	-	-	-	-	-	-	0.1593	0.0428	-	-	0.2639	0.0009	0.2947	0.0005	0.2373	0.0021
Chi-squared statistics	971.11	0.0000	1014.64	0.0000	1003.00	0.0000	1014.84	0.0000	1010.20	0.0000	1003.82	0.0000	1003.35	0.0000	1003.50	0.0000
Pseudo R ²	0.1492	-	0.1546	-	0.1528	-	0.1546	-	0.1529	-	0.1529	-	0.1529	-	0.1529	-
Odds-ratio	5.292	-	5.367	-	5.503	-	5.328	-	5.342	-	5.433	-	5.303	-	5.60	-
Count R ² (%)	71.66	-	71.82	-	72.08	-	71.80	-	71.80	-	71.84	-	71.60	-	72.06	-

- macroeconomic variables (X_1, X_4, X_{12}),
- variable describing accession shock (U).

Table 3 The probability of improvement of diagnostic economic sentiment depending on the values of independent variables calculated on IB model

Idiosyncratic Variables	Macroeconomic Variables	Accession Shock	Variables combination	Probability of economic sentiment improvement
Best	Best	Yes	BBS	0.8841
	Average		BAS	0.8118
	Worst		BWS	0.6863
Best	Best	No	BB	0.8282
	Average		BA	0.7315
	Worst		BW	0.5802
Average	Best	Yes	ABS	0.5591
	Average		AAS	0.4174
	Worst		AWS	0.2666
Average	Best	No	AB	0.4448
	Average		AA	0.3117
	Worst		AW	0.1868
Worst	Best	Yes	WBS	0.1505
	Average		WAS	0.0910
	Worst		WWS	0.0483
Worst	Best	No	WB	0.1007
	Average		WA	0.0595
	Worst		WW	0.0311

The highest⁶³, average and lowest⁶⁴ values were calculated for each variable group. This created 18 combinations of variable groups. The best combination (BBS) includes the highest values of idiosyncratic and macroeconomic variables in the accession shock time. The worst combination (WW) includes the lowest values of idiosyncratic and macroeconomic variables out of the accession shock time. Including specified variables combinations in IB model the probabilities of improvement of economic sentiment were calculated. Consumers with the highest values of idiosyncratic variables (with the highest incomes and from one-person households) during accession

⁶³ Highest values in case of stimuli variable and lowest value in the case of distimuli variable.

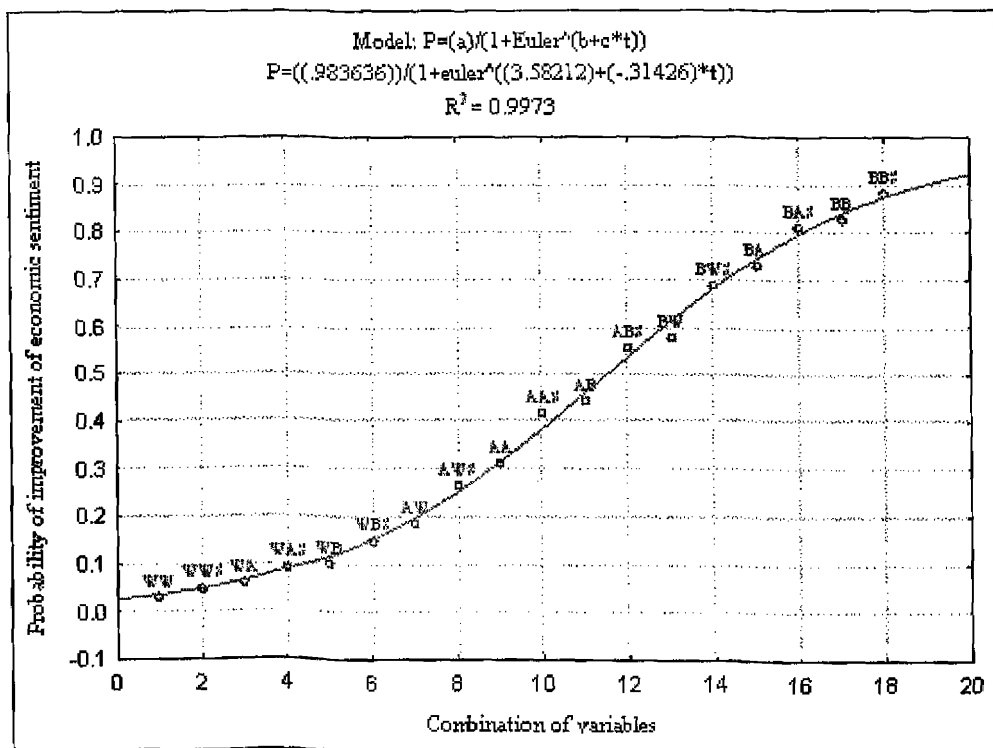
⁶⁴ Lowest values in case of stimuli variable and highest value in the case of distimuli variable.

shock period, when macroeconomic variables are biggest, face the greatest probability of economic sentiment improvement.

For consumers who happen to have BBS combination probability of economic sentiment improvement stands at 0.884. As a result, 88 out of 100 consumers are expected to express improvement. On the other hand, consumers with the lowest values of idiosyncratic variables (with the lowest incomes and from the biggest households) outside accession shock period, when macroeconomic variables are worst, face lowest probability of economic sentiment improvement. Only 3 out of 100 consumers who happen to have WW combination are expected to express improvement.

Variable combinations that were arrived at were put in a series with increasing probability of sentiment improvement and logistic curve was approximated.

Figure 3 The probability of improvement of diagnostic economic sentiment depending on the values of the combination of idiosyncratic and macroeconomic variables



The results fully confirm the logistic nature of probability of sentiment improvement changes. Every parameter is statistically significant and the model provides 99.7% accuracy of probability of economic sentiment improvement.

At the same time, the importance of idiosyncratic variables emerges. Regardless of macroeconomic condition and the time, the probability of economic sentiment improvement for consumers with best individual situation exceeds 0.58.

When macroeconomic variables values shift from lowest to highest regardless of idiosyncratic variable values, the increase in probability of economic sentiment improvement does not exceed 0.2925.

Table 4 The increase in probability of improvement of diagnostic economic sentiment if macroeconomic variables values shift from the worst to the best

Idiosyncratic Variables	Accession Shock	Increase in probability of economic sentiment improvement
Best	Yes	0.1979
	No	0.2480
Average	Yes	0.2925
	No	0.2580
Worst	Yes	0.1022
	No	0.0696

However, when idiosyncratic variables values shift from lowest to highest regardless of macroeconomic variables values, the increase in probability of economic sentiment improvement is not less than 0.549. It proves again that idiosyncratic variables affect economic sentiment changes to a greater extent than macroeconomic variables.

When count R^2 is adopted as a criterion, IC model, in which X_{12} variable was replaced by X_{13} - consumer discomfort index, turns out best (accuracy 72.08%). A negative parameter value for X_{13} variable indicates that the greater consumer discomfort (measured by unemployment and inflation rates), the worse their economic sentiment is.

IE model further displays how other macroeconomic variables affect diagnostic index of economic sentiment. The dynamics of the number of the unemployed in the last quarter (X_2) has negative impact and the number of job offers per 1000 unemployed (X_4) has positive impact. IB model does not comprise X_2 variable as it is

found to be strongly correlated with X_1 variable. IE model seems to be an alternative way to describe the same phenomenon.

Table 5 The increase in probability of improvement of diagnostic economic sentiment if idiosyncratic variables shift from the worst to the best

Macroeconomic Variables	Accession Shock	Increase in probability of improvement of economic sentiment
Best	Yes	0.7336
	No	0.7276
Average	Yes	0.7208
	No	0.6720
Worst	Yes	0.6380
	No	0.5491

Among many explanatory variables models IF, IG, and IH contained average quarterly gross wages and salaries in the enterprise (X_5), quarterly retail sales in enterprise sector (X_6), and quarterly sold production of industry (X_7) in the last quarter. All that only supports findings recorded for models presented above, which highlighted profound impact on the social and economic situation in the region on diagnostic consumer economic sentiment.

Explanatory variables in models ID, IF, IG, and IG was accompanied by a seasonal variable Q_1 , which assumed value 1 during first quarters and value 0 in the others, and that signalled seasonal improvement of economic sentiment in the first quarters.

5.2. Models of prognostic consumer economic sentiment

Procedures for analysing the influence of idiosyncratic and macroeconomic factors on consumer diagnostic economic sentiment were also applied to the modelling of prognostic economic sentiment for consumers from the Lubelskie region. It means that this time P_t is the dependent variable.

The set of potential explanatory variables was expanded with one more idiosyncratic variable: Z_3 – the consumer diagnostic economic sentiment index. Z_3 values are calculated as the sum of answers to diagnostic questions and they range between - 4 and 4.

Also, idiosyncratic variables turned out statistically crucial for prognostic economic sentiment. The smaller the household and the higher the income are, the more optimism consumers express. Respondents are markedly diversified by Z_3 variable. The better diagnostics sentiments for the last quarter were registered, the better prognostic sentiments were observed. 10 out of 13 macroeconomic variables show that the present economic situation has a statistically significant input in diversifying consumer prognostic economic sentiments.

Five models with the best formal qualities were selected using a method similar to the one for diagnostic sentiments models (see Table 3). Each model had idiosyncratic variables describing consumer income status (Z_2) and their diagnostic sentiments (Z_3). The best prognostic models had no variable describing the accession shock. Pseudo R^2 and count R^2 assumed highest values in IIC model, in which two idiosyncratic variables were accompanied by a macroeconomic value X_5 – average monthly wages. The model is complemented with the seasonal variable Q_1 . Model IIC shows that optimistic forecasts from quarter t for quarter $t+1$ depend on income status of a household, respondents good ratings of their economic condition in quarter t , and how much their wages went up in quarter t . Forecasts prepared in first quarters for second quarters displayed additional seasonal optimism which is indicated by positive value of λ_1 .

Model IIC was employed in simulating probability changes regarding improvement of forecasted economic sentiments depending on value changes of particular groups of explanatory variables: idiosyncratic variables (Z_2 , Z_3), macroeconomic variable (X_5) and seasonal variable (Q_1)⁶⁵.

Similarly to the diagnostic model (IB) it resulted in estimating a logistic curve which describes a dependence on the improvement of prognostic sentiment probability for the combination of selected variables. This curve adjustment is extremely high reaching 99.2%.

The model shows how strongly idiosyncratic factors influence prognostic economic sentiments, which applies particularly to consumers with the best and worst idiosyncratic variable values. Such cases prove that the improvement of macroeconomic variables from the worst to the best only slightly increases the probability of prognostic sentiment improvement (from 0.013 to 0.031). The probability rises when macroeconomic variables shift from the best to the worst for respondents with average idiosyncratic variable values from 0.224 to 0.239.

⁶⁵ As in analysis of diagnostic economic sentiments the combinations of the best, average and worst values of variables were specified.

Table 6 Micro – macro model estimation results of the prognostic economic sentiment index (n = 4885)

Variable	Model IIA		Model IIB		Model IIC		Model IID		Model IIE	
	coefficient	p-value	coefficient	p-value	coefficient	p-value	coefficient	p-value	coefficient	p-value
Constant	-1.5009	0.0000	-0.4632	0.0000	-6.6476	0.0000	-3.1738	0.0000	-3.2005	0.0000
Z ₂	0.34700	0.0000	0.3511	0.0000	0.3440	0.0000	0.3442	0.0000	0.3487	0.0000
Z ₃	0.7983	0.0000	0.7945	0.0000	0.7998	0.0000	0.8019	0.0000	0.7944	0.0000
t	0.0347	0.0000	-	-	-	-	-	-	-	-
X ₁	-	-	0.0599	0.0203	-	-	-	-	-	-
X ₅	-	-	-	-	2.7778	0.0000	-	-	-	-
X ₆	-	-	-	-	-	-	1.3139	0.0000	-	-
X ₇	-	-	-	-	-	-	-	-	0.5439	0.0000
X ₁₂	-	-	-0.0347	0.0415	-	-	-	-	-	-
Q ₁	0.2780	0.0017	0.2730	0.0022	0.5862	0.0000	0.5407	0.0000	0.4801	0.0000
Q ₂	-0.2266	0.0141	-0.4231	0.0003	-	-	-0.2714	0.0031	-	-
Chi-squared statistics	2020.85	0.0000	2007.76	0.0000	2033.27	0.0000	2015.95	0.0000	2023.39	0.0000
Pseudo R ²	0.3050		0.3030		0.3069		0.3043		0.3054	
Odds-ratio	14.009		13.165		13.997		13.833		13.949	
Count R ² (%)	79.18		78.75		79.20		79.18		79.20	

When idiosyncratic and macroeconomic variables assume maximum or minimum values the increase in probability of prognostic sentiment improvement in the first quarter seems slim in contrast with other quarters. Probability rises slightly when idiosyncratic variable values are average and range from 0.128 to 0.143, depending on the macroeconomic situation.

Improvement of idiosyncratic variable values from the worst to the best looks totally different. Therefore, the improvement probability of prognostic economic sentiment rises from 0,942 to 0,960 depending on the macroeconomic situation and the season. This confirms the theory that it is idiosyncratic factors, particularly former consumer economic sentiments, that determine expectations.

Conclusion

Modelling results presented in this paper support the thesis that diagnostic and prognostic consumer economic sentiment in the Lubelskie region depends not only on individual features of respondents (household income per capita, average number of people in a consumer household, diagnostic economic sentiment index) but is also influenced by labour market conditions in the region (increases in the number of jobs, increases in the number of job offers, decreases in the number of registered unemployed persons, increases in wages), changes in economic activities (value of enterprises sales and industrial production) as well as changes in the cost of living (interest rate of consumer credits, distress index). Also the Polish accession to EU had a positive influence on the economic sentiment of the citizens of the region.

References

- Agresti, A., (1996), *An Introduction to Categorical Data Analysis*, John Wiley & Sons, Inc., New York.
- Baekgaard, H., (1995), *Integrating Micro and Macro Models: Mutual Benefits*, Conference Paper CP1995_10, National Centre for Social and Economic Modelling (NATSEM), University of Canberra.
- Business Tendency Surveys - A Handbook, (2003), Source OECD, Transition Economies, No. 8.
- Curtin, R.T., (2000), *The Structure of Consumer Confidence: Comparisons Between the United States and Russia*, Papers of 25th CIRET Conference, Paris, www.ciret.com.
- Gangal, M., (2000), *Education and Labour Market Entry Across Europe: The Impact of Institutional Arrangements in Training Systems and Labour Markets*, Working papers, No. 25, Mannheimer Zentrum für Europäische Sozialforschung.
- Golinelli, R., and G. Parigi, (2004), Consumer Sentiment and Economic Activity: A Cross Country Comparison, *Journal of Cycle Measurement and Analysis*, Vol. 1, No. 2.
- Greene, W. H., (2003), *Econometric Analysis*, Fifth Edition, Prentice Hall, New Jersey, pp. 468-524.

- Gruszczyński, M., (2002), *Modele i prognozy zmiennych jakościowych w finansach i bankowości*, (Models and Forecasts of Quality Variables in Finances and Banking) SGH, Warszawa.
- Hayo, B., (1999), *Micro and Macro Determinants of Public Support for Market Reforms in Eastern Europe*, Working Paper B25, Zentrum für Europäische Integrationsforschung, Rheinische Friedrich-Wilhelms- Universität Bonn.
- Hellwig, Z., (1976), Przechodniość relacji skorelowania zmiennych losowych i płynące stąd wnioski ekonometryczne (Correlation Transitivity Among Random Variables and Resulting Econometric Conclusions), *Przegląd Statystyczny*, No. 1.
- Herauld, N., (2005), A Micro – Macro Model for South Africa: Building and Linking a Microsimulation to a CGE Model, *Melbourne Institute Working Paper Series*, Working Paper, No. 16, Melbourne Institute of Applied Economic and Social Research.
- Jacobson, K. C. T. and J. L. K Roszbach, (2004), *Exploring relationships between Firms' Balance Sheets and the Macro Economy*, Research Department, Sveriges Riksbank, 10337 Stockholm, www.atlres.com./finansconference/jacobson.
- Kowerski, M., (2005), Wpływ przystąpienia Polski do Unii Europejskiej na nastroje gospodarcze w województwie lubelskim (Influence of Polish EU Accession on Economic Sentiments in Lubelskie Voivodeship), *Gospodarka Narodowa*, No. 7-8.
- Maddala, G. S., (1992), *Introduction to econometrics*, 2nd ed., Macmillan, New York.
- McFadden, D., (1974), Conditional logit analysis of qualitative choice behaviour, in: Zarembka P., *Frontiers in econometrics*, (Ed.), Academic Press, New York.
- Okun, A.M., (1962), Potential GNP: Its Measurement and Significance, Proceedings, *Business and Economics Statistics Section of the American Statistical Association*.
- Robinson, M. and H. Baegaard, (2002), *Modelling Students in DYNAMOD-2*, Technical Paper no. 23, National Centre for Social and Economic Modelling (NATSEM), University of Canberra.
- Souleles, N. S., (2001), *Consumer Sentiment: Its Rationality and Usefulness in Forecasting Expenditure*, Evidence from the Michigan Micro Data, NBER Working Paper, 8410.
- The Joint Harmonised EU Programme of Business and Consumer Surveys User Guide*, (2004), European Commission, Directorate General Economic and Financial Affairs, Brussels.