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COMPOSITE INDICATORS OF BUSINESS ACTIVITY FOR POLAND BASED ON SURVEY DATA

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FOR POLAND BASED ON SURVEY DATA*

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Abstract

The paper presents a set of composite indicators of economic activity for Poland based on qualitative data from business and consumer surveys. They refer to the concept of economic sentiment indicator (ESI) used in EU countries, but alternative concepts proposed by the author are tested as well. Time series of the indicators have been calculated for the period 1994–2001, using four alternative formulas and two different data sets. Statistical properties of the indicators are analysed and business tendencies revealed by their evolution are compared with the actual economic developments, as reflected by GDP and industrial production. Component variables entering the composite indicator are also checked against the statistical data on output and sales volumes in the respective sectors. The ultimate aim is to assess the performance of such indicator in business cycle analysis and its relevance to economic policy purposes. The paper shows the usefulness of the composite indicator of business activity based on survey data as a monitoring and forecasting tool for business and policy purposes. Analysing the performance of alternative variants of the indicator, some conclusions could be reached as to the best formula of the indicator and the most reliable data source. Practical advice is also given as to the proper interpretation of such an indicator. A separate section brings an assessment of current economic situation in Poland and probable growth prospects.

1. Introduction

This paper refers to a broader research on composite indicators of economic activity for Poland. The work on the subject has been continued since 1994 in the Research Institute of Economic Development (RIED) at the Warsaw School of Economics under four successive research projects, by a research team headed by the author. The aim was to develop a system of composite indicators, based on quantitative and qualitative data, which could be used for analysing changes in the aggregate economic activity as well as for monitoring and forecasting purposes. It includes three types of composite indicators.

The first one is a composite indicator of aggregate economic activity, denoted GCI (general coincident indicator). It is a proxy for GDP, calculated on a monthly basis as a weighted average of indices reflecting production or sales volume in five major sectors of economy: industry, construction, agriculture, transport, and trade, weighted by their yearly shares in GDP. The cyclical component of GCI helped us to analyse growth cycles in Poland over the last 25 years. It is also used as reference cycle in our work on composite leading indicators. Autoregressive 12-month projections of the indicator helped us to forecast GDP growth rates.

The second one is the composite leading indicator (CLI) based on quantitative and qualitative data, compiled according to the OECD methodological standards. As a matter of fact, we have developed and tested many CLI variants designed for

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monitoring and forecasting purposes, with different component variables and different leads. Composite leading indicator combines a set of economic variables that precede cyclical changes in aggregate economic activity.

The third one is the economic sentiment indicator (ESI), which reflects the opinion of economic agents (entrepreneurs and consumers) on current economic conditions and the tendency of business. Likewise, we are testing several variants of ESI, with different formulas and different data sources. The indicator is almost exclusively based on survey data. It is compiled as a weighted average of appraisals obtained from individual sectors of the economy.

The main results of our research have been published in three volumes of RIED's 'Papers and Proceedings' (Z. Matkowski, ed., 1997, 1998, 1999) as well as in economic journals, and summarised in several conference papers. At the 23rd CIRET conference in Helsinki we presented (Z. Matkowski, 1997a) the analysis of growth cycles seen in the development of Poland's economy. The paper prepared for the 24th CIRET conference in Wellington (Z. Matkowski, 1999) dealt with use of survey data in our composite leading indicators. The papers presented at the 25th CIRET conference in Paris and the 26th CIRET conference in Taipei (Z. Matkowski, 2000b, 2002b) were devoted to the analysis of economic sentiment indicators based on survey data. The results of our research have been also reported at International Meetings on Economic Cycles in Ourense and Madrid (Z. Matkowski, 2000a, 2002a).

This paper focuses on economic sentiment indicators, based on survey data. Besides the introduction (section 1), the paper includes the following. Section 2 elucidates the concept of economic sentiment indicator and specifies alternative formulas of the indicator. Section 3 presents empirical results. Section 4 tries to assess the conformity of economic sentiment indicators with the actual economic development. Section 5 evaluates the conformity of component indicators entering our ESIs against the actual developments in the respective sectors of the economy. Section 6 brings an assessment of current economic situation in Poland and marks out probable growth prospects. Section 7 shows the relevance of the indicators to economic policy. Section 8 includes conclusions.

The results of this project have been presented in: Z. Matkowski 2000b, 2002a, 2002b, 2002c, 2002d. The first three papers have brought the results to international public while the last two were dedicated to domestic readers.

This paper presents the main results of the analysis of economic sentiment indicators for Poland and some conclusions about their application for policy purposes. The size of the paper does not indicate the amount of work put into the project. Arranging the database, extensive data processing, multiple calculations on a wide set of time series, big number of working tables and control graphs – all that produced several thousand of pages of the research material which had to be examined.

2. Alternative ESI concepts

The usefulness of survey data in monitoring systems designed to detect changes in economic activity has been evidenced by many theoretical and empirical studies.[1] It has been proved that certain qualitative indicators, reflecting the opinion of economic agents (entrepreneurs, consumers, etc.) on their own situation and on the tendency of

[1] Multiple applications of survey data in business cycle analysis are well documented in CIRET conference papers and proceedings. See eg. K. H. Oppenländer, G. Poser, B. Schips, eds. (2000).

business in general, are a valuable source of information on the actual course of business. On a theoretical plane, the concept of rational expectations explains the link between real economic developments and their reflection in people's attitudes and judgements. On an empirical plane, the analysis of leads and lags between micro- and macroeconomic variables provides a strong proof in favour of monitoring and forecasting properties of such qualitative indicators as investment plans, order-books and capacity utilisation rates of enterprises, or major purchase intentions of the consumers. Therefore, survey data are widely used in economic assessments and forecasts.

In our search for macroeconomic barometers that could be used to estimate current conditions and prospects of Poland's economy we have developed and tested several variants of a general indicator of business activity based on qualitative data from business and consumer surveys. The basic idea behind this attempt is to combine composite indicators of business activity in individual sectors of economy, compiled from survey data, into a single indicator reflecting the general condition of national economy. This kind of macroeconomic index resembles the EU concept of economic sentiment indicator (ESI), but we are also testing alternative formulas, with different coverage and weights. It may be also called: economic climate indicator (ECI).

Several institutions in Poland are continuously testing public opinion about the course of business in individual sectors of the economy. The most important sources of survey data are the Research Institute of Economic Development at the Warsaw School of Economics (RIED) and the Central Statistical Office (CSO). The RIED surveys now cover five sectors: industry, agriculture, construction, trade, and households. The CSO surveys cover three sectors: manufacturing industry, construction, and retail trade. The latter are supplemented by the consumer survey made by Ipsos-Demoskop, a private polling company (recently, CSO has started its own consumer survey).

The first attempts to construct a general indicator of business activity for Poland based on survey data were made in 1993 independently by two researchers using the RIED survey data (K. Stanek, 1993; Z. Matkowski, 1993). Both of them calculated a composite indicator inspired by the EU ESI concept, but different in coverage. Since 1994, two versions of the indicator have been occasionally published by RIED.

In 1998, this author developed several alternative formulas of a composite indicator of economic activity for Poland and filled them with RIED and CSO survey data, supplemented by consumer survey data from Ipsos-Demoskop. A concise analysis, covering the period from 1994 to 1997, was included in the paper presented at the 24th CIRET Conference in Wellington (Z. Matkowski, 1999a). The research has been continued and the results were successively published. Here we wish to present a new and deepened analysis, covering the period from 1994 to 2001. This study includes, apart from the presentation of alternative ESI indicators and the analysis of their statistical properties, a comparative assessment of their performance against the actual development of the economy.

Table 1 shows the list of component indicators entering the composite index of business activity based on RIED and CSO survey data. Most of them are composed of two or more time series reflecting business tendency in the given sector. Empirical data for component variables have been taken from the indicated sources or calculated by the author according to his own (ZM) or harmonised (EU) formula. Supplementary data of Warsaw Stock Exchange Index were also included in some variants.

Table 1

Component variables entering economic sentiment indicators

Code	Indicator / Formula	Compiled as:	Used in:
ZH01	Business Indicator Industry (RIED)	Avg. of production appraisal & forecast	ZHG3A
ZH03A	Industrial Activity (ZM)	Avg. of production appraisal & forecast	ZHG4
ZH05A	Industry Confidence (EU)	Future production, change in stocks, order book	ZHG1,2,3
ZH11A	Construction Activity (ZM)	Avg. of production appraisal & forecast	ZHG4
ZH09	Construction Confidence (EU)	Order book & expected change in employment	ZHG1,2,3
ZH17	Business Indicator Trade (RIED)	Future sales, anticipated change in supplies, commodity stocks	ZHG2,3,4
ZH20A	Trade Sales (ZM)	Avg. of sale appraisal & forecast	ZHG4
ZH25	Business Indicator Agriculture (RIED)	Current & future revenue, adjusted for anticipated change in economic condition	ZHG2,3,4
ZH28	Consumer Confidence (RIED)	Change in income and savings, modified by anticipation factor; since 1995 EU formula	ZHG1,2
ZG01	Industrial Climate (CSO)	Avg. of enterprise situation & prospect	ZGG3A
ZG03A	Industrial Activity (ZM)	Avg. of production appraisal & forecast	ZGG4
ZG05A	Industry Confidence (EU)	Future production, change in stocks, order book	ZGG1,2,3
ZG06	Construction Climate (CSO)	Avg. of activity appraisal & forecast	ZGG3A
ZG08A	Construction Activity (ZM)	Avg. of production appraisal & forecast	ZGG4
ZG10A	Construction Confidence (EU)	Order book & expected change in employment	ZGG1,2,3
ZG13	Retail Trade Climate (CSO)	Avg. of enterprise situation & prospect	ZGG2,3
ZG15A	Retail Sales (ZM)	Avg. of sale appraisal & forecast	ZGG4
ZD06	Consumer Confidence (DEMO)	EU formula	ZGG1,2
ZWR01	Warsaw Stock Exchange Index R/T	Detrended	ZHG1, ZGG1

Alternative formulas of the composite indicator based on RIED data have been denoted ZHG while similar formulas filled with CSO data have been recorded as ZGG. For the presentation of the alternative variants let us denote: I – industry, C – construction, A – agriculture, T – trade, H – households, S – stock exchange.

The first two variants of the indicator refer to the ESI concept adopted in European Union while the next two formulas are our own concepts.

Variant 1 is the closest implementation of the harmonised EU ESI concept. Both with the RIED and CSO data, it was calculated according to the formula:

$$\text{ZHG1 or ZGG1} = {}^1\!/_3\, I + {}^1\!/_3\, H + {}^1\!/_6\, C + {}^1\!/_6\, S.$$

It is a weighted average of the following components: industrial confidence indicator, consumer sentiment indicator, construction confidence indicator (all compiled according to EU standards), and the detrended share price index of Warsaw Stock Exchange. The latter is supposed to reflect confidence and expectations in the capital market.[2]

Variant 2 excludes the share price index which, in the case of Warsaw Stock Exchange, does not yet correctly reflect real business developments. At the same time, it includes business indicator for trade and, in case of RIED data, also agriculture. Industry and households are given weights twice as high as each of the remaining

[2] Another version of this indicator, including undetrended index of Warsaw Stock Exchange, has also been tested. Since it does not much differ from the original EU formula, it will be omitted in this presentation.

sectors. The resulting formulas are as follows:

$$\text{ZHG2} = {}^{2}/_{7}\, I + {}^{2}/_{7}\, H + {}^{1}/_{7}\, C + {}^{1}/_{7}\, T + {}^{1}/_{7}\, A,$$

$$\text{ZGG2} = {}^{1}/_{3}\, I + {}^{1}/_{3}\, H + {}^{1}/_{6}\, C + {}^{1}/_{6}\, T.$$

This indicator retains the logic of the original EU ESI concept, applying similar system of constant weights, but it differs in coverage. Therefore, it can be referred to as 'modified EU formula'.

Variant 3 differs significantly from the EU ESI concept as to the coverage and weights. It covers productive sectors only: industry, construction, and trade (in case of RIED, also agriculture), which directly contribute to the creation of GDP. Households and stock exchange are not included. Business tendency in each sector is determined according to EU concepts with the exception of RIED's indicator for agriculture and CSO's indicator for trade, which are compiled according to their own formulas. Unlike in the preceding variants, component indicators reflecting the situation in individual sectors are combined using no arbitrary constant weights, but weights that represent their actual share in GDP (more precisely, in gross value added).[3] The weights are changed each year, according to the changing structure of the economy. For the period covered by this analysis, the average shares were: industry – 29.0%, construction – 7.9%, agriculture – 5.3%, trade – 20.1%. Since the above sectors do not cover the whole economy (amounting to slightly less than 2/3 of GDP), sum total of weighted indices must be divided by the sum of weights. The resulting algorithms are:

$$\text{ZHG3} = \frac{a_1 I + a_2 C + a_3 T + a_4 A}{a_1 + a_2 + a_3 + a_4},$$

$$\text{ZGG3} = \frac{a_1 I + a_2 C + a_3 T}{a_1 + a_2 + a_3},$$

where weights a_1, a_2, a_3, a_4 reflect the contribution of individual sectors to GDP in the given year.[4]

Variant 4 has the same coverage and weights 3, but it is filled with homogeneous component indicators reflecting business tendency in individual sectors. Instead of different concepts of business tendency applied for individual sectors (a practice adopted by EU harmonised standards), this variant employs a uniform concept of business tendency for each sector, namely the average of output (sales) appraisal and forecast (except of agriculture where the available survey data do not contain relevant information). The algorithms are the same as in variant 3.

Though all the variants of our indicator are filled with survey data, nevertheless they should properly reflect the actual tendency of aggregate economic activity. This is because the component variables entering the indicator reflect the assessment of real magnitudes shaping the conditions of economic units, as expressed by their output and

[3] A similar ESI concept with GDP shares taken as weights (covering industry, construction, and trade) has been recently applied in Italy (P. Carnazza, G. Parigi, 2000). However, a new study on a composite aggregate indicator for Italy takes another approach, trying to identify common elements in the dynamics of different economic sectors, including households (G. Bruno, M. Malgarini, 2002).

[4] Another version of this indicator, including business indicators for industry and construction compiled according to the source formula (RIED or CSO), has also been tested. It has been omitted in this presentation because it does not differ significantly.

sales, order-books, change in stocks, employment levels, financial standing, etc. Thus, even if the original survey data are qualitative in nature (reflecting the direction of change of certain performance characteristics or their relation to some norms), the aggregate indicators derived from them should reflect the real tendency of aggregate economic activity, provided that the surveys are representative and correctly made. For this reason, the notion 'economic sentiment indicator' does nor precisely express the actual meaning of such indicators. Perhaps, a more adequate term would be 'economic climate indicator'. However, since the former term has already been firmly anchored in the literature, we shall use it in this paper.

3. Empirical results

Economic sentiment indicators calculated according to the above formulas have been filled with monthly survey data of the period 1994–2001, available at the time of analysis. Quarterly data were transformed into monthly series by interpolation. All component series entering the combined indicator have been smoothed with 3-month moving average and standardised according to the following formula (OECD, 1987):

$$\left[(x - \bar{x}) : \frac{\sum |x - \bar{x}|}{n} \right] + 100 ,$$

where x denotes numerical values of the given variable, $\bar{x}$ – arithmetic mean, n – number of observations (months). Standardisation is needed because component variables are differently calibrated. Moreover, amplitude adjustment allows direct comparison of different time series.

Standardised component series and composite indicators derived from them usually take values between 97 and 103 (this is why most graphs presented in this paper are scaled so). The resulting indicators express relative deviations of the values observed from their long run average, taken as 100. They should not be mistaken for simple dynamic indices. Anyway, numerical values of indicator higher than 100 mean that current business activity is assessed positively (above average) while values lower than 100 indicate that current condition of the economy is perceived as rather poor (below the long-run trend). The increase of the indicator suggests a rising tendency of economic activity whereas its decrease is tantamount to a slack.[5]

Alternative variants of economic sentiment indicators calculated from RIED survey data are shown in Figure 1a, and similar variants based on CSO survey data (supplemented by Ipsos-Demoskop) are presented in Figure 1b.

All the indicators display a distinct and quite a regular seasonal pattern. In order to trace the tendency, they must be deseasonalised. This has been done using X11-ARIMA procedure.[6] Seasonally adjusted and smoothed time series of the indicators are shown in Figures 2a and 2b. The charts show the tendency (trend + cycle) of each indicator as reflected by Henderson curve (9- or 13-term moving average).

[5] However, in case of very sensitive business tendency indicators, a decrease may either mean an absolute fall in activity level or merely a slowdown. This question is exhaustively discussed in section 4.

[6] For the description of X11-ARIMA, see: E. B. Dagum (1988), A. C. Harvey (1994), J. D. Hamilton (1994).

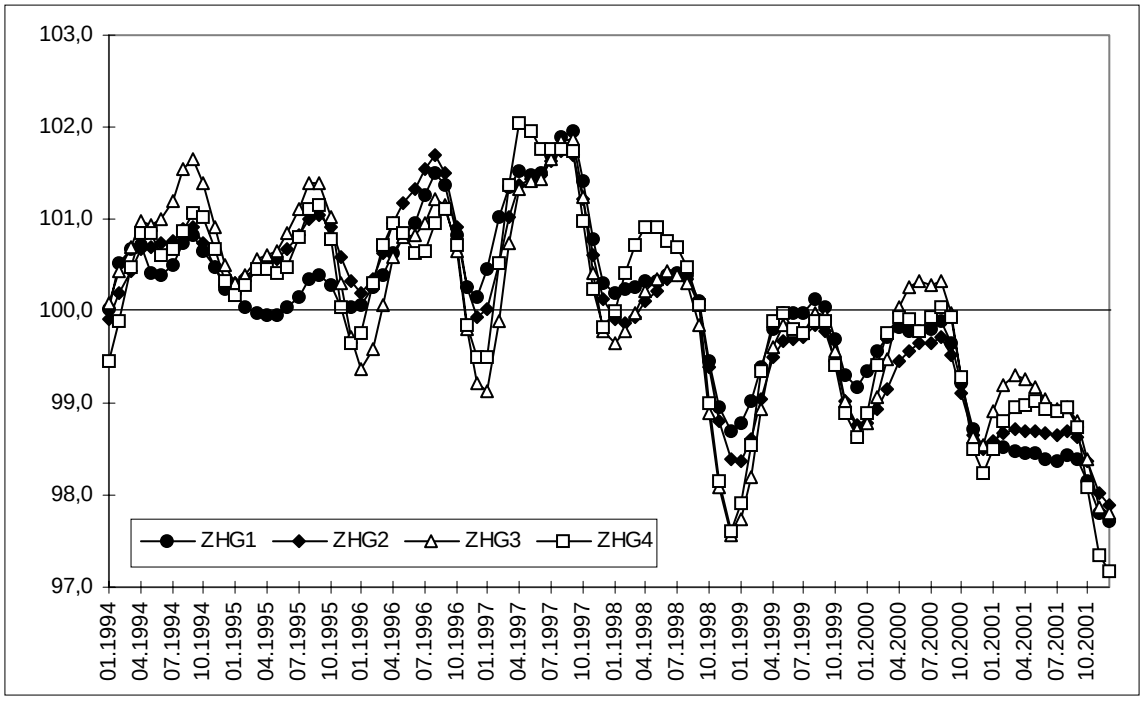

Figure 1a
Economic sentiment indicators based on the RIED survey data

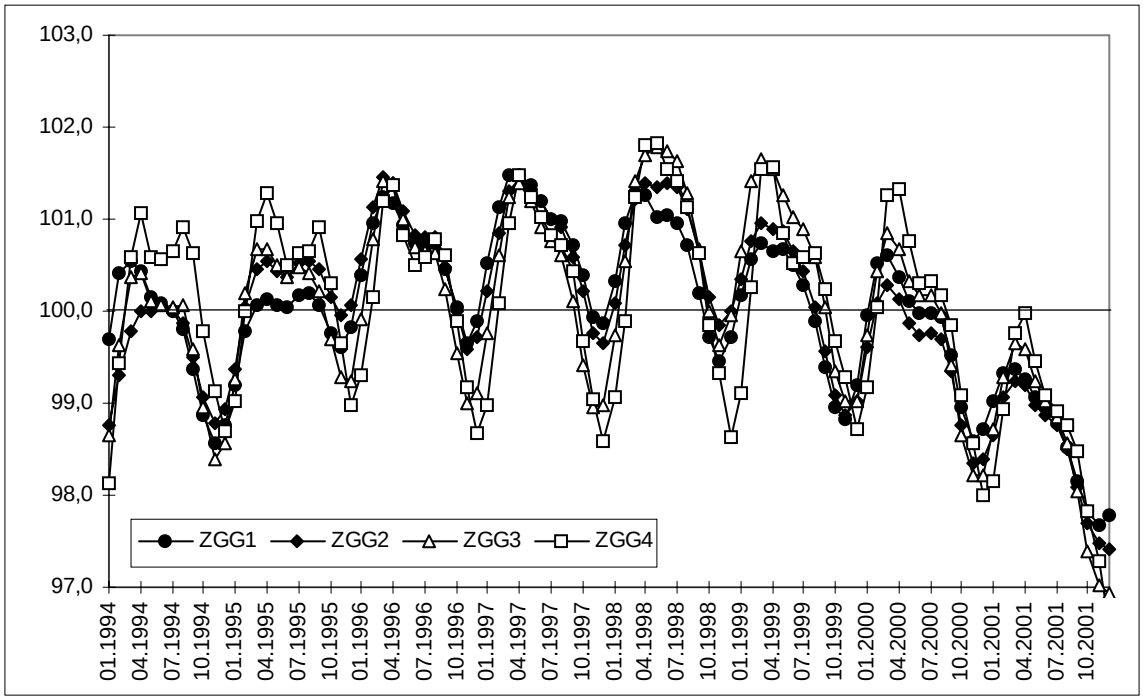

Figure 1b
Economic sentiment indicators based on the CSO survey data

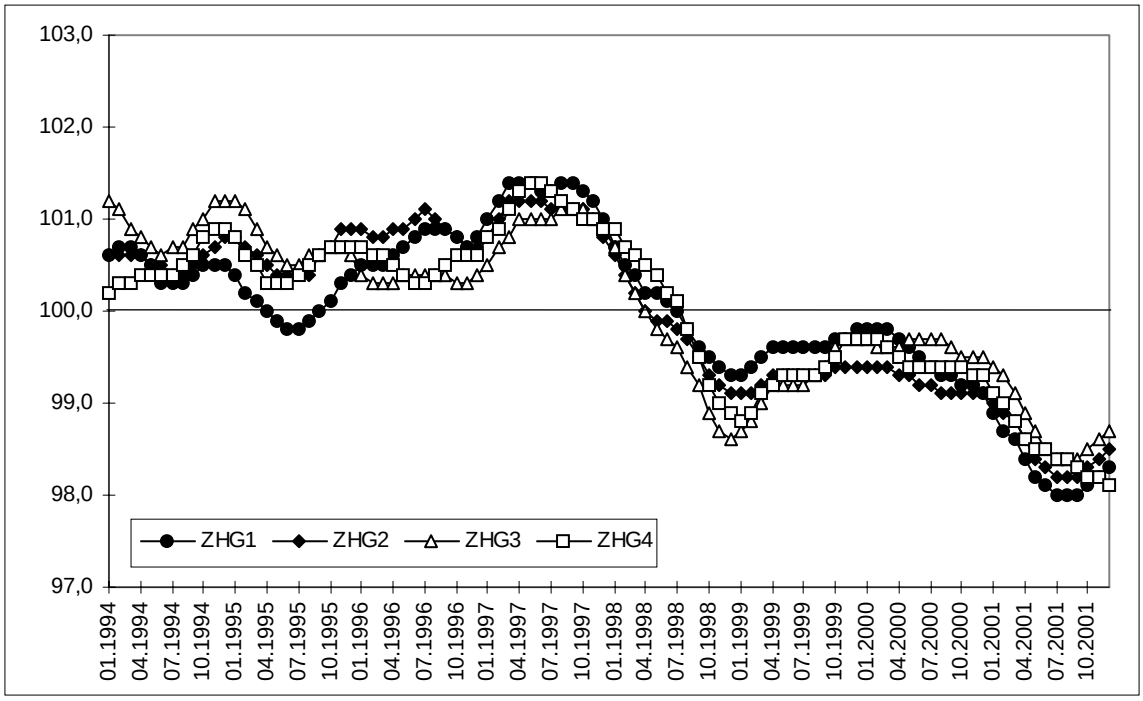

Figure 2a
General business tendency according to RIED-based ESI

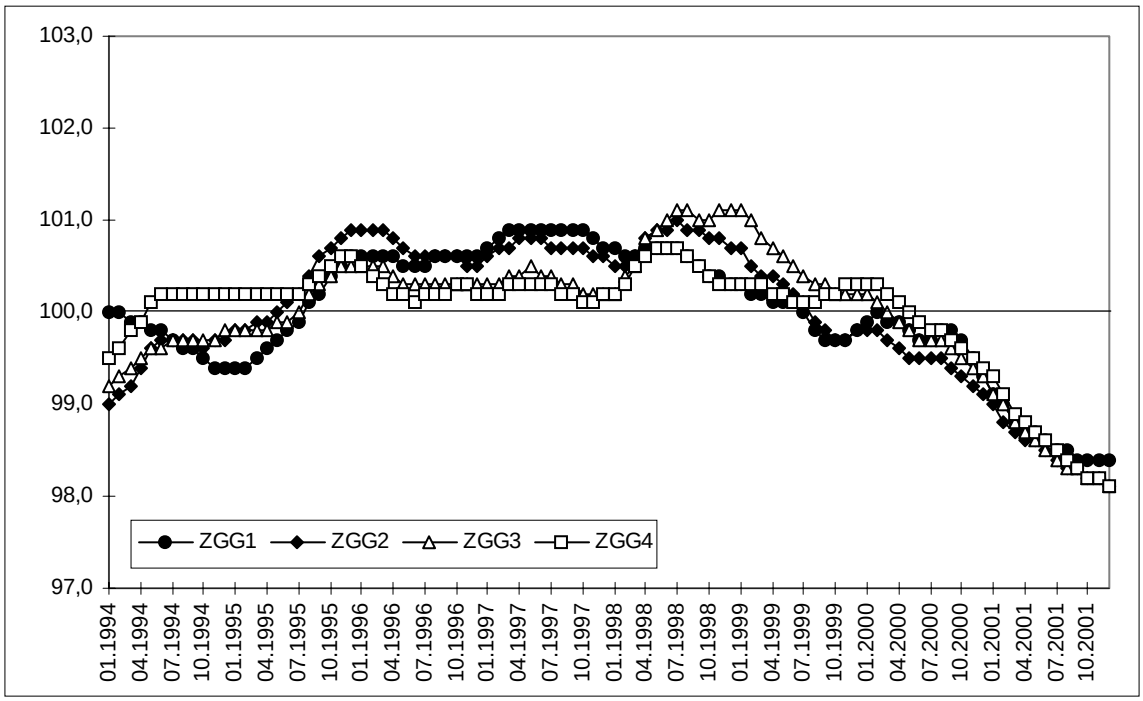

Figure 2b
General business tendency according to CSO-based ESI

Looking at the graphs, we can make two important observations. First, strikingly enough, it turns out that different ESI formulas give similar tendencies of general

business if they are filled with survey data from the same source. Secondly, the indicators compiled from RIED data signalled the slowdown in economic growth towards the end of period much sooner as compared to the indicators obtained from CSO data. The RIED-based indicators tend to rise less sharply when economy is booming (as in he first half of the analysed period), but they tend to fall more deeply when economic conditions deteriorate (as in the second half of the period). We can say that the RIED-based indicators are less sensitive to favourable than to unfavourable trends.

The difference between the RIED- and CSO-founded indicators can be partly explained by the fact that the first include agriculture, the sector most hit by economic reforms and foreign competition. But the difference also exists in variant 1, which does not include agriculture. If the major aim of ESI would be to signal the worsening of economic climate (rather than its improvement), then RIED-based indicators could have an advantage over the other source. On the other hand, CSO-based indicators seem to be more consistent with the actual trends of economic growth, e.i. its acceleration in the first half of the period and deceleration during the second half.

Table 2
Statistical properties of ESI variants

Code	Coverage	QCS	MCD	Relative contribution to stationary variance			Average duration of run			ARIMA forecast
				I	S	TC	I	MCD	TC	
ZHG1	*I* + *H* + *C* + *S*	0.31	1	1.5	27.4	78.4	2.1	5.0	6.3	no
ZHG2	*I* + *H* + *C* + *T* + *A*	0.26	1	0.9	48.9	58.5	1.9	3.3	5.6	no
ZHG3	*I* + *C* + *T* + *A*	0.44	1	1.8	69.6	35.8	2.0	3.1	6.8	yes
ZHG4	*I* + *C* + *T* + *A*	0.33	1	2.2	51.7	45.6	1.7	2.6	6.8	no
ZGG1	*I* + *H* + *C* + *S*	0.20	1	0.5	37.7	59.8	1.9	4.0	6.3	yes
ZGG2	*I* + *H* + *C* + *T*	0.20	1	0.3	66.5	34.3	1.9	3.8	6.8	yes
ZGG3	*I* + *C* + *T*	0.15	1	0.3	51.6	45.2	1.7	3.2	5.9	no
ZGG4	*I* + *C* + *T*	0.19	2	1.1	68.8	23.8	1.6	4.7	6.8	yes

I – industry, *H* – households, *C* – construction, *T* – trade, *A* – agriculture, *S* – stock exchange,
I – irregular, S – seasonal, TC – trend-cycle, QCS – quality control statistics (required QCS ≤ 1),
MCD – months for cyclical dominance (required MCD ≤ 6).

Table 2 shows statistical properties of the alternative ESI time series. All the calculated ESI variants have very good performance characteristics (QCS < 0.5, MCD ≤ 2) making them suitable for monitoring purposes. The amount of irregular movements, after preliminary smoothing of component variables, has been brought to minimum. Seasonal changes are very pronounced (in some variants extremely large), but relatively stable seasonal patterns allow for seasonal adjustment of time series. Nevertheless, indicators dominated by seasonal changes (notably ZHG3, ZGG2, and ZGG4) are less convenient for monitoring purposes. They surely require seasonal adjustment before any judgement is made on current business tendency. This drawback may disappear with longer time series, when cyclical movement becomes more pronounced.

Some of the indicators render autoregressive 12-month ARIMA projection. Other can also be extrapolated with less restrictive reliability constraints. However, such

automatic projections, even if based on quite stable variability patterns, may appear misleading in case of a sudden change that reverses the trend-cycle.

Seasonality seen in business and consumer survey data is a big problem which makes it difficult to interpret the results. Unfortunately, this problem is largely overlooked in the literature.[7] Many researchers interpret survey data as a genuine business tendency, with no allowance made for the seasonal factor. A rise in construction activity in early spring, or a surge of retail sales before holidays, are often falsely interpreted as a sign of recovery. Some institutions carrying out business surveys try to reduce the amount of seasonality by asking the respondents to formulate their answers 'net of seasonal change'. This certainly does not solve the problem, but only shifts the task of seasonal adjustment onto respondents. Very few surveying centres make systematically seasonal adjustment of their indicators. As a result, aggregate indicators derived from survey data also include a more or less pronounced seasonal element. The only way to cope with the problem is to examine the seasonality present in the time series analysed and, if it appears to be significant and stable enough, to remove it by the available statistical methods. This approach has been taken in this study when dealing with composite indicators of business activity based on survey data.

Detrended, deseasonalised and MCD-smoothed time series of the alternative ESI variants have been correlated against each other in order to check how closely they move together and whether they display any significant leads or lags which might be essential in choosing the most useful formula. For the lack of space, we shall not present here the correlation matrix, but the results may be summarised as follows. As it could be expected, indicators of similar coverage and weights, such as 1 and 2, or 3 and 4, give similar empirical patterns, which are closely correlated, provided that they are filled with the same data. But close correlation is also seen between the alternative indicators based on different formulas, if they are compiled from the same source of survey data. The source of data affects significantly the distribution of empirical values of the indicator and alters the total variance, resulting in much lower correlation. On the examination of graphs, the RIED-based indicators seem to display some lead over the CSO-based equivalents, but this is not clearly reflected in the results of cross-correlation. Correlation is strong (0.82 – 0.95) between the alternative indicators based on a single data source, but quite weak (0.50 – 0.81) between the indicators of the same or similar formula filled with different source data.[8] No significant lead or lag has been noticed in the evolution of alternative indicators over time.

All the indicators reveal an economic slowdown during the last few years. RIED-based indicators signalled the worsening of economic climate as early as in mid-1997, and CSO-based indicators announced the same a year later. These early indications of a slack have been ultimately confirmed by statistical data that showed a marked slowdown in economic growth. Composite indicators based on RIED data signalled the slowdown about 1.5 year in advance. On the other hand, the RIED-based indicators announce some improvement of economic climate at the end of 2001, not yet confirmed

[7] This author addressed the problem of seasonality seen in the RIED's survey data in a brief paper presented at CCET workshop in Budapest in 1996 (Z. Matkowski, 1996a).

[8] These are the maximum values of cross-correlation coefficients. They may, however, be biased due to apparent downward trend inherent in all the ESI time series in the period under consideration. For detrended time series internal correlation within each set of indicators based on the same source of data diminishes to 0.78 – 0.94 while any correspondence between the same indicator variants filled with different data almost entirely disappears.

by statistical data, while the alternative CSO-based indicators suggest a continuous depression.

The analysis of statistical properties of various ESI variants does not provide enough evidence in favour of any single indicator. Nor does it ultimately prove that one of the two sources of survey data has an absolute advantage over the other.

The examination of economic merits of various ESI formulas leads us to conclude that variants 1 (or 2) and 4 seem to be most promising and deserve further testing. Variant 1 is fully comparable with the harmonised EU ESI formula and it includes some leading indicators (order book, change in stocks, expected production, etc.) whereas its modified version 2 seems to be more suitable for the transition economy (with relatively less developed capital market and relatively well developed trade). Formulas 3 or 4 are a real alternative to the EU ESI concept; both represent a consistent ESI concept coming close to the real category of aggregate economic activity and more comparable with GDP.

The most adequate formula of the general indicator of business activity should be chosen by comparing the evolution of alternative indicators over a longer period with the actual development of the economy, as reflected by GDP growth rates and other objective statistical measures. The next paragraph brings such an analysis for the period covered by this study.

4. Conformity with the real economic development

The most important test for the practical usefulness of ESIs is their conformity with the actual economic development and the ability to signal changes in macroeconomic activity in advance. In order to assess these properties, we must first choose the indicator representing changes in the aggregate economic activity.

The most evident reference indicators are GDP and total industrial output, both measured in real terms (at constant prices). GDP has the advantage of much fuller coverage, but it is available only at quarterly intervals, while the industrial production index is published at monthly intervals, much sooner than recent GDP estimates. Therefore, both the indicators can be used to show economic cycles.

As to the form of reference indicators, the available statistical data include the following measures:

(a) constant base index (1995 = 100) representing the change in absolute production levels;
(b) chain index representing current (monthly or quarterly) growth rates against the preceding period;
(c) chain index representing annual growth rates against the respective month or quarter of the preceding year.

In the period under consideration, Poland's economy has not revealed *business cycles* in the traditional meaning of the term, including a recession marked by the absolute fall in real GDP. There were, however, significant swings in the rate of economic growth which could be qualified as *growth cycles*. The latter category is very comprehensive, though more difficult to interpret. It includes both fluctuations in the absolute levels of total output and more discrete fluctuations of the growth rate, with constant rise in output levels. Growth cycles can be discriminated using cyclical

components of the reference indicator (trend deviation) or its growth rates.[9]

Absolute figures are surely unsuitable for growth cycle analysis. More appropriate are trend deviations calculated from the constant base index, or growth rates. Current monthly or quarterly growth rates are extremely volatile, dominated by seasonal and irregular movements. More indicative of cyclical swings are annual changes against the respective period of the preceding year.

Therefore, for both the GDP and industrial production, we shall apply two measures:

(a) trend deviations (from a linear trend);

(b) annual growth rates (against the respective period of the preceding year).

After seasonal adjustment and some discrete smoothing,[10] they can be used to represent growth cycles.

The reference indices should be applied in monthly intervals, used in our ESI time series. Industrial production index (IP) is readily available at this frequency from the published statistical data. GDP index, available on a quarterly basis, has been interpolated to monthly intervals for the purpose of this analysis. Volume indices of industrial production and GDP are quite closely and simultaneously correlated (with coefficient 0.99 for undetrended and 0.81 for detrended time series).

Another reference indicator may be the general coincident index (GCI), used as a reference frame in our work on composite leading indicators. It is a proxy for GDP, compiled at monthly intervals from the available statistical data on output or sales volumes in five major sectors of the economy: industry, construction, agriculture, trade, and transport, weighted by their shares in GDP. Altogether, they cover about $^2/_3$ of GDP. Unlike the GDP figures, which are calculated at yearly and quarterly intervals and published with a substantial delay, the GCI can easily be calculated on a monthly basis, 3–5 months before the GDP quarterly data are released. This timing gain is an important advantage of this indicator for monitoring and forecasting purposes, and it was the main reason for its introduction.[11] Since the dynamics of GCI does not differ much from that of GDP (in the period considered, both indicators are simultaneously correlated with coefficient 0.99 for undetrended and 0.84 for detrended time series), we shall not include here the results for ESI conformity with GCI. These results are however essential in developing GDP forecasts on the basis of our composite indicators.

Statistical properties of the reference indicators are acceptable, even though irregular and seasonal components contained in some time series are quite strong. Constant base indices (GDPI, IPI, and GCI) are characterised by remarkable seasonality while the annual growth rates (GDPG and IPG), calculated against the respective month of the preceding year, are obviously free of seasonal impact. The amount of irregular factor can be brought to the minimum by MCD-smoothing. The GDP index is marked by QCS = 0.32 and MCD = 1, with practically no random movement, but it has a heavy content of seasonal changes in the stationary portion of the variance. The industrial production index is much more volatile, with QCS = 0.72, MCD = 5 and quite significant amount

[9] For the relation between both concepts of economic cycles see: M. Bronfenbrenner, ed. (1969), A. E. Ott, ed. (1973), P. A. Klein, G. H. Moore (1985), V. Zarnowitz (1992), M. P. Niemira, P. A. Klein (1994), G. Tichy (1994). Old and new arguments in favour of growth cycle analysis are systematically summarised in the recent paper by V. Zarnowitz, A. Ozyildirim (2002).

[10] Rough data have been pre-smoothed using 3-month moving average; seasonally adjusted time series, whenever necessary, have been further smoothed with MCD moving average.

[11] The concept of GCI and the way in which its cyclical component is isolated have been clarified in our earlier publications. See Z. Matkowski (1996b, 1997b, 1997c).

of both irregular and seasonal components, but with MCD-smoothing QCS improves to 0.36 and the irregular component is reduced almost to null. Our own indicator of aggregate economic activity (GCI) has QCS = 0.51, MCD = 5 and a minor amount of irregular component, but a considerable share of seasonal factor. GDP growth rates are marked by QCS = 1.06 and MCD = 1, with virtually no irregular or seasonal contents. Industrial output growth rates are again much less regular, with rather poor performance characteristics: QCS = 1.93, MCD = 8, and a heavy content of irregular changes. Only after intensive MCD-smoothing can the random element be reduced to a tolerable level.

Due to broader economic coverage and better statistical properties, GDP is the best single indicator of economic growth cycles. For this purpose, it should be taken as a deseasonalised and detrended constant-base index or in the form of annual growth rates. The two other reference indicators, IP and GCI, may be supplementary measures to be used mainly for the verification and updating of GDP.

Figures 3a and 3b show the growth cycles revealed by our reference indicators: GDP, IP, and GCI. The upper graph shows the fluctuation of their cyclical components while the lower graph depicts the oscillation in growth rates. All the variables presented here have been normalised (amplitude-adjusted) as to facilitate the comparison.

As regards the different forms of reference indicators, trend deviations are not significantly correlated with undetrended time series while the growth rates (against the respective month of the preceding year) are quite weakly and often inversely related to trend deviations. This means that growth cycles identified on the basis of trend deviations may significantly differ from those revealed by the growth rates.

It should be noted that the chronology and amplitude of economic cycles critically depend on how they are identified, e.i. on the reference indicator and its numerical expression. Growth cycles represented by GDP and IP time series will certainly differ. For a given reference indicator, peaks and troughs of its cyclical component (trend deviation) will rarely coincide with lows and highs of growth rates (simply because current growth rates come to null at turning points of output levels). As regards trend deviations, dating of growth cycles depends much on the form of trend (linear or non-linear) as well as on the way of its estimation and elimination. All in all, there is no single pattern of growth cycles for any given time series.[12]

In order to check the conformity of our ESIs with the actual development of the economy, we have applied cross-correlation. All the time series have been seasonally adjusted and MCD-smoothed. ESI time series in undetrended and detrended form were correlated with the above reference indicators.[13] The results are given in Table 3. The figures show the maximum value of correlation coefficient, observed at the indicated lead or lag (in brackets). Correlation below 0.50 and/or inverted has been reported as insignificant (*ns*).

[12] Typical relationships between different forms of cycles are elucidated in the literature. See eg. G. Tichy (1976), M. Körber-Weik (1983), and Z. Matkowski (1997a). However, the attention is focused on the fluctuation of absolute levels, trend deviations and current growth rates. No reference is made to the fluctuation of annual growth rates calculated against the respective period of the preceding year.

[13] Both ESI time series and the annual growth rates display a falling trend towards the end of period, so they should be detrended for the purpose of cross-correlation to make them stationary. Over a longer run, however, ESI time series, based on normalised components, and the growth rates of reference indicators tend to be stationary.

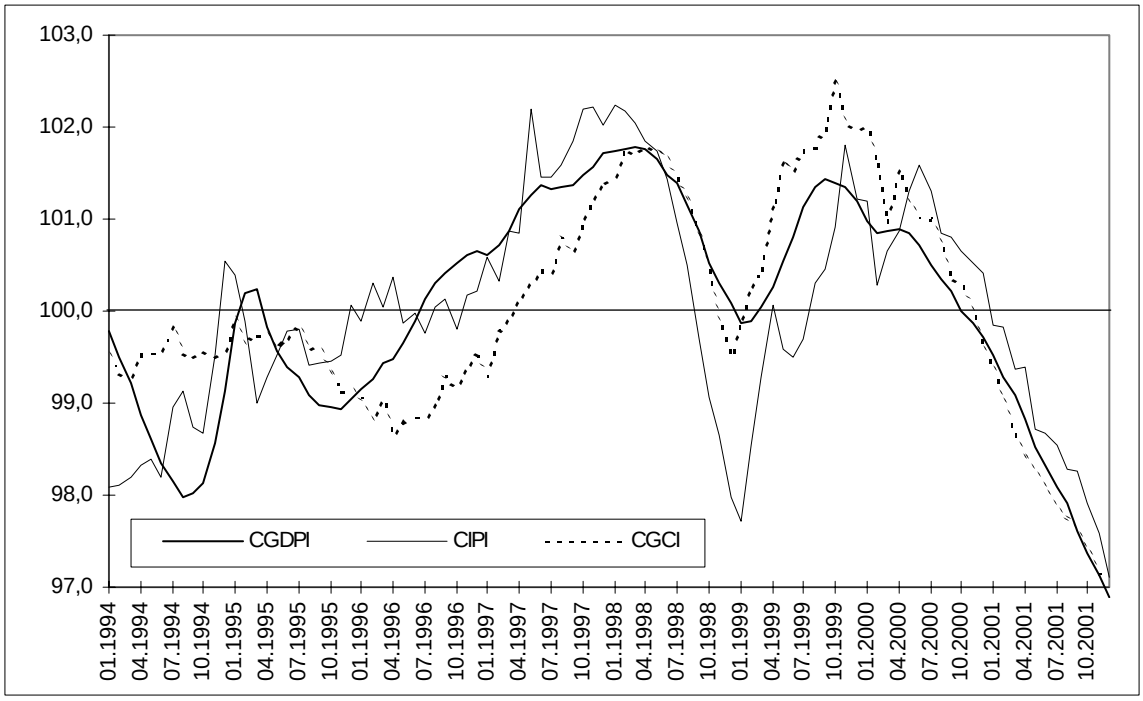

Figure 3a
Cyclical components of reference indicators: GDP, IP, and GCI

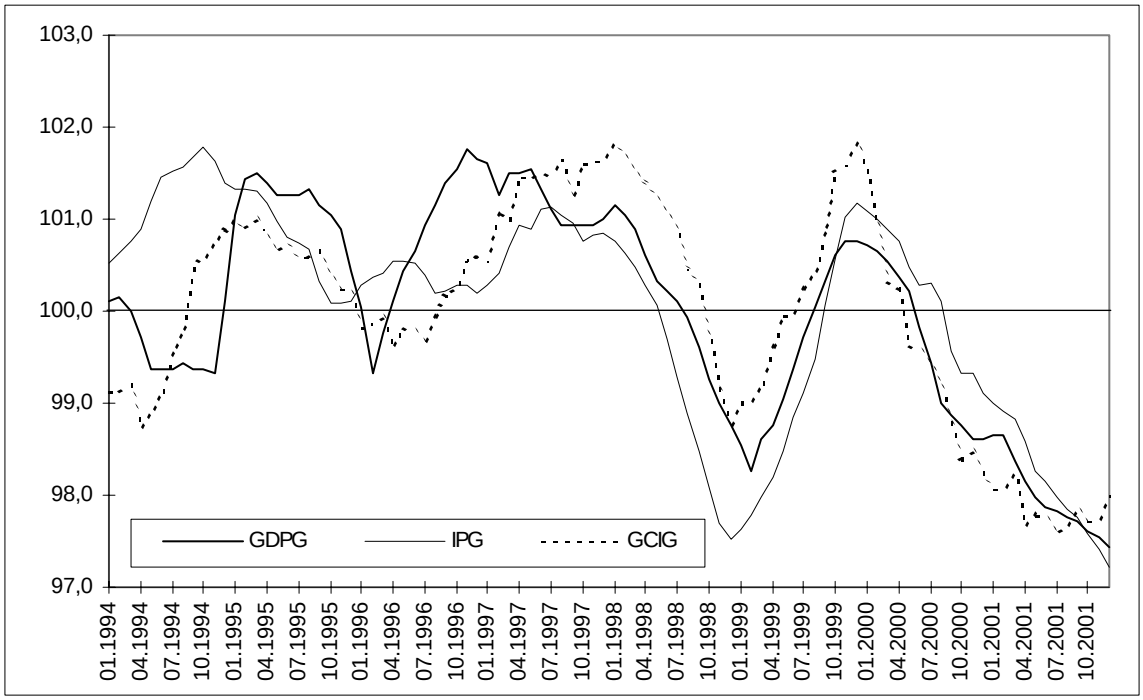

Figure 3b
Growth rates of reference indicators: GDP, IP, and GCI

Table 3
Cross-correlation between ESIs and reference indicators

ESI	GDP		IP	
absolute values or trend deviation*	trend deviation (CGDPI)	growth rate (GDPG)	trend deviation (CIPI)	growth rate (IPG)
ZHG1	0.826 (–2)	0,803 (0)	0.800 (–1)	0,725 (0)
ZHG2	0.684 (–2)	0,795 (0)	0.759 (–1)	0,734 (0)
ZHG3	*ns*	0,726 (0)	0.729 (–1)	0,862 (0)
ZHG4	0.685 (–2)	0,800 (0)	0.864 (0)	0,801 (0)
ZGG1	0.786 (0)	0,718 (+4)	0.644 (0)	*ns*
ZGG2	0.715 (–3)	0,660 (+3)	0.571 (0)	*ns*
ZGG3	0.737 (0)	0,537 (+1)	*ns*	*ns*
ZGG4	0.769 (0)	0,688 (0)	0.632 (0)	*ns*

* Absolute values of the ESIs were correlated with GDP and IP growth rates while trend deviations of the ESIs were correlated with trend deviations of GDP and IP.
ns – maximum correlation coefficient below 0.500 and/or negative.

For the lack of space we have not included the results of correlation between the ESI time series and the reference constant-base indicators (GDPI and IPI), both taken in undetrended form. As expected, the correlation here is rather weak and inverse, meaning that our indicators do not move together with undetrended GDP and IP. This is because the reference indicators are continuously rising during the whole period covered by the analysis while ESIs tend to decrease since the downturn of 1997/98, indicating a worsening of economic climate. But most ESIs are significantly and positively correlated with the annual growth rates of reference indicators (GDPG and IPG). This is especially true for the RIED-based indicators (correlation between 0.73 and 0.86). Pure cyclical components of our ESIs (seasonally adjusted, MCD-smoothed and detrended time series) are also in line with the corresponding cyclical movement of reference indicators (CGDPI and CIPI). The RIED-based indicators again perform better as compared to the CSO-filled indicators (correlation between 0.68 and 0.86). What is also important, most RIED-based indicators tend to lead (by 1-2 months) the actual cyclical development of the economy.

These findings are very important for a proper interpretation of survey-based composite indicators. Such indicators are very sensitive to any worsening of economic conditions. As a result, they tend to decrease even if the activity level remains high, but the growth rates of output and sales start to decelerate. Therefore, the ESI graphs are indicative of the change in the growth rates rather than in absolute activity levels. Alternatively, they can be used to assess the cyclical developments as reflected by the detrended indicators of aggregate economic activity. Looking at ESIs, we may not interpret their signals in terms of the absolute activity levels.

From table 3, it can be seen that some ESI variants, particularly those based on the RIED data (notably ZHG1 and ZHG4), are significantly correlated with the reference cycle, either synchronically or with some lead. ZHG1 gives the best fit to the actual development of the economy, as expressed by the cyclical components and growth rates on GDP and industrial production. ZHG4 is equally good except for its poor link with the detrended GDP. This makes them useful for monitoring and forecasting purposes. Most CSO-based indicators perform worse, but again the same variants, e.i. ZGG1 and ZGG4, are best related to the actual cyclical developments.

Additional proof is given by the regression equations which show the ability of various ESIs to reflect actual fluctuations in GDP and industrial output. Table 4 presents

the regression results against GDP. A similar set of regression equations was also estimated for industrial output, but for the sake of conciseness, it is not presented here. The results are included in Table 4. The leads or lags displayed by some predictors have been indicated in brackets. All the parameter values in the regression equations are statistically significant, but only few ESI variants give a satisfactory fit. GDP growth rates are best reflected by ZHG1, ZHG2, ZHG4, and ZGG1 while the cyclical component of GDP is best matched by ZHG1 and ZGG1. Once more, we see that certain ESI variants, notably those filled with RIED data, give quite a good fit to the evolution of GDP growth rates and trend deviations. Some indicators also tend to display a lead against the reference index.

Table 4
Regression results for GDP

Dependent variable	Predictor	Constant	Parameter	R^2
Undetrended time series				
GDPG	ZHG1 (0)	–83.6 (–5.8)	1.9 (13.1)	0.65
GDPG	ZHG2 (0)	–79.2 (–5.5)	1.8 (12.7)	0.63
GDPG	ZHG3 (0)	–76.2 (–4.3)	1.8 (10.2)	0.53
GDPG	ZHG4 (0)	–88.7 (–5.9)	1.9 (12.9)	0.64
GDPG	ZGG1 (+4)	–115.6 (–6.6)	2.2 (12.6)	0.64
GDPG	ZGG2 (+3)	–78.8 (–4.3)	1.8 (10.1)	0.53
GDPG	ZGG3 (+1)	–52.7 (–2.2)	1.6 (6.4)	0.31
GDPG	ZGG4 (0)	–128.5 (–5.1)	2.3 (9.2)	0.47
Detrended time series				
CGDPI	CZHG1 (–2)	–123.7 (–8.1)	2.2 (14.7)	0.70
CGDPI	CZHG2 (–2)	–126.5 (–5.1)	2.3 (9.1)	0.47
CGDPI	CZHG3 (–2)	–59.0 (–1.9)	1.6 (5.0)	0.21
CGDPI	CZHG4 (–2)	–102.8 (–4.7)	2.0 (9.3)	0.49
CGDPI	CZGG1 (0)	–107.3 (–6.4)	2.1 (12.3)	0.62
CGDPI	CZGG2 (–3)	–83.0 (–5.0)	1.8 (10.9)	0.57
CGDPI	CZGG3 (0)	–74.5 (–4.5)	1.7 (10.6)	0.54
CGDPI	CZGG4 (0)	–138.6 (–6.8)	2.4 (11.7)	0.59

GDPG – GDP annual growth rates (against the corresponding period of the preceding year);
CGDPI – detrended GDP index (1995 = 100).
The number of leads or lags and *t*-statistics are given in brackets.

Another important test for our ESIs is their performance at the major turning point of economic growth in 1997–1998. This is documented by Table 5. The peak of economic activity, as indicated by IP and GDP trend deviations, was reached in late 1997 or early 1998. The slowdown was earlier marked by the falling rates of economic growth: industrial output started to decelerate in mid 1997, and GDP growth began to abate even sooner, at the end of 1996.[14]

Table 5

[14] In yearly data, the year 1997 nevertheless witnessed a new height of economic growth, with the increase in GDP by 6.8% and the rise in IP by 20.8%. The slowdown was reflected in 1998 annual data as the GDP and IP growth rates fell to 4.8% and 3.5% respectively. In the following years the GDP growth rate decreased to 4.1% in 1999, 4.0% in 2000, and merely 1.1% in 2001.

The behaviour of ESIs around the major peak in 1997–98

ESI	CGDPI (03.1998)	GDPG (12.1996)	CIPI (11.1997)	IPG (06.1997)
ZHG1 (09.1997)	–6	+9	–2	+3
ZHG2 (04.1997)	–11	+4	–7	–2
ZHG3 (09.1997)	–6	+9	–2	+3
ZHG4 (04.1997)	–11	+4	–7	–2
ZGG1 (10.1997)	–5	+10	–1	+4
ZGG2 (07.1998)	+4	+19	+8	+13
ZGG3 (06.1998)	+3	+18	+7	+12
ZGG4 (06.1998)	+3	+18	+7	+12

CGDPI – detrended GDP index (1995 = 100);
GDPG – GDP annual growth rates (against the corresponding period of the preceding year);
CIPI – detrended IP index (1995 = 100);
IPG – IP annual growth rates (against the corresponding period of the preceding year).

Looking at trend deviations, the major slowdown was signalled by all the ESIs based on RIED survey data well in advance: half a year or almost one year before. Meanwhile, most ESIs based on CSO data (except of ZGG1) have revealed the slack with some delay though it was suggested by their stagnation much earlier.

However, almost all the ESIs failed to announce the halt to rapid economic growth earlier than GDP and IP growth rates did. This finding could raise some doubts about the performance of our indicators at the major downturn. Nevertheless, the validity of our indicators may be defended by the following arguments. First, growth rates have typically a technical lead over the absolute figures and trend deviations at the upper turning point (Tichy, 1994; Zarnowitz, 1992). If the ESI time series are transformed into growth rates – an exercise which has not been made here because its results are simply meaningless – they would probably display some leads over the GDP and IP growth rates. Second, statistical data on GDP growth are published with a considerable delay (up to 6 months) whereas the ESIs can be compiled much sooner (up to 3 months). Third, the ESIs have been designed not only to signal economic fluctuations, but also to verify the significance of the official statistical data. In this function, they remain useful independent of their forecasting properties.

The diagnostic and prognostic performance of our ESIs is illustrated by Figures 4a and 4b. All the indicators have been normalised as to adjust their amplitudes. The upper graph shows the evolution of the detrended ZHG1 (the dotted line) against the cyclical component of GDP (the solid line).[15] The lower graph shows the evolution of the same indicator against the GDP growth rates. The peaks and troughs of the reference cycle have been marked, together with the respective swings in our indicator. We can see that the plotted ESI time series has been well correlated with the actual fluctuations in economic activity and that it signalled most swings in economic growth either synchronically or in advance. This is especially true as regards trend deviations.

[15] Cyclical components of all the indicators were isolated from deseasonalised, MCD-smoothed and detrended time series.

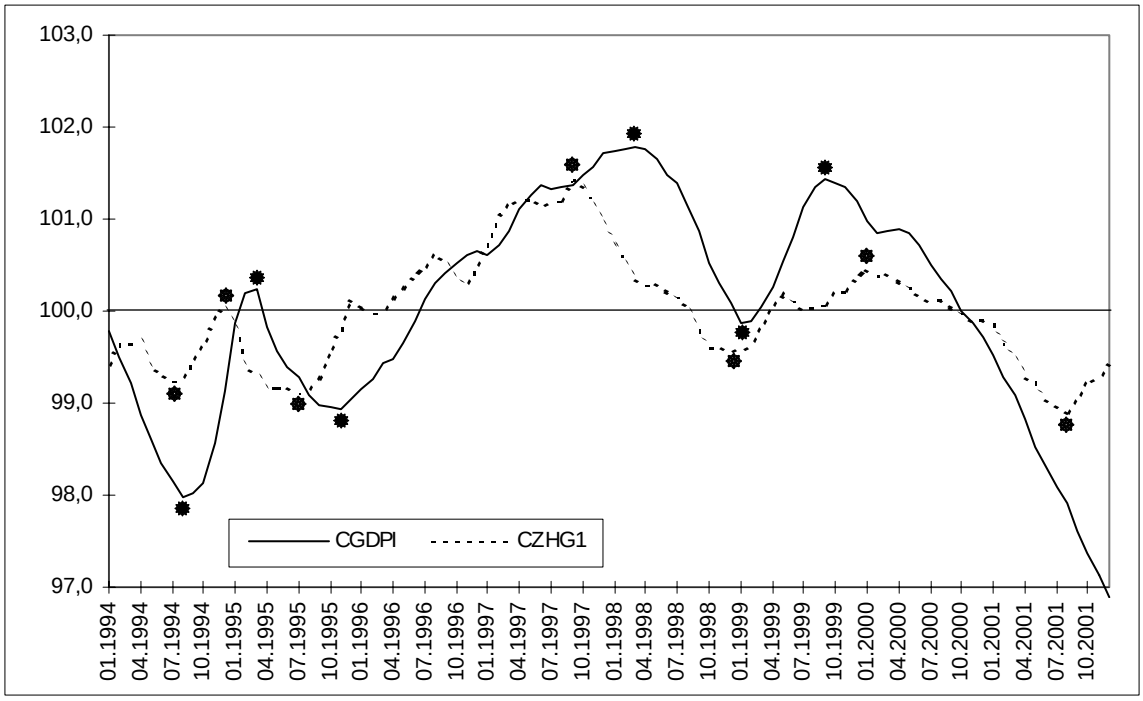

Figure 4a
Detrended ESI (CZHG1) and the cyclical component of GDP (trend deviations)

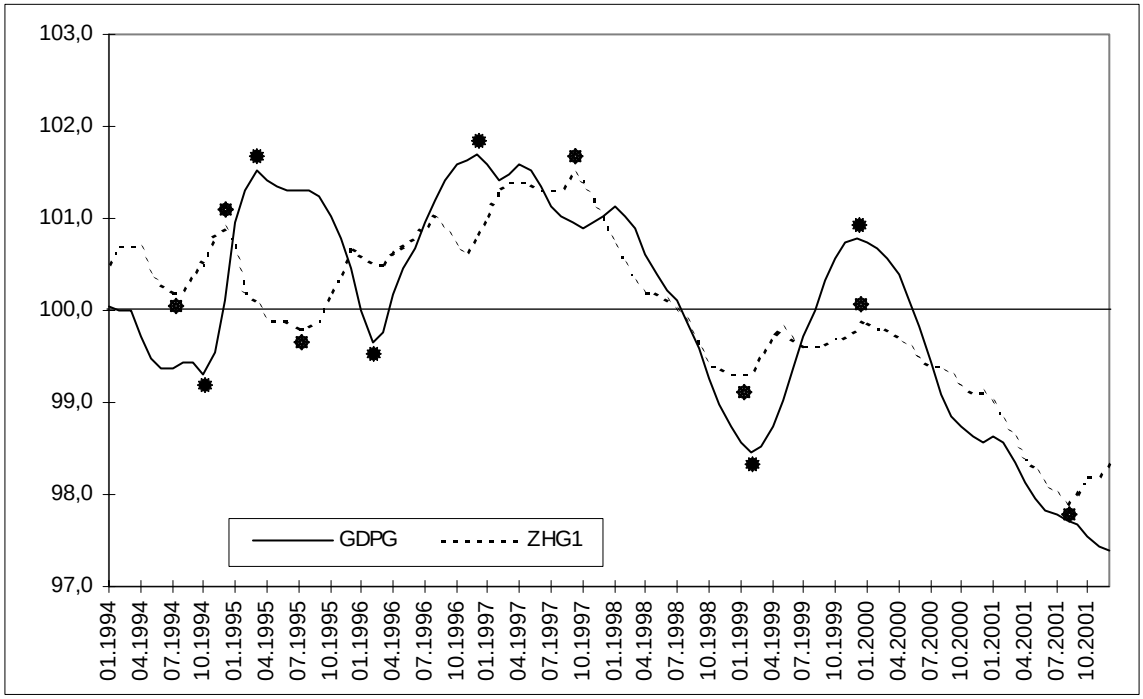

Figure 4b
Economic sentiment indicator (ZHG1) and the GDP growth rates

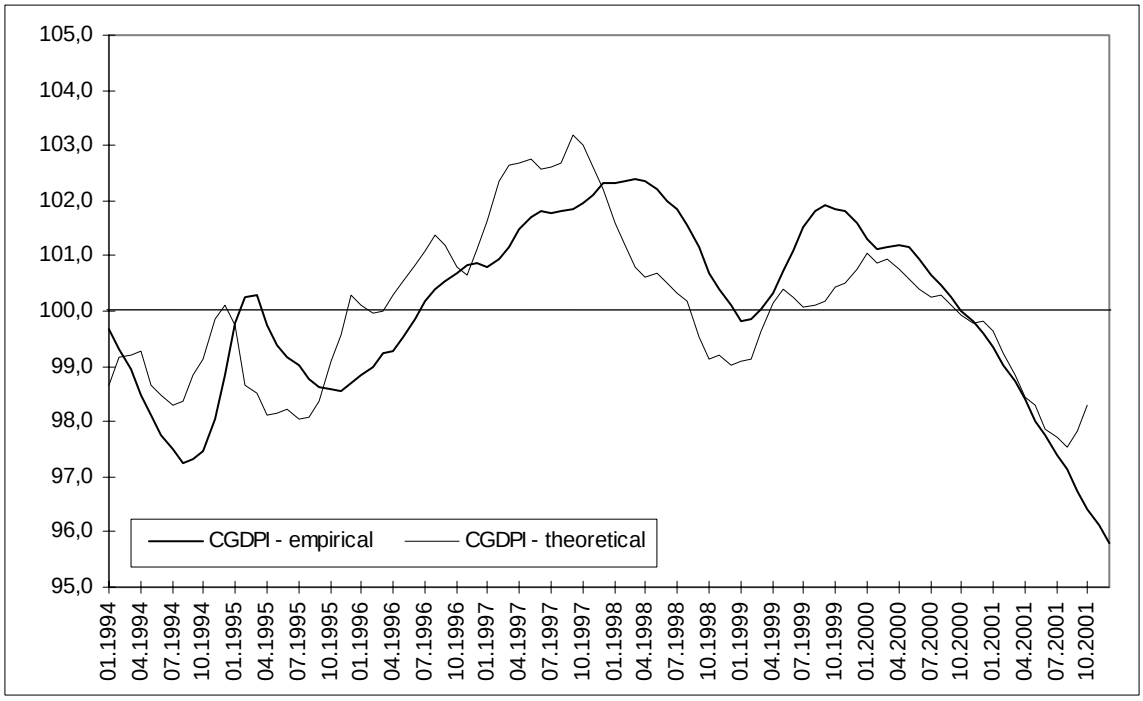

Figure 5a
Growth cycle of GDP and its representation by the regression against ESI (CZHG1)

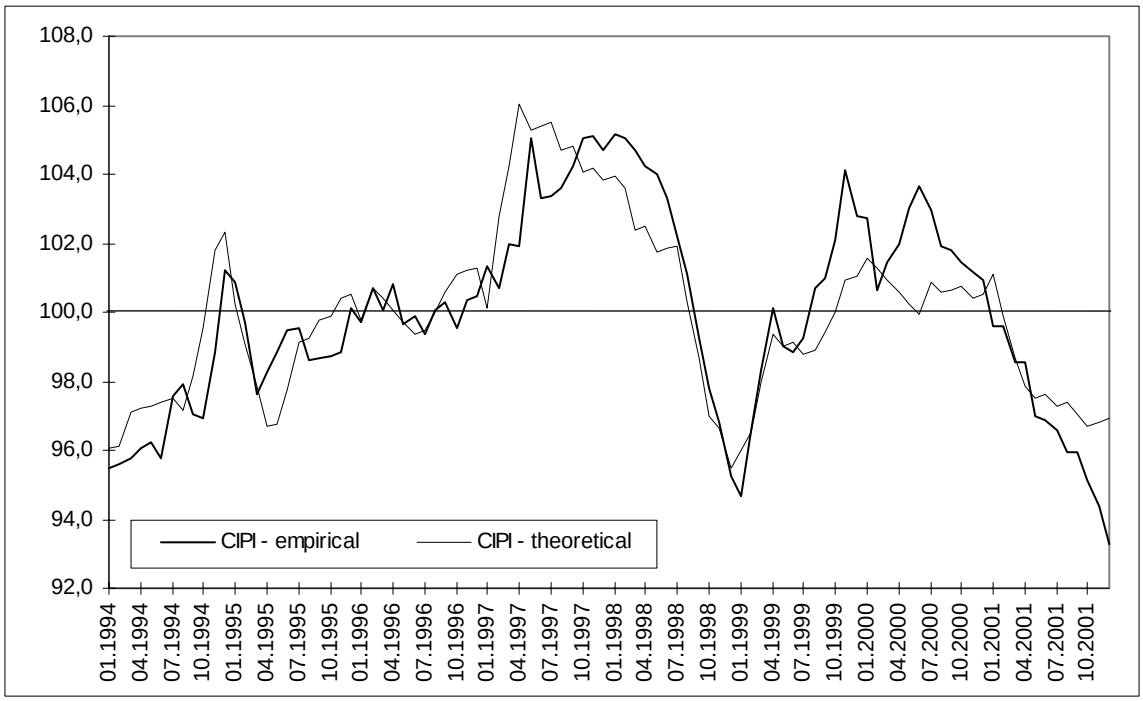

Figure 5b
Growth cycle of IP and its representation by the regression against ESI (CZHG4)

Using the estimated regression equations, we can predict or notice without any delay all major swings in the aggregate economic activity. Figures 5a and 5b illustrate such capacity of indicators ZHG1 and ZHG4 against the cyclical movement of GDP and IP

respectively. The thick line marks the actual growth cycles while the thin line gives the simulated picture obtained from the respective regression equations. The graphs show a very good fit to actual growth cycles.

Figures 4 and 5 reveal a strikingly close correspondence between the real economic developments and their reflection given by some composite indicators compiled from business survey data. Some of the indicators have apparent forecasting properties, both as regards the average lead and the behaviour at turning points.

Certainly, not all the tested ESI variants perform equally well in terms of their conformity with the actual economic development and the capacity to signal major swings in economic growth. This justifies our continuous search for the most effective variant, best suited for monitoring and forecasting purposes.

The analysis of the performance of our ESIs against the actual development of the economy leads us to conclude that, in the period covered by this analysis, the RIED-based indicators have had a better proof as compared with the CSO-founded indicators. In both samples of survey data, the best fit is found with ESI formulas 1 and 4. The same formulas have been earlier recommended on the basis of their economic merits. Thus, the most promising formulas for our further research seem to be: ZHG1 and ZHG4 or, eventually, ZGG1 and ZGG4.

The close correlation between some indicators based on survey data and the reference indicators of economic growth provides an additional empirical proof to the hypothesis that real macroeconomic developments depend to a large extent on microeconomic perception of current conditions and prospects. Microeconomic judgements about the current situation and probable prospects influence the supply and demand decisions taken by economic agents, thus shaping the actual course of economic activity. Therefore, economic sentiment indicators, reflecting microeconomic assessments and attitudes, are a valuable tool in business cycle analysis.

The major shortcoming of this analysis is the relative shortness of available time series, both for economic sentiment indicators and the reference data. As a matter of fact, the period covered by this analysis does not even encompass one fully fledged business cycle in the classical sense. But at least two complete growth cycles can be distinguished in terms of trend deviations or growth rates.[16]

In order to assess monitoring and forecasting ability of our indicators, we should analyse their performance at both the upper and lower turning points over a longer period, including several cycles. The period covered by this analysis is too short for making a final judgement and a final choice between the ESI variants. This very fact calls for the continuation of our research. Nevertheless, the analysis has provided significant proof of the practical usefulness of our ESIs, as well as some evidence as to the comparative performance of the alternative variants. One important finding is that the RIED-based indicators tend to provide a better indication of the current course of the economy as compared with their counterparts filled with CSO data.

5. Performance of component indicators

Before we reach any conclusion about the most promising ESI formula and the most

[16] The concept of growth cycle includes, apart from the fluctuations in output levels, also more discrete fluctuations reflected in trend deviations or growth rates. Therefore, the number of growth cycles is usually bigger as compared to the traditionally perceived business cycles, and their average length is shorter.

reliable data source, we should also assess the quality of component indicators entering our ESIs. The latter represent business tendencies in major sectors of the economy: industry, construction, agriculture, and trade, as reflected by survey data. Certainly, the adequacy of our aggregate indicators directly depends on the adequacy of component sectoral data. Therefore, it might be worth while to examine statistical properties of component indicators and their conformity with the actual development of the sectors concerned.

Table 6
Statistical properties of sectoral survey data

Code	Coverage	QCS	MCD	Relative contribution to stationary variance			Average duration of run			ARIMA forecast
				I	S	TC	I	MCD	TC	
ZH01	Industry	0.61	1	2.7	32.2	64.4	2.2	4.0	4.0	yes
ZH03A	Industry	0.56	2	3.7	45.6	48.5	1.8	3.6	6.8	no
ZH05A	Industry	0.44	1	2.5	39.4	59.3	1.8	4.5	4.5	no
ZG01	Industry	0.64	1	2.0	20.9	72.6	1.7	3.1	8.6	yes
ZG03A	Industry	0.32	3	2.3	71.6	16.4	1.8	3.6	6.8	yes
ZG05A	Industry	0.19	3	0.7	73.1	19.9	1.7	5.8	7.9	yes
ZH09	Construction	0.38	1	0.5	50.9	50.9	2.0	5.9	5.9	yes
ZH11A	Construction	0.30	1	1.1	87.7	20.4	2.6	4.3	5.9	no
ZG06	Construction	0.23	2	1.0	93.7	11.3	2.0	4.2	5.0	yes
ZG08A	Construction	0.34	1	0.6	76.3	22.6	2.0	4.1	5.6	yes
ZG10A	Construction	0.35	1	0.5	71.8	29.1	1.9	3.5	3.5	yes
ZH17	Trade	0.61	1	4.1	68.0	22.9	2.3	4.3	5.6	yes
ZH20A	Trade	0.65	1	1.3	34.8	55.7	2.4	4.8	9.5	yes
ZG13	Trade	0.22	1	0.9	22.6	71.8	1.7	3.0	7.9	no
ZG15A	Trade	0.20	2	1.3	39.1	56.4	1.7	4.4	2.6	yes
ZH25	Agriculture	0.28	1	0.4	15.1	78.7	2.0	5.3	6.8	yes

QCS – quality control statistics (required QCS ≤ 1),
MCD – months for cyclical dominance (required MCD ≤ 6).

Table 6 shows statistical properties of component indicators entering our ESIs. All of them have good performance characteristics, with QCS ranging from 0.2 to 0.7 and MCD equal to 1, 2 or 3. Irregular factor is insignificant while seasonal factor is strongly pronounced and sometimes it can obscure cyclical movement. This especially applies to the following components: ZG03A and ZG05A (industry), ZH11A, ZG06, ZG08A, ZG10A (construction), and ZH17 (trade). This fact may call for certain modification of the ESI formulas that employ those components (eg. ZHG4 and ZGG4). However, before any adjustment is made in ESI formulas, we should probably wait until the period covered by the analysis is long enough to include more pronounced cyclical movements. At the same time, improvements in business survey questionnaires can also reduce the amount of seasonal factor.

Table 7
Cross-correlation between survey-based ESI components and reference indicators

Survey-data indicator	Respective statistical indicator		
	constant-base index	detrended index[a]	growth rate
Industry			
ZH01	ns inv.	0,793 (0)	0,647 (+1)
ZH03A	ns inv.	0,856 (0)	0,753 (0)
ZH05A	–0,612 (+5) inv.	0,686 (–1)	0,907 (0)
ZG01	–0,645 (+13) inv.	0,775 (0)	0,712 (+1)
ZG03A	–0,663 (+3) inv.	0,680 (0)	0,747 (0)
ZG05A	ns	ns	ns
Construction			
ZH09	–0,832 (+20) inv.	0,751 (–5)	0,787 (–1)
ZH11A	–0,796 (+20) inv.	0,578 (–3)	0,691 (0)
ZG06	–0,666 (+19) inv.	0,705 (–2)	0,803 (0)
ZG08A	–0,762 (+18) inv.	ns	0,738 (0)
ZG10A	–0,815 (+20) inv.	0,667 (–3)	0,793 (0)
Trade			
ZH17	–0,657 (0) inv.	ns inv.	ns
ZH20A	–0,910 (0) inv.	ns inv.	ns
ZG13	ns inv.	ns	0,509 (+5)
ZG15A	0,509 (–19)	ns	0,505 (+6)
Agriculture			
ZH25	–0,832 (0) inv.	–0,669 (+7) inv.	.

[a] Detrended survey-based indicator against detrended statistical constant base index.

Much more important is the adequacy of sectoral survey data and their conformity with the actual development of output and sales. Table 7 brings the results of cross-correlation between the survey-based indicators of business activity in individual sectors of the economy and their real counterparts given by output and sales statistics. As reference indicators we took the constant-base volume indices of industrial production, construction and retail sales, and for agriculture we applied our own volume index of production sold. Most sectoral indicators based on business surveys tend to be inversely correlated with output or sales volumes in the respective sectors, i.e. they usually move in the opposite direction. However, detrending greatly improves the fit. Most of the indicators are quite closely related to the growth rates of the sectors concerned.

These findings support our earlier observation about the link between the indicators based on survey data and the statistical data on the actual development of the economy. Survey-based indicators cannot be simply interpreted in terms of rising or falling activity levels. They are rather indicative of changing growth rates. If there is any trend in their evolution over time, they should be detrended as to reflect business tendency properly. Over a longer period the indicators based on survey data should become stationary (with no apparent trend). Nevertheless, they should be confronted with the dynamics of the respective sectors rather than with the absolute changes in the activity levels.

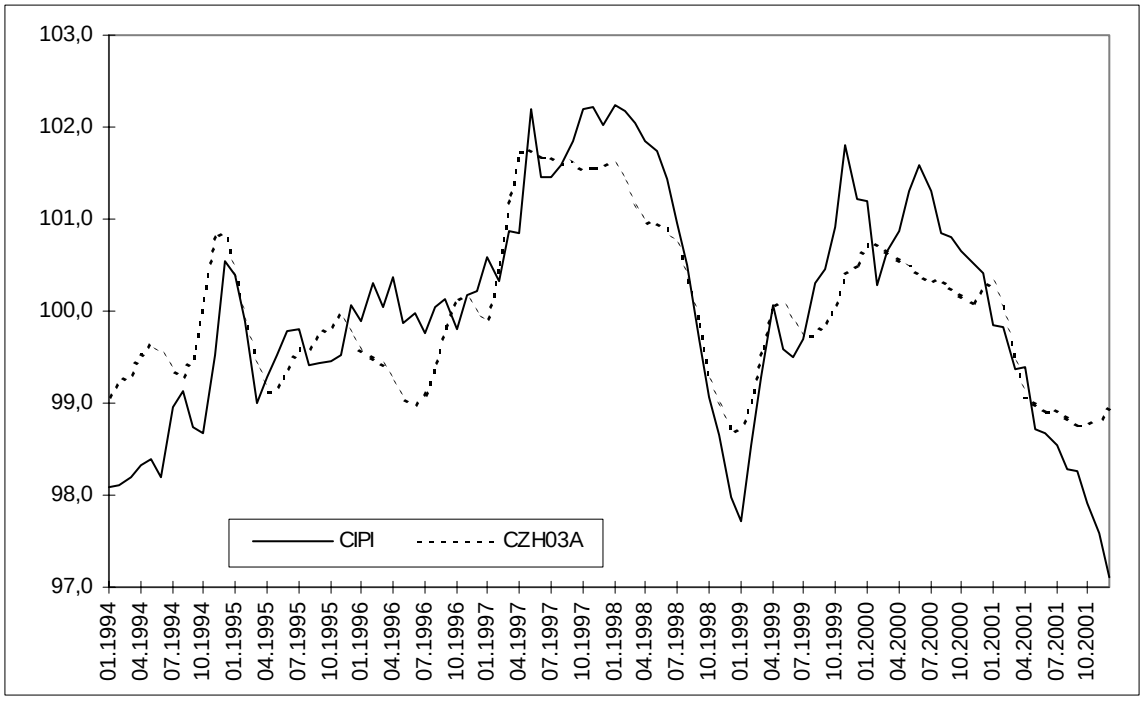

Figure 6a
Detrended survey indicator for industry (CZH03A)
and the cyclical component of industrial production

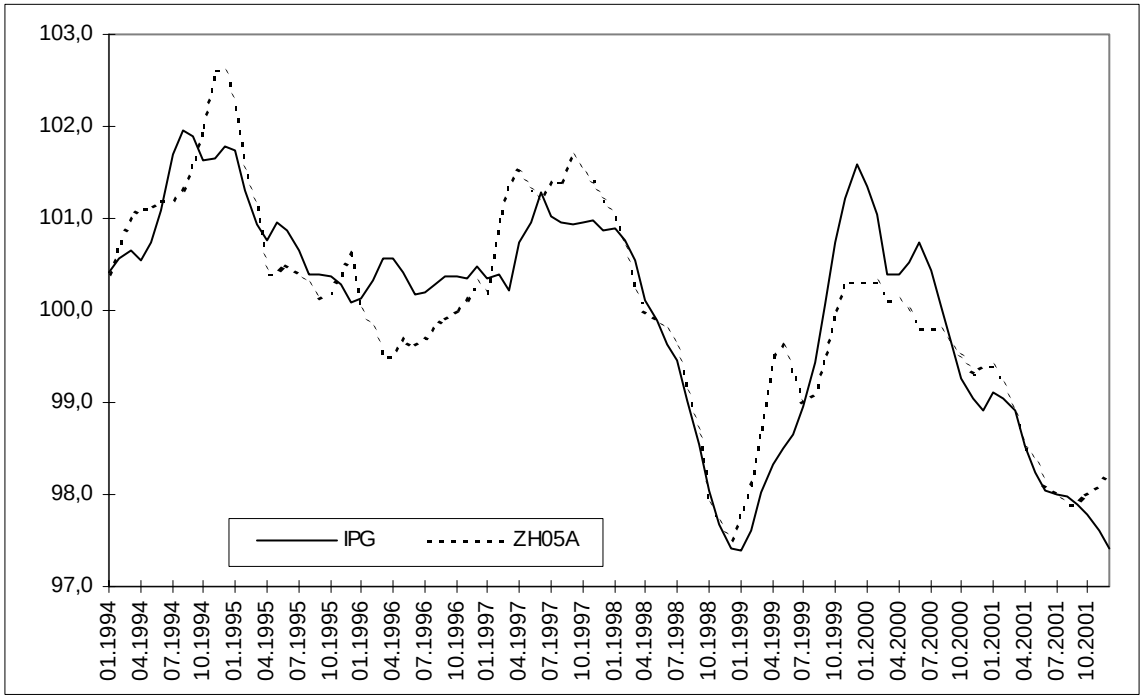

Figure 6b
Industry confidence indicator (ZH05A)
and the growth rates of industrial production

Figures 6a and 6b show a very close correspondence between two business indicators for industry compiled from the RIED's survey data (ZH03A and ZH05A) and

the industrial production index (detrended and deseasonalised) or its growth rates. However, other component indicators based on survey data are less closely related to the actual development in the sectors concerned, as reflected by the output and sales data.

None of the available survey indicators for trade would match well the statistical sales record. The same can be said about the survey indicator for agriculture, which evidently misses the estimated tendency of output sold. The latter indicator is calculated as the tendency of farmers' revenue, corrected by confidence factor, so it may diverge from the volume of output sold. More troublesome is the uncertainty about the business indicator for trade, a sector creating about 20% of GDP. Although trade is not included in the EU ESI concept, it would be a great informative loss to exclude it from our alternative versions of the aggregate indicator. We can only hope that the progress both in surveying methods and in the accuracy of statistical data will narrow the gap between qualitative and quantitative business indicators for the retail and wholesale trade. Much depends on the honesty of trade units and the correctness of their voluntary and obligatory business statements.

For industry and construction, most business indicators (save ZG05A, ZH11A, and ZG08A) match statistical output data quite well. For industry a better fit is given by the RIED survey while for construction both the RIED and CSO surveys seem to perform equally well.

As to the households, both the Ipsos-Demoskop and RIED surveys now are made on a representative sample and their indications are more or less comparable. Both are using the same EU concept of consumer confidence.[17] But until 1999 the RIED consumer survey was based on a questionnaire published in a women magazine, so it could not be considered representative.

In order to reach firm conclusions about the most effective ESI formula and the most reliable data source (including the proper selection of component variables), we should observe and analyse the performance of the alternative versions of the indicator over a longer period of time. At this moment the best fit to the actual development of the economy is given by two ESI variants filled with the RIED survey data: ZHG1 and ZHG4.

By analysing survey data for individual sectors of the economy, we can arrive at an effective formula of the composite indicator which may be compiled by merging the best fitted sectoral components taken from different survey sources. For example, the RIED-based indicator for industry (which performs very well) can be merged with CSO-based indicators for construction and trade, and Ipsos-Demoskop indicator for households. All the component indicators would then be available at monthly intervals, which would improve the timeliness of the aggregate indicator. The real problem involved in the selection of component indicators is however the fact that in case of discrepancy between the survey data and the official statistical data we shall be never sure which information is more correct.

6. Current economic situation in Poland

[17] The EU concept of consumer confidence has been recently revised. Since October 2001, the indicator is based on five component variables reflecting consumers' expectations about household's financial situation, saving capacity, general economic conditions, and unemployment. The willingness to purchase durable consumer goods has been dropped, and the focus now is on 12-month expectations.

A comprehensive assessment of current economic conditions in Poland is not envisaged here, simply because it was not the purpose of this project and because the period covered by the analysis is up to the end of 2001. However, we shall include a concise assessment of current economic situation and probable growth prospects for 2003, based on the newest data.

Since 2001, Poland is suffering from a deep slowdown in economic growth, with GDP rising by merely 1% a year. The deceleration of economic growth was accompanied by a substantial rise in unemployment, up to 18.5%. Inflation meanwhile has been reduced to 1% on current month/previous year basis.

The causes of economic slack are manifold and diverse. But the most important factors behind the current slowdown can easily be identified: weak domestic investment (due to expensive credit and strong international competition), a sudden drop in FDI inflows (after the completion of the most attractive privatisation deals), slowdown in major export markets, and ambivalent economic policy with no explicit priority list.

In 2002, the general economic situation in the country has not improved. Inflation has been curbed down to almost null, but unemployment reached a new height. GDP growth will be again about 1%. Current account deficit remained unchanged while general government deficit rose to 5% of GDP.

In the first half of 2002, all major sectors of the economy saw a decrease or stagnation in their output and sales. In the second half of the year, industry and retail trade noticed a pick-up. But it is too early to announce that the slowdown is over.

Survey-based business indicators for industry suggest an improvement of economic climate, but construction remains increasingly depressed. Agriculture and trade stay at a low level. Households are reporting a continuous worsening of their financial conditions. These indications are largely confirmed by the newest statistical data.

Taking into consideration both the survey results and the macroeconomic statistical data, our forecast for 2003 is much less optimistic than what is assumed in the official governmental projections and the estimates made by some international organisations. According to our own calculations, the GDP growth in 2003 will remain quite low, between 1 and 2%, while unemployment can increase up to 20%.

7. Policy relevance and possible applications in other CEE countries

All the CE/FSU countries in transition urgently need reliable monitoring and forecasting systems to assess their current economic situation and probable prospects. Such information is necessary for local and international business, including foreign investors. It is also necessary for the policy purposes. An effective fiscal or monetary stabilisation policy requires continuous assessment of economic conditions. A wrong or too late diagnosis may result in false decisions and improper actions, which would only worsen the situation and compound the existing problems.

Business and consumer surveys, as well as composite indicators of aggregate economic activity based on them, provide an effective framework for the assessment of current conditions in major sectors and the economy as a whole. In the developed market countries, business indicators for industry, construction, households, and trade derived from survey data have become one of the most popular and reliable sources of information on economic trends and prospects. The EU member countries have adopted a harmonised methodology for business and consumer surveys, and they apply a

common concept of economic sentiment indicator (ESI), a composite indicator of aggregate economic activity derived from qualitative survey data. Confidence indicators for the individual sectors and economic sentiment indicators based on them are calculated monthly for all the member countries and the EU as a whole. The results are published in the journal „European Economy".

After EU accession, Poland will also be obliged to deliver its economic survey data to the common monitoring system, including an economic sentiment indicator. As a matter of fact, Poland and some other CEE countries are already included in the EU surveying system: business and consumer survey results for those countries appear in a separate part of the same publication. What is still missing, is the lack of an aggregate economic indicator based on survey data for the economies concerned. Our project could contribute to fill the gap by providing a solid conceptual and analytical base for compiling and interpreting such indicators.

Both the demand for current economic information raised by domestic and foreign entrepreneurs, investors and banks, and the needs of economic policy performed by the government, as well as the requirements related to EU-accession, justify our concern about the development of a reliable economic sentiment indicator for Poland and our search for its most effective formula.

Even if further efforts are necessary to improve the quality of our composite indicators, some of them are now ready for operational use. The research team implementing this project has gathered enough analytical experience. It can compile an economic sentiment indicator for Poland on a monthly or quarterly basis, amending it with a concise assessment of current economic trends and prospects. Macroeconomic assessment could be supplemented by an evaluation of current situation in major sectors of the economy. The results could be disseminated by one of the leading newspapers and made available on website. Such a constant information service could be provided on behalf of a governmental agency, monetary authorities, an international organisation, or a private sponsor. The estimated total cost would be negligible as compared with information gains.

In order to avoid false decisions and actions, macroeconomic policy (notably fiscal and monetary policies) should be continuously supplied with information and expertise about current economic situation and probable future developments. Composite indicators based on survey data, in particular the economic sentiment indicator, may help to undertake proper policy decisions at a proper time.

Monetary authorities in Poland were publicly accused of having contributed to the recent economic slowdown by keeping too long tight credit conditions, in spite of weak investment and consumer demand. This criticism is still alive, despite the fact that the basic interest rate has been decreased 14 times during the last two years. Monetary Council in turn maintains that the main source of current economic problems is related to the government's budget deficits.

Not entering the political debate about who is responsible for the current economic slack and huge unemployment, we wish to remind that our composite indicators of economic activity for Poland signalled the current slowdown as early as in mid-1997. The time was enough for taking some deliberate expansionary actions.

The responsibility of a researcher or analyst involved in macroeconomic assessments is to warn politicians as to avoid false decisions, and to assist them in taking positive actions. However, services offered by professional analysts may not be ignored or disregarded.

8. Conclusions

1. Composite indicators of economic activity based on business and consumer data have proved to be a powerful tool in assessing current economic trends and prospects, notably as regards growth cycles. In all the EU member countries such an indicator, the so-called economic sentiment indicator (ESI), calculated as a weighted average of confidence indicators for industry, households, construction, and stock exchange, is regularly compiled and published each month. It is considered to be a very useful indication of current economic conditions for business and policy purposes. Since the indicator has typically a short lead over the actual changes in aggregate economic activity, it may be also indicative of probable short-term prospects.

2. In this project, several variants of economic sentiment indicator for Poland have been developed and tested, based on four alternative formulas and two different data sources. The ultimate aim was to choose the most reliable version of the indicator, best suited for monitoring and forecasting purposes. Time series for all the indicators have been compiled in monthly intervals for the period 1994–2001. Economic merits and statistical properties of the indicators were analysed, and their conformity with the actual economic development was tested against the growth cycle reflected by macroeconomic reference indicators based on statistical data. Component variables entering the composite indicator were also compared with output or sales data of the respective sector.

3. The analysis has indicated two variants of the composite indicator which seem to be the best fit: ZHG1 and ZHG4. Both are based on the RIED's survey data. The first is the closest approximation to the EU ESI concept while the second is the author's own formula. Probably, even better indicator can be obtained by filling the two alternative formulas with best fitted component variables taken from different sources of survey data. They would include RIED's indicators for industry and agriculture, CSO's indicators for construction and trade, and Ipsos-Demoskop indicator for households. By the same, all the component variables will be available at monthly intervals, shortening the information lag.

4. Our analysis brings some important conclusions as to the practical use of composite indicators based on survey data and their proper interpretation. First, if such indicators are significantly affected by seasonal changes, they must be seasonally adjusted before any judgement is made about current business tendency. The latter is best reflected by the deseasonalised and MCD-smoothed time series showing trend and cycle. Second, survey-based indicators show changes in the growth rates of economic activity rather than in absolute output levels. A decrease in the indicator may reflect a worsening of economic climate due to the slowdown in economic growth, but not necessary a true recession with absolute fall in total production.

5. Composite indicators of economic activity based on survey data can be easily and promptly updated, using the newest survey data. The simplicity of the indicator and its availability on a monthly basis add to its attractiveness as a tool for monitoring and forecasting purposes. Economic sentiment indicators compiled for Poland proved to be

very effective in signalling major swings in economic growth. The recent slowdown of economic growth was signalled by our indicators at least 1–2 years in advance.

6. During the last two years Poland's economy experienced a marked slowdown, coupled with rising unemployment. The GDP growth rate fell to 1.0% in 2001, and it will probably remain so in 2002. The deceleration of economic growth contributed to a further rise in unemployment to 18.5%, but also to a substantial fall in inflation (the latter now, measured by the consumer price index, stays at about 1%). The expected recovery, as suggested by the rise of some indicators based on survey data, has not come true as yet. Most survey-based indicators now show a continuous worsening of economic climate or its stagnation at a low level. This is largely confirmed by statistical output and sales data. In the second half of 2002, industrial output and retail trade picked up a little, but it is not certain whether this would be a lasting improvement. Contrary to many optimistic growth forecasts, based on arbitrary assumptions, we do not see any real premises for a distinct revival in the economy during the next year. Therefore, our estimate of the GDP growth rate in 2003, based on both composite indicators of business activity and on a broader analysis of the macroeconomic context, is cautious: growth will probably remain quite slow, about 1 – 2%.

7. Composite indicators of economic activity based on survey data may be a helpful tool in assessing current economic trends. They should be included in macroeconomic monitoring and forecasting system. These indicators are intended to supplement other instruments used in macroeconomic assessments, but not to replace them. For a correct evaluation of the general state of economy one cannot rely on a single indicator, no matter how good it is.

8. All the CEE & FSU countries in transition urgently need reliable monitoring and forecasting systems in order to assess their economic trends and prospects for business and policy purposes. Our experience in composite indicators of economic activity for Poland might be utilised in developing similar indicators for the other countries in transition.

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