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Using Business Tendency Surveys for Short-term Forecasting of Macro-categories. An Econometric Approach

Abstract

The problem stated in this paper is whether the incorporation of qualitative data into the econometric model improves short-term forecasts.

The key assumption is that qualitative data reflects rational expectations, hence it broadens the category of a business entity to a substantial extent. Microeconomic decisions, which automatically absorb any events, decisions, and other phenomena in the economic environment, are expressed in time series derived from business survey data. Therefore, we can assume that business survey data combined with econometric instruments will have a certain added value, particularly if selected quantitative and qualitative variables are merged. This should make macroeconomic diagnosis and forecasting both quicker and better.

The purpose of the empirical research is the evaluation of the predictive capabilities of the qualitative business survey data. The data set comprises time series of 15 variables from monthly business surveys and 21 time series of macroeconomic indicators published by the Central Statistical Office for the period 1995Q1 to 2005Q4. The applied econometric procedures shed light on the significant causal relations between qualitative and quantitative variables. Presented economic procedure is an essential preliminary condition for improvement of efficiency for forecasting of the main macroeconomic variables.

Key Words: Granger causality, Stationarity of qualitative and quantitative time series, Predictive value of qualitative indicators
JEL Classification: C10, O50, D00, E30

1. Introduction - Theoretical approach

The contemporary macroeconomics refers to the microeconomic basis more and more frequently.

The microeconomic basis is here understood as decisions made by individual business entities which operate in certain economic environment and have defined access to information.

Irrespective of the model and the way of interpretation of fluctuations of the real product, the issue of expectation is always taken into account. Different schools of macroeconomics have represented different perceptions of the role of expectation in the theories of macroeconomic fluctuations. Initially, expectations are treated as a source of fluctuation and also the impulse-propagation mechanism taken into account. Therefore, there is a sufficient assumption for including microeconomic basis into macroeconomic models. Typically, it is assumed that business entities make their decisions based on measurable and observed behaviour of other market participants.

In fact, expectations also play an important role (Muth 1961, pp. 315-335, Lucas 1972, pp. 103-124). This leads us to the conclusion that econometric models including the rational expectations of the business entities, identified on the microeconomic level should provide a better explanation of the cyclical product fluctuations. This can form the basis for arriving at short-term forecasting. In this context one should put forward the hypothesis that inclusion of expectation formulated at the microeconomic level improves macroeconomic forecasts and integrates both levels of economic analysis. Such integrated research may also inspire modifications of the theories.

Qualitative data from the business surveys are highly useful to measure the categories which cannot be measured by their nature. Indicators from business surveys fulfil certain conditions: firstly, they relate to representative business entities; secondly, survey responses are formulated with incomplete information assumed; thirdly, the responses take into account expectations of the economic environment.

Last but no least, in their very nature they take into consideration the current micro and macroeconomic changes, including the decisions of the policy makers. In this sense then, a larger data set lies at the foundation of potential projections. Furthermore, integration of official statistics and business survey data should improve the obtained macroeconomic forecasts.

2. Empirical sources of short-term diagnosis and forecast in the context of business entities expectations

The assessment of current economic situation has always been a subject of economic research, whether its direct aim was to achieve guidelines for economic policy or building time series for the estimation of economic trends.
The growth of economic environment uncertainty and the number of information which had to be reflected in the increase of difficulty in economic forecasting. On the one hand, single business entities must take into account more information, coming from growing areas in which they function, on the other hand, uncertainty and risk and limited rationality of decision-taking can cause decisions not reflecting objective conditions of economy.

Hence, in modeling macroeconomic phenomena referring to the economic growth and fluctuations there is a need for such variables, which after being tested on microeconomic level should complete short-term forecasts, formulated basically on the basis of strictly quantitative data. The examples of such research are numerous, done in the whole world, like business or consumer survey. They are called „statistics without numbers", since they reflect only subjective feelings of business entities, concerning creation of chosen economic phenomena in the current period and near future. The method of business cycle test has a long history and tradition, which is due to methodology of business cycle theories, connected with psychological basis of consumers and producers behavior. The change of political system in Poland at the beginning of the 90s was a stimulus for sudden and unexpected appreciation of this method, due to the initial lack of European standards as far as quantitative statistics is concerned, and at the same time results of anti-inflationary shock therapy. Traditional quantitative statistics faced comparative and interpretational difficulties of transformational changes. This gap was perfectly filled with the economic tendency test method research, whose results were neutral to against changes of economic quantities, indicating only the direction of their changes.

With the stabilization of market economy and its institutions, the relations of usefulness between both types of statistics for diagnosing and forecasting economy were smoothened. However, one could notice quite separatist tendencies of official state statistics and business surveys. Quantitative statistics has undergone an enormous evolution, adjusting to European standards, especially after Poland's accession to the European Union. Qualitative statistics created new research areas, new methodological

approaches and to a large extent directed towards short-term economic forecasting and building leading indicators. Considerably long time series allowed for a new look, as far as merger of these two types of research is concerned[1]. The turning point was, from the point of view of quantitative statistics, the year 1995, when there was a shift to comparable international statistics. Taking into account the evolution of both approaches to measuring economic phenomena, and also parallel changes of views in macroeconomic theory leading towards merging phenomenon of economic fluctuations with economic growth and taking into account business entities expectations on microeconomic level, one can conclude that the integration of quantitative and qualitative statistics entered a new stage of development.

We hope that with some improvements the econometric procedure described in the next section could be of practical use when we want to integrate qualitative and quantitative information for economic forecasting.

3. Econometric procedure and empirical results

The purpose of the empirical research is the evaluation of the predictive capabilities of the qualitative business survey data. The data set comprises time series of 15 variables from monthly business surveys and 21 time series of macroeconomic indicators published by the Central Statistical Office for the period 1995Q1 to 2005Q4. For the purpose of correlation and causality analysis the time series were seasonally adjusted using the Demetra package.

At the preliminary stage, appropriate quantitative and qualitative pairs of variables which would be most suitable for the forecasting of Polish economy were chosen. It involved a procedure of selecting a set of quantitative and qualitative variables, and the making of a subjective decision identifying the potential economic interrelations. As a result, a potential list of time series under consideration is presented in Table A in Appendix.

The beginning of a new approach in empirical macroeconomics can be dated back to 1982 that is to the year, when the seminal paper by Nelson and Plosser was

[1] The new ideas about the interpretation of results and the use of economic cycle test method in diagnosing and forecasting Polish economy are published and presented at cyclical CIRET conferences by all research organisations dealing with this problem. Most of the works are continuously published in Prace and Materiały Instytutu Rozwoju Gospodarczego of Szkoła Główna Handlowa and in publications of Akademia Ekonomiczna in Poznań. The new medium on international level, which has been publised since 2004 is Journal of Business Cycle Measurement and Analysis, published in cooperation of CIRET and OECD.

published. Since then, it has become a standard practice to determine the order of integration for time series. As described by da Silva Lopes (da Silva Lopes, 2003, pp. 783-784), such an analysis can be viewed as useful for several purposes, e.g. for preliminary data description, as a guide to subsequent univariate and multivariate modelling and inference and forecasting purposes. This way of reasoning advised also by other researchers (see e.g. Evans, 2003, pp. 238-245) was followed in the presented research.

The adopted econometric procedure consists of the following stages:

- the log transformation of macroeconomic variables and calculation of first differences;
- seasonal adjustment of the series with the use of Demetra package;
- computation of cross-correlations with leads and lags up to 7 periods;
- evaluation of stochastic structure of the data generating processes;
- testing for block Granger non-causality based on 2-equation VAR model;
- for the I(0) variables in the case of Granger causality, calculation of two-period dynamic forecasts based on the VAR model and the measurement of forecasts accuracy.

In order to discover any relations between the macroeconomic variables considered crucial for the diagnosis and economy forecasting, the correlation between the quantitative and qualitative time series was calculated. The quantitative variables were defined as a difference of logarithms of original series. In step one, evaluation of the linear correlation between selected pairs of qualitative and quantitative variables with leads and lags up to 7 quarters, both unadjusted and seasonally adjusted was performed. For the variables demonstrating seasonality the correlation coefficients were calculated for original and seasonally adjusted series (letter A at the end of the variables' name). The time lags of the statistically significant correlation coefficients (at significance level $\alpha = 0.05$) are depicted in Table C in Appendix.

Only four of the analyzed series do not show seasonal pattern: foreign order-books (DZA), expected selling prices (PPI), general climate of the economic situation (NRBO) and the volume of total liabilities (NAL). The results of the linear correlation analysis indicate that in case of many variables significant correlations can be observed for various lag structure, the most striking one relating to employment (ZP, ZPP – ZAT) with lag structure from 0 to 5, inventory of finished products (ZAPPA – ZAPA) with lag structure 0 – 7, producer price development (PPIB – PPI) with lag structure 0 – 7, the qualitative indicator of expected general economic situation (FOG) and the

GDP dynamics (lag structure 0, 1, 4, 5) and general climate of the economic situation (NRBO) and the GDP dynamics for lags 1 and 5. However, we have to take into account that some of the correlations can be spurious due to the potential non-stationarity of the analyzed time-series.

Based on the results of the step one, the final list of potential qualitative indicators for forecasting the level or dynamics of quantitative macro-variables was established. The detailed description of the variables is presented in Table A and B in Appendix.

In the subsequent step the stochastic structure of the qualitative and quantitative time series was analyzed in detail using the ADF test (see e.g. Charemza and Deadman, 1992, pp. 130-136,; Strzała, 1994, pp. 150-153) and the reversed ADF proposed by Leybourne (1995) – for stationarity at "0" frequency. The inference was based on the critical values calculated along the lines proposed by Cheung and Lai (Cheung and Lai, 1995), which was an extension of the reasoning proposed by MacKinnon (1991). As the time series are of quarterly frequency, the subsequent step involved testing the quarterly seasonal unit roots with the use of the HEGY test (Hylleberg, 1992, pp. 425-448, Hylleberg at all., 1990). The inference was based on critical values proposed by Franses and Hobijn (Franses and Hobijn, 1997).

The results of the stationarity evaluation allow us to state that the majority of macroeconomic quantitative data and business survey data are non-stationary. The macroeconomic and especially business survey data are characterized by a complex stochastic structure, e.g. by non-stationarity with respect to long term and seasonal behaviour[2].

Taking into account the results of the cross-correlation and stationarity analyses, it is possible to obtain pairs of variables, i.e. macroeconomic category and its potential qualitative indicator, which should be analyzed deeper in subsequent steps of the procedure. Table 1 presents the potential pairs of qualitative and quantitative variables with the same order of integration. It is clear that only in 3 cases we can get pairs of variables integrated of order zero (I(0)), that is stationary. The remainder are integrated of order one I(1)), e.g. non-stationary.

[2] The detailed results of the stationarity evaluation are presented in a paper by M. Blangiewicz and K. Strzała (2006).

Table 1 Quantitative variables and potential qualitative indicators

	Quantitative variables	Indicator – qualitative variables	Order of integration
1	dLGVAP, IPPB, IPPPPB	PROD	I(0)
2	dLNALPRZ, dLNALPP	NAL	I(0)
3	dLGDP	NRBO	I(0)
4	LGDP, LGVA, LGVAP	OG	I(1)
5	LDDEM, dLPRZSP, dLPRZSPP, dLINW,	DOG	I(1)
6	LZAPPP	ZAP	I(1)
7	WFBP, WFBPP	PAY	I(1)
8	LGDP, LGVA, LGVAP, dLINW	FOG	I(1)
9	LDDEM, LGDP, LGVA, dLINW	ZAM	I(1)
10	LGDP, LDDEM, LGVA	ZAMZ	I(1)
11	LGVA, LGVAP	PPR	I(1)
12	PPIB	PPI	I(1)
13	dLZP, LZPP	ZAT	I(1)

"L" indicates logarithm, e.g. LGDP=log(GDP), indicates "d" – first difference, e.g. dlGDP=LGDP(t)-LGDP(t-1).
For explanation of abbreviations see Table B.

The third step in the adopted procedure consisted in the evaluation of block Granger non-causality. Granger causality was evaluated for A) pairs of variables ignoring their order of integration, and B) for pairs with the same order of integration. Table 2 presents the results of Granger causality evaluation.

The most striking feature discovered by testing for block Granger non-causality is the difference in inference in relation to unadjusted and seasonally adjusted series. Whereas in the original series only in 8 out of 52 analysed cases the hypothesis of block Granger non-causality is not rejected, this is the prevailing case for seasonally adjusted series (32 out of 52). For seasonally unadjusted series hypothesis of block Granger non-causality is not rejected only for 8 pairs of variables, 4 in case A, i.e. when ignoring their order of integration and 4 in case B for pairs with the same order of integration. The hypothesis of block Granger non-causality is rejected in the case A - when we ignore the order of integration and (B) for pairs with the same order of integration for the rest of the pairs under consideration.

Table 2 Granger causality

No	Case	Indicator (cause)	for Variable	p-val for LR stat.	VAR rank	Conclusion	p-val for LR stat.	VAR rank	Conclusion
				unadjusted series			*seasonally adjusted series*		
1	B	**PROD I(0)**	**dLGVAP**	0.001	2	**C**	0.332	3	nC
2	B		**IPPB**	0.000	5	**C**	0.911	2	nC
3	B		**IPPPPB**	0.011	4	**C**	0.049	3	**C**
4	A	**NAL I(0)**	**LNALPRZ**	0.021	4	**C**	0.090	5	nC
5	B		**dLNALPRZ**	0.019	4	**C**	0.238	4	nC
6	A		**LNALPP**	0.012	4	**C**	0.003	5	**C**
7	B		**dLNALPP**	0.011	4	**C**	0.000	5	C
8	B	**NRBO I(0)**	**dLGDP**	0.557	4	**nC**	0.017	5	**C**
9	A	**FOG**	**DLGDP**	0.000	3	**C**	0.163	5	nC
10	B		**LGDP**	0.000	4	**C**	0.169	1	nC
11	A		**dLGVA**	0.003	2	**C**	0.554	1	nC
12	B		**LGVA**	0.000	4	**C**	0.202	1	nC
13	A		**dLGVAP**	0.000	4	**C**	0.289	1	nC
14	B		**LGVAP**	0.000	4	**C**	0.033	2	nC
15	B		**dLINW**	0.003	5	**C**	0.019	1	**C**
16	A	**ZAM**	**dLDDEM**	0.005	4	**C**	0.005	5	**C**
17	B		**LDDEM**	0.001	5	**C**	0.005	5	**C**
18	B		**LGDP**	0.003	5	**C**	0.781	4	nC
19	B		**LGVA**	0.001	4	**C**	0.817	1	nC
20	A		**EKSPB**	0.007	4	**C**	0.167	2	nC
21	B		**dLINW**	0.000	4	**C**	0.000	6	**C**
22	A	**ZAMZ**	**EKSPB**	0.000	4	**C**	0.041	1	**C**
23	B		**LGDP**	0.000	4	**C**	0.119	1	nC
24	B		**LDDEM**	0.000	4	**C**	0.490	1	nC
25	B		**LGVA**	0.001	4	**C**	0.153	1	nC
26	A	**PPR**	**dlGVAP**	0.084	5	nC	0.152	4	nC
27	B		**LGVAP**	0.041	5	**C**	0.607	2	nC
28	A		**dlGVA**	0.015	5	**C**	0.714	5	nC
29	B		**LGVA**	0.000	4	**C**	0.269	1	nC
30	A		**dlGDP**	0.000	3	**C**	0.754	5	nC
31	B		**LGDP**	0.000	4	**C**	0.216	1	nC
32	B	**PPI**	**PPIB**	0.526	1	nC	0.859	1	nC
33	A	**ZAT**	**LZP**	0.000	5	**C**	0.000	1	**C**
34	B		**dLZP**	0.000	5	C	0.000	1	**C**
35	A		**dLZPP**	0.000	5	**C**	0.000	1	**C**
36	B		**LZPP**	0.000	1	C	0.000	1	**C**
37	A	**OG**	dLGDP	0.157	3	nC	0.337	5	nC
38	B		LGDP	0.004	4	**C**	0.015	5	**C**
39	A		dLGVA	0.129	3	nC	0.012	2	**C**
40	B		LGVA	0.003	4	**C**	0.017	4	C
41	A		dLGVAP	0.325	4	nC	0.052	2	nC
42	B		LGVAP	0.009	4	**C**	0.041	5	C

Table 2 Granger causality – **continued**

No	Case	Indicator (cause)	for Variable	p-val for LR stat.	VAR rank	Conclusion	p-val for LR stat.	VAR rank	Conclusion
				unadjusted series			*seasonally adjusted series*		
43	A	**DOG**	dLPOPKR	0.286	4	nC	0.095	4	nC
44	B		LDDEM	0.000	4	C	0.186	1	nC
45	B		dLINW	0.034	4	C	0.100	1	nC
46	A		EKSPB	0.001	2	C	0.015	4	C
47	A		LPRZSP	0.000	4	C	0.001	5	C
48	A		LPRZSPP	0.000	5	C	0.000	3	C
49	A	**DZA**	EKSPB	0.014	2	C	0.532	2	nC
50	A	**ZAP**	DLZAPP	0.007	2	C	0.581	2	nC
51	B	**PAY**	WFBP	0.247	4	nC	0.891	2	nC
52	B		WFBPP	0.003	4	C	0.087	5	nC

Notes: H_0: x does not Granger-cause y; C - H_0 rejected at $\alpha = 0{,}05$; nC - H_0 - not rejected at $\alpha = 0{,}05$; A – order of integration ignored, sample 1995q1-2004q4; B – pairs of variables with the same order of integration, sample 1995q1-2005q4; LR stat. – Likelihood-ratio statistics for block Granger non-causality test.

The hypothesis H_0, that x does not Granger-cause y is consistently (i.e. for unadjusted and seasonally adjusted series) not rejected in 6 cases for the following pairs of variables: dynamics of GVA in industry and expected volume of sold production in industry (dLGVAP – PPR), price dynamics development (PPIB – PPI), dynamics of GDP and GVA in industry and general economic situation (dLGDP, dLGVAP – OG), dynamics of domestic demand and judgment on domestic and foreign order-books (dLDDEM – DOG), the gross profit in industry and ability to pay current debt (WFBP – PAY). All variables mentioned above are non-stationary, i.e. I(1), in which case the conclusion about block Granger non-causality should be treated with a respective caution. It is worth mentioning that for the pairs with the same order of integration there exists a possibility of cointegration, which validates the inference on Granger causality (see e.g. Maddala and Kim, 1998, p. 189).

For 6 out of 52 analyzed pairs only, we can formulate the conclusion about Granger causality without above reservation, as the variables under consideration are stationary. These pairs are to be found in rows 1-3, 5 and 7-8 of the Table 2.

Analysing pairs of variables having the same orders integration (case B), we reject the hypothesis of Granger non-causality for 8 of them.

The consistent result for unadjusted and seasonally adjusted time series is obtained for the following pairs of variables: dynamics of investment and expected general

economic situation (dLINW – FOG), domestic demand and dynamics of investment and expected domestic and foreign order-books (LDDEM, dLINW – ZAM), dynamics of employment in industry and volume of employment in manufacturing and expected employment (dLZP, LZPP – ZAT), volume of GDP, GVA and GVA in manufacturing and general economic situation (LGDP, LGVA, LGVAP – OG).

For the original, unadjusted series, we can state that six of the qualitative indicators i.e. volume of total liabilities (NAL), expected general economic situation (FOG), expected domestic and foreign order-books (ZAM), expected foreign order-books (ZAMZ), the qualitative judgment on current volume of sold production (PROD) and expected employment (ZAT) Granger cause the all selected macroeconomic categories, so they may exert a good forecasting ability. The coefficients of cross-correlation in the case of volume of total liabilities (NAL) and the qualitative estimate of current volume of sold production (PROD) with the all selected macroeconomic variables are as well statistically significant, so we obtained consistent inference based on cross-correlation and block Granger non-causality analysis. It is worth mentioning that NAL and PROD and their quantitative counterparts are I(0) variables.

The previous steps of the applied procedure allow us to select 6 pairs of the quantitative and qualitative variables integrated of order zero for the further detailed analysis, namely:

1	dLGVAP, IPPB, IPPPPB	PROD	I(0)
2	dLNALPRZ, dLNALPP	NAL	I(0)

Five of them can be analyzed further, as the qualitative variables NAL and PROD Granger cause the quantitative variables. In the case of NRBO variable we do not reject the hypothesis that NRBO does not Granger cause the percentage change of GDP, so we do not proceed to subsequent steps. Table 3 presents the outcomes of multivariate dynamic forecasts based on VAR model and summary statistics of forecasts errors for the percentage change of gross value added (dLGVAP), the percentage change of short term liabilities of enterprises in industry (dLNALPRZ) and in manufacturing (dLNALPP).

Forecasting quality of the qualitative indicators is evaluated through ex-post forecasts. Ex-post forecasts are generated by ignoring the observations of quantitative variables in the estimation process and after re-estimation based on a sample that excluded the latest two quarterly observations computation of forecasts for 2005Q3 – 2005Q4.

Table 3 Multivariate dynamic forecasts

Macro- category	Indicator	RMSE	VAR rank
dlGVAP	PROD	0.034	3
IPPB	PROD	3.064	3
IPPPB	PROD	3.257	4
dlNALPRZ	NAL	0.031	4
dLNALPP	NAL	0.025	4

All RMSS errors (Root Mean Sum of Squares) errors in forecast period for macro-categories GVA in manufacturing (GVAP) and dynamics of short-term liabilities of enterprises in industry (dLNALPRZ) and in manufacturing (dLNALPP) are within reasonable boundaries 0.025 – 0.034. The opposite conclusion can be drawn in the case of indexes, for which RMSS is much bigger. The estimated time series equations for the macro-categories trace well the values of explained variables. Taking into account the meaning of Granger causality, we can state that, e.g., the judgment of current volume of sold production (PROD) does Granger cause the percentage change of gross value added in industry (dLGVAP) as the information in past PROD helps to improve forecasts of dLGVAP. However, it is worth mentioning that the qualitative indicators are not in general sufficient to provide good estimates of quantitative variables. Their forecasting quality is demonstrated on the basis of VAR model, in which specification, the past values of qualitative indicators coexist with past values of the explained quantitative variable.

4. Conclusions

As the results of the applied econometric procedures shed light on the significant causal relations between qualitative and quantitative variables, further steps in the research should concentrate on the design of econometric models, which would incorporate qualitative variables in order to arrive at effective forecasts of the key macroeconomic variables, e.g. the dynamics of gross domestic product and gross value added, domestic demand, employment and some financial characteristics such as short term dues of enterprises. In this paper we illustrated only the subsequent steps for I(0) variables. For the I(1) variables, a different approach should be adopted, namely bivariate cointegrated VAR analysis. In the case the cointegration is found, the analysis could be followed by calculation of the two-period forecasts based on the underlying VECM and then, comparison of forecasts' accuracy.

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APPENDIX

Table A

Question	Answers	Indicator	Method of calculation
1 General economic situation of the enterprise	· good · satisfactory · bad	OG	a
2 Order-books (domestic and foreign) for the enterprise's products	· increase · remain unchanged · decrease	DOG	a
3 Foreign order-books for enterprise products:	· increase · remain unchanged · decrease · the enterprise does not produce for export	DZA	a
4 Current volume of sold production of the enterprise:	· increases · remains unchanged · decreases	PROD	a
5 Current stocks of finished products in the enterprise are :	· too large · adequate · too small	ZAP	b
6 Ability of the enterprise to pay current debts:	· improves · remains unchanged · decreases	PAY	a
7 Volume of total liabilities of the enterprise	· improves · remains unchanged · decreases	NAL	b
8 Expected domestic and foreign order-books for the enterprise's products:	· will increase · will not change · will decrease	ZAM	a
9 Expected foreign order-books for the enterprise products:	· will increase · will not change · will decrease · the enterprise won't produce	ZAMZ	a
10 Expected volume of sold production of the enterprise:	· will increase · will not change · will decrease	PPR	a
11 Expected selling prices of the enterprise products:	· will increase · will not change · will decrease	PPI	a
12 Expected employment in the enterprise:	· will increase · will not change · will decrease	ZAT	a
13 Expected general economic situation of the enterprise:	· will improve · will not change · will deteriorate	FOG	a
14 Expected ability of the enterprise to pay current debts:	· will improve · will not change · will deteriorate	ZOB	a

Source: Central Statistical Office, www.stat.gov.pl

a-balances (differences) of the percentage of the first answer option (advantageous from the point of view of the enterprise) and the third option (disadvantageous).

b-balances (differences) of the percentage of answers of the third option and of the first option.

The indicator of the general climate of the economic situation (NRBO) from the monthly questionnaire is a composite indicator. It is calculated as an arithmetical average of the balances of answers to questions relating to the current (question 1) and expected (question 13) economic situation. "A good" climate of the economic situation refers to enterprises of which the above mentioned indicator is above zero. In the opposite case the climate is evaluated as "bad".

Table B Qualitative and quantitative variables

	Qualitative variables – Business survey data	
1	OG	General economic situation
2	FOG	Expected general economic situation
3	NRBO	General climate of the economic situation
4	DOG	Order-books (domestic and foreign)
5	DZA	Foreign order-books
6	PROD	Current volume of sold production
7	ZAP	Current stocks of finished products
8	PAY	Ability of the enterprise to pay current debts
9	NAL	Volume of total liabilities
10	ZAM	Expected domestic and foreign order-books
11	ZAMZ	Expected foreign order-books
12	PPR	Expected volume of sold production
13	PPI	Expected selling prices
14	ZAT	Expected employment
15	ZOB	Expected ability of the enterprise to pay current debts
	Quantitative variables	
1	GDP	gross domestic product, 1995*
2	GVA	gross value added, 1995*
3	GVAP	gross value added in industry, 1995*
4	CONS	final consumption expenditure, 1995*
5	CONSI	individual consumption, 1995*
6	INW	investments, 1995*
7	DDEM	domestic demand, 1995*
8	ZP	employment in industry (BS)
9	ZPP	employment in manufacturing (BS)
10	PRZSP	revenues from sold production in industry (BS)
11	PRZSPP	revenues from sold production in manufacturing (BS)
12	ZAPPP	inventories in manufacturing (BS)
13	WFBP	the gross profit in industry (BS)
14	WFBPP	the gross profit in manufacturing (BS)
15	EKSPB	index of exports (BS)
16	IPPB	index of sold production in industry (BS)
17	IPPPPB	index of sold production in manufacturing (BS)
18	PPIB	index of producer prices (BS)
19	PPIPP	index of producer prices in manufacturing (BS)
20	NALPRZ	short-term liabilities of enterprises in industry (BS)
21	NALPP	short-term liabilities of enterprises in manufacturing (BS)

* constant prices of 1995

Source: Time series with acronym BS – from Statistical Bulletins, Central Statistical Office, Poland, the rest of quantitative variables –National Accounts Division, CSO.

Remarks: c.p. – constant prices.

Table C Lag structure of statistically significant coefficients of cross - correlations at $\alpha = 0{,}05$

Variables	DDEM	DDEMA	EKSPB	EKSPBA	PRZSP	PRZSPA	PRZSPP	PRZSPPA	GVAP	GVAPA	IPPB	IPPBA	IPPPB	IPPPBA
DOG	0, 4, 7		0, 1, 7		0, 1, 4, 7		0, 4, 6							
DOGA		0 - 7		———		0 – 4		0,1						
DZA			———	———										
PROD									0, 1, 3, 5, 7		0, 1		0, 2, 6	
PRODA										0, 1		4, 5		———
ZAM	0, 1, 4, 5		0, 1, 4											
ZAMA		0 –3		———										
Variables	ZAPPP	ZAPPPA	ZAPRZ	ZAPRZA	WFBP	WFBPA	WFBPP	WFBPPA	NALPRZ	NALPP	PPIB			
ZAP	0, 1, 4		0, 3, 4											
ZAPA		0 – 7		0 – 5										
PAY					4		———							
PAYA						0, 4, 5		0, 1						
NAL									3, 4	3, 6, 7				
PPI											0 – 7			
Variables	GDP	GDPA	GVAP	GVAPA	GVA	GVAA	ZP	ZPA	ZPP	ZPPA				
FOG	0, 1, 4, 5		1, 3, 4, 7		0, 1, 4, 5									
FOGA		0, 1		0		0, 1								
PPR			0, 1, 3-5, 7		0, 1, 4, 5									
PPRA				0		0								
NRBO	1, 5													
ZAT							0 – 5		0 – 5					
ZATA								0 – 5		0 – 6				

Remarks: all quantitative variables are differenced, letter A at the end of the variable's name indicates seasonally adjusted series, lags and leads 0 – 7, number of observations 32 – 39; seasonal adjustment calculated with the use of DEMETRA package: DZA, NAL, PPI, NRBO – have no seasonal factors.