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ECONOMIC SENTIMENT INDICATORS

1. Introduction

This paper refers to a broader research on composite indicators of economic activity for Poland, which was started in 1994 and has been continued in the Research Institute of Economic Development (RIED) at Warsaw School of Economics under five successive research projects headed by the author. The aim is to develop a system of composite indicators based on quantitative and qualitative data to be used in analysing cyclical changes in the economy as well as in forecasting. Three types of composite indicators have been developed to this purpose:

(a) general coincident indicator (GCI) – a monthly proxy to GDP, covering five major sectors of the economy: industry, construction, agriculture, and trade;
(b) composite leading indicators (CLI) based on quantitative and qualitative data, compiled according to OECD standards;
(c) economic sentiment indicators (ESI) vs. economic climate indicators (ECI) based on survey data.

The results have been published in RIED's 'Papers and Proceedings' (Matkowski, ed., 1997, 1998, 1999) as well as in economic journals. They have been also presented at several international conferences (e.g. CIRET Conferences in Budapest, Munich, Helsinki, Wellington and Taipei, and International Meetings on Economic Cycles in Ourense and Madrid). The new results are included in this book.

This paper focuses on economic sentiment indicators, based on survey data. It presents the results of the newest analysis of economic sentiment indicators for Poland and some conclusions about their application for policy purposes. The main results of our earlier research on the subject have been published in domestic and international sources (Matkowski, 1996a, 1998ab, 1999abc, 2000abc, 2001, 2002abcd, 2003).

The paper includes ten parts. Section 1 is this introduction. Section 2 elucidates the ESI vs. ECI concept. Section 3 indicates the data used to compile our ESIs. Section 4 specifies alternative ESI formulas. Section 5 presents empirical results. Section 6 describes the reference cycle. Section 7 tries to assess the conformity of our ESIs with the actual economic development. Section 8 evaluates the adequacy of component indicators entering ESIs. Section 9 shows the relevance of our indicators to economic policy. Section 10 includes conclusions.

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2. ESI vs. ECI concept

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 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 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.

The first concept of a general indicator of business activity based on survey data was developed in Germany in 1965 (Strigel, 1965). This indicator, called 'business climate' (*Wirtschaftsklima*), combined the assessments of economic situation in industry and households. The Ifo Institute in Munich continues to compile this type of indicator, though its coverage and formula have been changed.

The Joint Harmonised EU Programme of Business and Consumer Surveys launched in 1970 (updated in 2003) paved the way for the calculation of economic sentiment indicator (ESI) for the European Community. The indicator was originally based on the results of business surveys in industry and construction, consumer survey, and the share-price-index reflecting the situation in financial markets. In 2001, the formula of the indicator was modified as to exclude stock-exchange index and to include the results of business survey in trade, so it is now based exclusively on survey data. In this way, parallel to the official economic statistics, an alternative system for the assessment of business activity has been created, based on qualitative survey data.

In our search for composite indicators that could be used to estimate current conditions and prospects of Poland's economy we have tested several variants of a general indicator of business activity based on survey data. The basic idea was to combine the indicators of business activity in individual sectors of economy, compiled from survey data, into a single indicator reflecting the overall condition of national economy. Apart from the EU ESI concept, we are also testing alternative formulas developed by ourselves, with different coverage and weights.

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).

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[1] Multiple applications of survey data in business cycle analysis are well documented in CIRET conference papers and proceedings. See e.g. Oppenländer, Poser, Schips, eds. (2000), and Poser, Bloesch, eds. (2002).

The RIED was the first research center in Poland involved in regular business and consumer surveys. Its monthly industrial survey, covering public enterprises, was launched in 1986; private enterprises were included in 1993. After the change of economic system four new surveys were started on a quarterly basis to cover the remaining sectors: households (1990), agriculture (1992), construction (1993), and trade (1993). In 1998, a quarterly survey of banking was also instituted.

The CSO started its business surveys covering manufacturing, construction and retail trade in 1992-93. All of them are run monthly. In 2000, a quarterly consumer survey was also launched. However, as regards consumer surveys, the most established position belongs to Ipsos-Demoskop, a private polling agency involved in monthly household surveys since 1991. The data from this source will be used in our analysis to supplement the CSO survey data.

In the last years another set of business surveys in industry, trade, services and banking was also started by the Research Institute on Market Economy. A separate survey for transports is run by the Institute of Transport. Additional business surveys are conducted by various institutions for individual regions and industries, incidentally or on a regular basis.

All in all, we have a lot of information from business and consumer surveys which can be used in accessing the overall situation in the Polish economy. The real problem is the lack of comparative assessment of their merits and shortcomings. Our analysis tries to fill this gap, at least by comparing the adequacy of survey data to real economic developments as described by statistical data.

The first attempts to construct a general indicator of business activity for Poland based on survey data were made in 1993 (Stanek, 1993; Matkowski, 1993). Both authors calculated a composite indicator inspired by the EU ESI concept, but different in coverage. Since 1994, two ESI versions have been occasionally published by the RIED, compiled according to its own concept or to a modified EU formula (for a detailed presentation see: Stanek, 1999, and Adamowicz and Klimkowska, 2004).

In 1998, this author started a systematic research on different ESI variants for Poland filled with RIED and CSO survey data. This is the sixth edition of our ESIs. Each edition includes a comparative analysis of different ESI formulas filled with the RIED or CSO survey data, with updated time series. The formulas used are modified in the light of the results obtained in their examination. The ultimate aim is to choose the most effective formula of the indicator and the most reliable data source.

Though all the variants of our indicator are filled with survey data, they reflect quite well the tendency of real economic activity. This is because all the component variables entering our indicator give an assessment of real magnitudes shaping the conditions of economic units: their output and 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 deviation from some norms), composite indicators derived from them may properly reflect the actual tendency of aggregate economic activity, provided that the underlying survey data are representative and correct.

The notion 'economic sentiment indicator' does nor precisely express the actual meaning of such indicators.[2] They are not merely a reflection of feelings and spirits of economic agents, but an indication of their real economic situation. Perhaps, a more adequate term would be 'economic climate indicator', which however would suggest the conditions of doing business, not described by this indicator. Since the former term has already been firmly anchored in the literature, we shall use it in this paper.

3. Data

The list of component indictors entering our ESIs is given in Table 1. 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 (RIED, CSO, IPSOS) or calculated by the author according to his own (ZM) or harmonised (EU) formula. Supplementary data of Warsaw Stock Exchange Index are also included.

Table 1. Component variables included in ESI

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	ZHG3A,4
ZH05A	Industry Confidence (EU)	Future prod., change in stocks, order book	ZHG1C
ZH11A	Construction Activity (ZM)	Avg. of production appraisal & forecast	ZHG4
ZH09	Construction Confidence (EU)	Order book & expected change in employment	ZHG1,1C,3A
ZH17	Business Indicator Trade (RIED)	Future sales, anticipated change in supplies, commodity stocks	ZHG1C, 3A,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	ZHG3A,4 ZHG3A,4
ZH28	Consumer Confidence (RIED)	Change in income and savings, modified by anticipation factor; since 1995 EU formula	ZHG1,1C
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 prod., change in stocks, order book	ZGG1,1C
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	ZGG1,1C
ZG13	Retail Trade Climate (CSO)	Avg. of enterprise situation & prospect	ZGG1C, 3A
ZG15A	Retail Sales (ZM)	Avg. of sale appraisal & forecast	ZGG4
ZD06	Consumer Confidence (IPSOS)	EU formula	ZGG1,1C
ZWR01	Warsaw Stock Exchange Index R/T	Detrended	ZHG1, ZGG1

Component data available on a quarterly basis (RIED's surveys for construction, trade and agriculture) have been transformed into monthly series by interpolation. The net answer balances from business and consumer surveys have been transformed into positive values by adding 100. All the indicators have been then recalculated to

[2] For the meaning of the term 'economic sentiments' and its significance in economics see e.g. Rothschild (2001).

1995=100 indexes and smoothed with 3-month moving average and standardised using the 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 some component variables are differently calibrated (Ipsos data on consumer confidence and share-price index). Moreover, amplitude adjustment allows for a direct comparison with reference indicators.

The standardised component series and composite indicators derived from them usually take values between 97 and 103 (this is why most graphs included in this paper keep up this scale). The resulting indicators express relative deviations of the values observed from their long-run average. They should not be mistaken for simple dynamic indices. Nevertheless, values higher than 100 mean that current business activity is assessed positively (above average) while values lower than 100 indicate that current economic conditions are perceived negatively (below the trend). The increase of the indicator suggests a rising tendency of economic activity whereas its decrease is tantamount to a slack. A decrease of the indicator may either mean an absolute fall in the aggregate activity level or merely a slowdown.

4. Alternative ESI variants

In this analysis we have tested eight alternative ESI variants, but for the sake of simplicity we shall present only four basic variants.

ESI variants based on RIED data have been denoted ZHG while ESI variants filled with CSO data are recorded as ZGG. For this presentation let us denote component indicators describing the situation in individual sectors: I – industry, C – construction, A – agriculture, T – trade, H – households, S – stock exchange.

The first two variants of the indicator refer to the EU concepts while the next two are our own concepts.

Variant 1 is the closest implementation of the harmonised EU ESI concept applied until 2001. It was calculated according to the formula:

$$\text{ZHG1 \& ZGG1} = {}^{1}/_{3}\, I + {}^{1}/_{3}\, H + {}^{1}/_{6}\, C + {}^{1}/_{6}\, S.$$

It is a weighted average of 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.

Variant 1C is based on the new EU ESI formula. Instead of share-price-index it includes confidence index for trade. The weights have been also changed with industry now weighing twice as much as each other sector. The resulting formula is:

$$\text{ZHG1C \& ZGG1C} = 0.4\, P + 0.2\, H + 0.2\, C + 0.2\, T.$$

Variants 3A and 4 are our own constructs, differing from the EU ESI as to the coverage and weights. They cover 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.

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.[4] 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:

$$\text{ZHG3A \& ZHG4} = \frac{a_1 I + a_2 C + a_3 T + a_4 A}{a_1 + a_2 + a_3 + a_4},$$

$$\text{ZGG3A \& ZGG4} = \frac{a_1 I + a_2 C + a_3 T}{a_1 + a_2 + a_3},$$

where weights a_1, a_2, a_3, a_4 reflect the contribution of individual sectors to GDP.

Both the latter variants have the same coverage and weights. The only difference is that they are filled with different component indicators reflecting business tendencies in individual sectors. Variant 3A includes confidence indicators used by the data source (RIED and CSO) whereas variant 4 employs a uniform concept of business tendency for each sector: the average of output (sales) appraisal and forecast (except of agriculture for which output or sales data are not collected in the RIED survey). Variant 4 may be seen as the most consequent alternative to EU ESI.

5. Empirical results

Economic sentiment indicators calculated according to the above formulas have been filled with monthly survey data of the period 1994–2002, available at the time of analysis (some quarterly component data were transformed into monthly series by interpolation). Our analysis will comprise two ESI variants based on the old and new EU formula and two alternative ESI variants calculated according to our own concept.

Alternative ESI variants calculated from RIED survey data are shown in Figure 1a, and corresponding variants based on CSO survey data (supplemented by the Ipsos-Demoskop consumer survey data) 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-

[3] A similar ESI concept with GDP shares taken as weights (covering industry, construction, and trade) was later proposed for Italy (Carnazza and Parigi, 2000). However, a newer study on a composite indicator for Italy took another approach (Bruno and Malgarini, 2002).

[4] For the period covered by this analysis, the average shares were: industry – 28.5%, construction – 7.8%, agriculture – 5.1%, trade – 20.1%.

ARIMA procedure.[5] 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).

Looking at the graphs, we can make two important observations. First, strikingly enough, it turns out that different ESI formulas give quite similar tendencies if they are filled with survey data from the same source. The most important factor behind different tendencies depicted by our ESIs is the data source, and not the formula. Secondly, the indicators compiled from RIED data signalled the slowdown in economic growth in 2001-02 much sooner than the indicators based on CSO data. At the end of period, the revival was also earlier signalled by the RIED-based indicators. It seems that the RIED-based indicators are more sensitive to short-term changes in economic activity and signal them earlier.

Table 2. Statistical properties of ESI

Code	Coverage	QCS	MCD	Relative contribution to stationary variance			Average duration of run			ARIMA forecast
				I	S	TC	I	MCD	TC	
ZHG1	$I+H+C+S$	0.38	1	1.3	27.9	75.0	2.0	4.9	7.1	no
ZHG1C	$I+H+C+T$	0.38	1	1.0	59.4	46.3	2.1	4.0	5.9	no
ZHG3A	$I+C+T+A$	0.42	1	1.6	70.0	46.3	1.9	4.1	6.7	yes
ZHG4	$I+C+T+A$	0.31	1	2.0	54.5	44.3	1.8	3.2	7.1	no
ZGG1	$I+H+C+S$	0.20	1	0.5	37.1	65.2	1.8	3.3	6.7	yes
ZGG1C	$I+H+C+T$	0.15	1	0.4	46.6	59.3	1.7	2.9	6.3	yes
ZGG3A	$I+C+T$	0.31	1	1.2	29.1	71.9	1.9	3.5	9.7	no
ZGG4	$I+C+T$	0.22	2	1.3	68.6	27.4	1.7	5.0	6.3	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 variants, as revealed in X11-ARIMA procedure. All the indicators 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, but their relatively stable patterns allow us to adjust time series.

Some of the indicators render autoregressive 12-month ARIMA projections. The 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 which reverses the cyclical tendency.

[5] A newer version X12 was not used here as to make the results fully comparable with our former research.

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

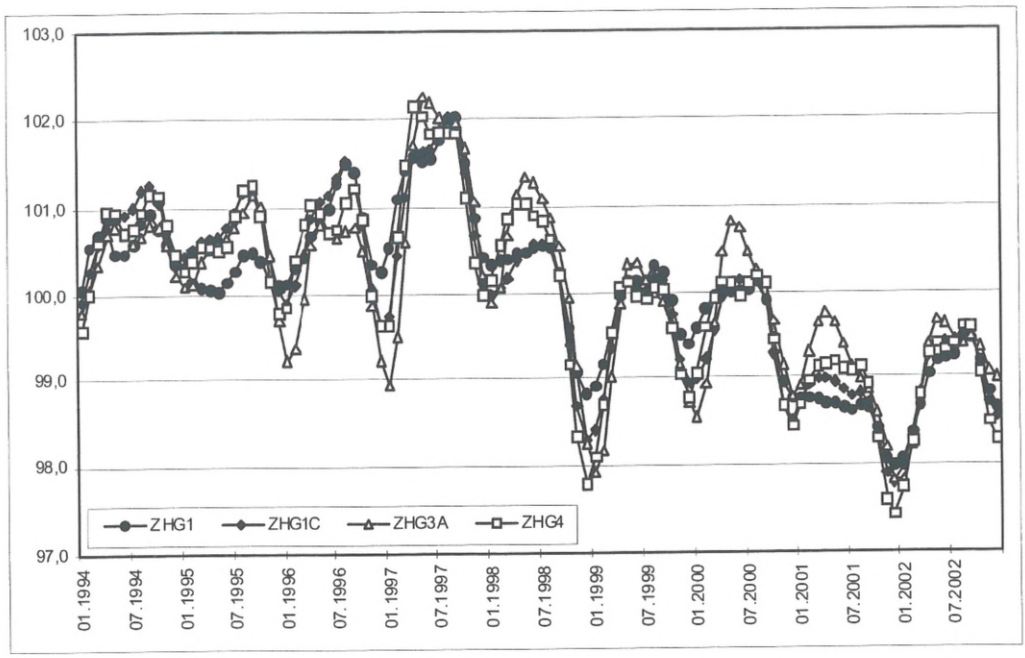


Figure 1b
Economic sentiment indicators based on the CSO survey data

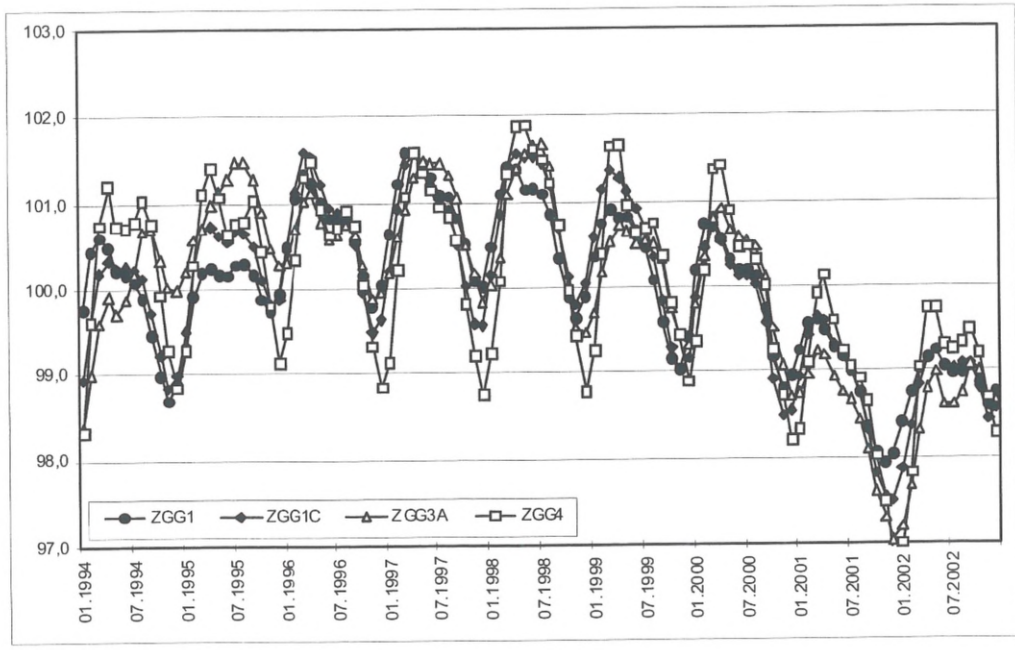


Figure 2a
General business tendency according to RIED-based ESI

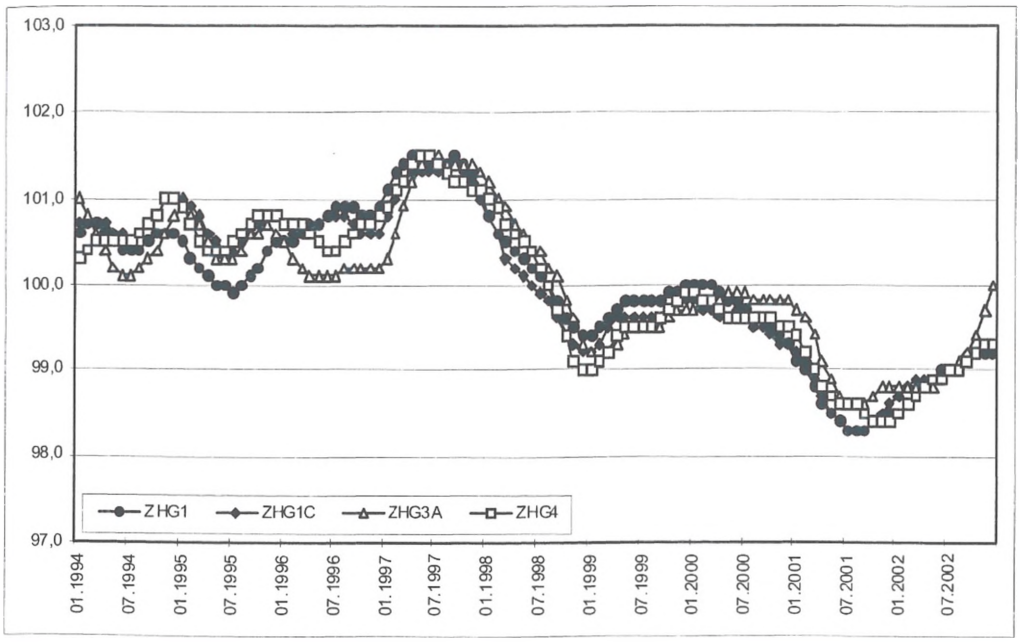
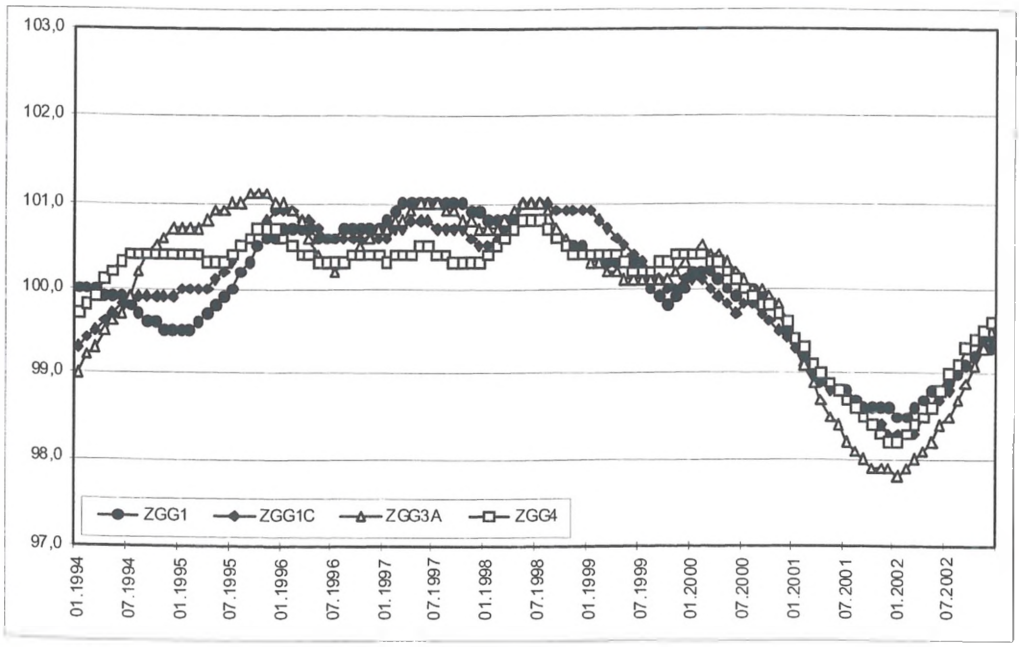


Figure 2b
General business tendency according to CSO-based ESI



Seasonality seen in business and consumer survey data is a big problem which makes it difficult to interpret the results. This problem is often overlooked or neglected.[6] 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, shifting only 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 seasonality present in time series 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[7] 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 important in choosing the best 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 1C or 3A and 4, have similar empirical patterns, which are closely and synchronically correlated, provided that they are filled with the same data (correlation coefficient 0.95 – 0.96).[8] But there is also quite a close correlation between alternative indicators based on different formulas if they are compiled from the same data source. The source of data affects significantly the distribution of empirical values of the indicator and alters the variance, resulting in much lower correlation. Looking at the graphs, the RIED-based indicators seem to display some lead over the CSO-based equivalents, though it is not clearly reflected in the results of cross-correlation.

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 1C and 4 are most promising and deserve further testing. Variant 1C is based on the harmonised ESI formula now used in the EU and it includes some leading indicators (order book, change in stocks, expected production, etc.). Variant 4 is our

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[6] Seasonality seen in survey data was addressed in our paper presented at CCET workshop in Budapest (Matkowski, 1996b).

[7] Seasonal and irregular changes have been removed by X11-ARIMA. After preliminary smoothing of component time series all the ESI variants (except ZGG4) have MCD = 1, not requiring any more smoothing. Detrending (by linear regression) was applied to isolate cyclical components and to avoid biased estimation of correlation coefficient (all ESI time series show an apparent downward trend in the analysed period).

[8] These are the maximum values of cross-correlation coefficients.

own alternative concept, coming close to the real category of aggregate economic activity and more comparable with GDP.

The most adequate ESI formula will 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 statistical measures. Section 7 brings such an analysis for the period covered by this study.

6. Reference cycle

To assess the usefulness of our ESIs for monitoring and forecasting purposes, we must choose a reference 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). The GDP has the advantage of 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 indicators can be used to represent economic cycles.

Another reference indicator may be our general coincident index (GCI), used as a reference in our work on composite leading indicators. It is a monthly proxy for GDP, compiled from statistical data on output or sales in five major sectors of the economy: industry, construction, agriculture, trade, and transport, weighted by their shares in GDP. Unlike the GDP, calculated at quarterly intervals and published with a substantial delay, this indicator can be easily calculated on a monthly basis, several months before the GDP quarterly data are released. The timing gain is an important advantage of this indicator.[9] Despite its merits, the GCI as well as the industrial production index have been treated as auxiliary reference indicators in this analysis. The main reference indicator used here is GDP.

As to the form of reference indicators, the available statistical data allow us to use the following measures:

(a) constant base index (1995 = 100) describing the absolute production level;

(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 (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, with 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 output levels and more discrete fluctuations of the growth rate. Growth cycles

[9] The concept of GCI and the way in which its cyclical component is isolated are clarified in another paper by the author, included in this book (Matkowski, 2004).

can be discriminated using cyclical components of the reference indicator (trend deviation) or its growth rates.[10]

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 all the reference indicators, we shall apply two measures:

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

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

After seasonal adjustment and a discrete smoothing,[11] they can be used to represent growth cycles.

Table 3. Turning points of reference cycles

Reference indicator	Code	1994	1995	1996	1997	1998	1999	2000	2001	2002
GDP										
– index 1995 = 100[a]	GDPI									
– trend deviation	CGDPI	T 08	P 02 T 11			P 03	T 02 P 11			
– growth rate[b]	GDPG	T 11	P 02	T 02 P 11[c]			T 02	P 01	T 12	
GCI										
– index 1995 = 100[a]	GCI					P 06 T 12		P 04	T 10	
– trend deviation	CGCI		P 07	T 04		P 02 T 12		P 01		
– growth rate[b]	GCIG		P 01	T 04		P 01 T 12	P 12		T 07	
IP										
– index 1995 = 100[a]	IPI					P 05	T 01	P 12		T 01
– trend deviation	CIPI		P 01 T 08			P 01	T 01 P 11			T 04
– growth rate[b]	IPG	P 08			T 03	P 01	T 01 P 12		T 12	

[a] Seasonally adjusted and MCD-smoothed. [b] Respective month of the preceding year = 100.

[c] This peak is doubtful (see the text).

All the reference indices should be expressed in monthly intervals, as used in our ESI time series. Industrial production index (IP) is readily available at this frequency. GDP index, available on a quarterly basis, has been interpolated to monthly intervals for the purpose of this analysis. The GCI is compiled at monthly intervals.

[10] For the relation between both concepts of economic cycles and between the forms of their measurement see our paper on growth cycles included in this book. See also: Ott, ed. (1973), Klein and Moore (1985), Zarnowitz (1992), Niemira and Klein (1994).

[11] Industrial production index has been pre-smoothed using 3-month moving average. Seasonally adjusted time series, whenever necessary, have been further smoothed with MCD moving average. Trend deviations, using linear regression, were calculated from deseasonalised and smoothed constant-base indexes.

In our further analysis, constant-base indexes will be denoted by suffix I after variable code, cyclical components (trend deviations) will hold prefix C, and growth rates will be marked by suffix G. For instance, GDPI means GDP constant-base index, CGDPI its trend deviation (R/T), and GDPG year-over-year growth rate. A similar notation will be applied to the ESIs. For instance, ZHG1C (one of the calculated ESI variants) would mean seasonally adjusted and MCD-smoothed (if necessary) time series, and CZHG1C would be the same time series after detrending.

Statistical properties of the reference indicators are acceptable for the purposes of cyclical analysis. Constant base indices are characterised by MCD = 1 and QCS < 1. Trend deviations have similar characteristics. Growth rates are more volatile, with QCS slightly higher than 1 and MCD = 1 (for industrial production MCD = 3).

Chronology and amplitude of economic cycles critically depend on how they are identified, e.i. on the reference indicator and its numerical expression. Turning points indicated by GDP, GCI and IP time series may differ. For a given reference indicator, peaks and troughs of its cyclical component (trend deviation) will rarely coincide with the lows and highs of current growth rates (simply because current growth rates come to null at turning points of output levels). Dating of growth cycles by trend deviations depends much on the form of trend (linear or non-linear) as well as on the way of its estimation and elimination. The year-over-year growth rates render a similar (though not identical) pattern of cyclical phases as compared with trend deviations. All in all, there is no single picture of growth cycles for any given time series.[12]

Table 3 shows turning points (P – peak, T – trough) of three reference indices in the period 1994-2002, established by analysing three forms of each indicator: (a) constant-base index (1995=100), (b) cyclical component (trend deviation), (c) growth rate against the same month of the preceding year (year-over-year).[13]

In dating turning points, we must adopt some rules about the minimum length of a phase and about the treatment of no-change periods. It has been assumed that the minimum length of an upward or downward phase is 6 months; for growth rates this restriction was loosened to 3 months because of greater variability. The restriction placed on the minimum length of a phase allows us to ignore very minor fluctuations. The upward (downward) phase covers the period of the rise (fall) of a given reference indicator upon completion of the preceding phase. When the indicator keeps up the same value for several months before the change in direction, we would take the last quoting as turning point. The same rules will be applied to the ESIs.

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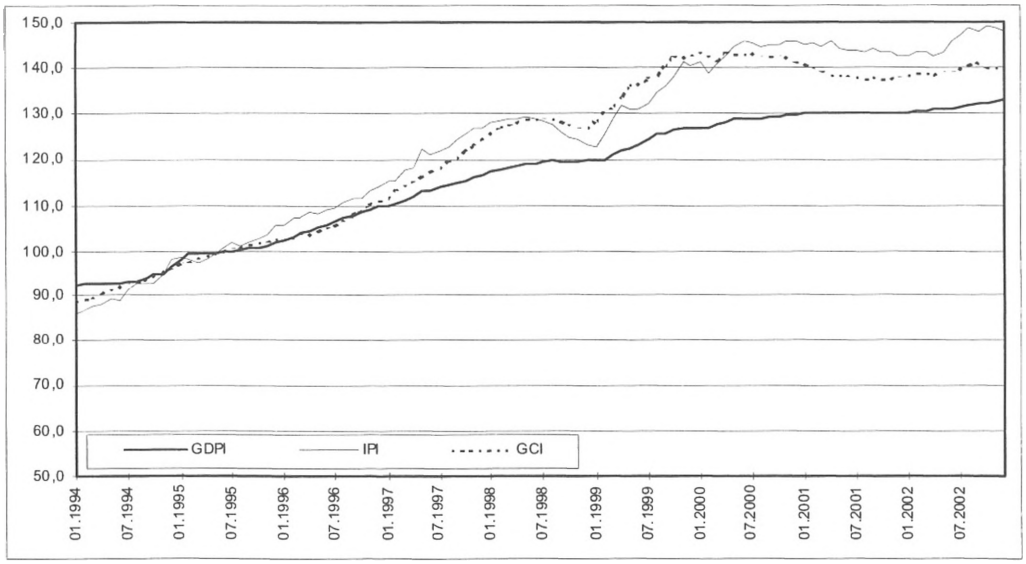
[12] Typical relationships between different forms of cycles are elucidated in the literature. See e.g. Tichy (1976), Körber-Weik (1983), and Matkowski (1997a). However, the attention is usually focused on the fluctuation of absolute levels, trend deviations, and current growth rates. Less reference is made to the fluctuation of annual growth rates calculated against the respective period of the preceding year. In analysing cyclical fluctuations in the U.S. by PAT-detrended coincident index and y-o-y percentage change, Zarnowitz and Ozyildirim (2002) found that cyclical patterns in the two series were quite similar if growth rates had been properly smoothed.

[13] Turning points of short-run cycles indicated in this analysis differ from those noted in our analysis of long-term cycles because of different methods and reference indicators.

Figure 3 shows the development of the three forms of our reference indicators. The constant-base GDP index on graph 3a is rising continuously over the whole period, with no recession perceived as an absolute fall. The alternative reference indicators, GCI and IPI, reveal an absolute drop in the second half of 1998 and a prolonged but not deep decrease in 2000-01. Graphs 3b and 3c show growth cycles as reflected by trend deviations or growth rates of our reference indicators. Both measures have been normalised (amplitude-adjusted) as to facilitate the comparison. We can see that dating of growth cycles marked by trend deviations and y-o-y growth rates is more or less similar, but the exact dates of turning points differ, sometimes significantly (even by about one year). This is why we should make an explicit distinction between the two forms of growth cycles, as measured by trend deviations or growth rates.

All the reference indexes reached the lowest values at the trough of economic crisis in 1992 (beyond the period covered by this analysis) and the most distinct peak during the slowdown in 1998-2000. A closer examination of the slowdown reveals two peaks: the first appeared in early 1998 and the second one took place in late 1999 or early 2000. The peaks are separated by a 'saddle', with a trough located in early 1999. During 1999 there was some improvement in economic dynamics, which however turned to be temporary. In 2000-01 the economy was stagnant. At the turn of 2001 and 2002 some signs of revival may be seen as reflected by the rising growth rates.[14]

Figure 3a
GDP, GCI and IP (1995 = 100)



[14] According to yearly data, 1997 was the last year of rapid expansion of mid 90's, with the record increase of GDP by 6.8% and IP by 20.8%. The slowdown began in 1998 when GDP rose by 4.8% and IP by only 3.5%. In the next years GDP growth rate decreased to 4.1% in 1999, 4.0% in 2000, 1.0% in 2001, and 1.3% in 2002. Preliminary data for 2003 indicate a revival as reflected by the GDP growth rate of about 3.5%.

Figure 3b
GDP, GCI and IP (trend deviations)

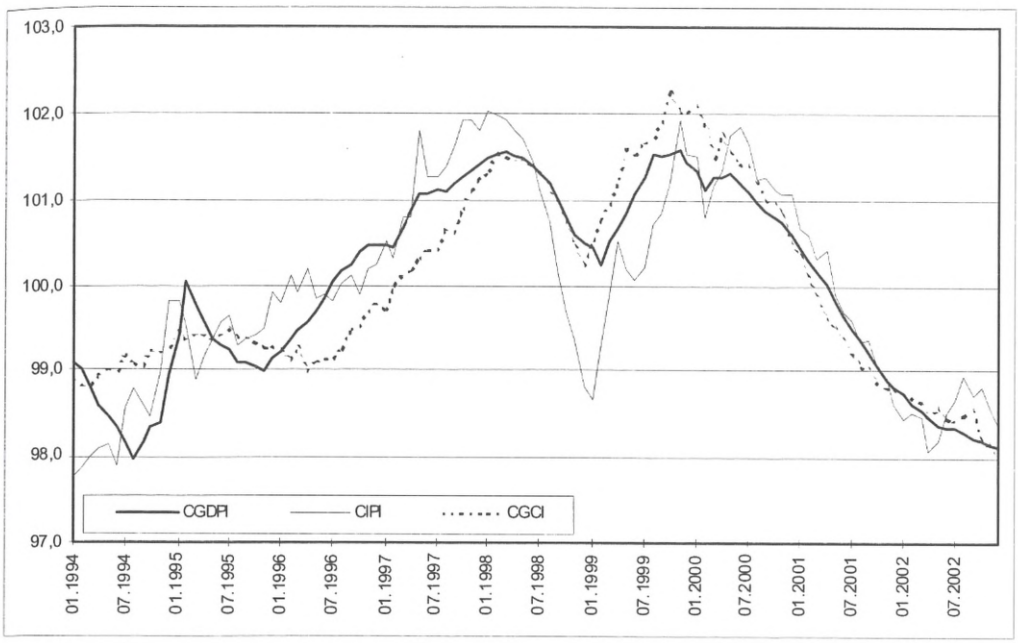
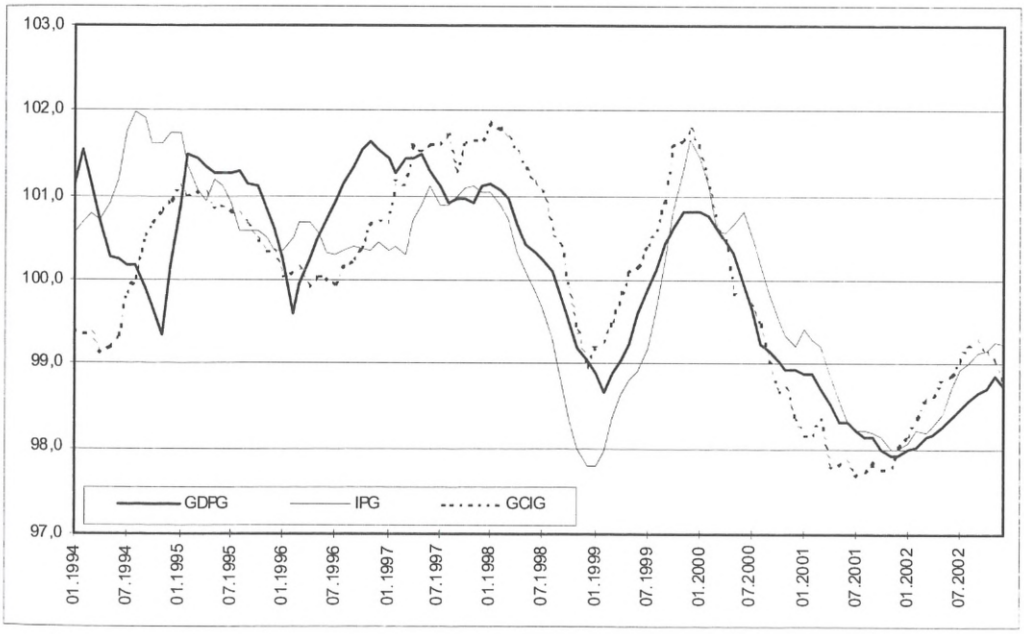


Figure 3c
GDP, GCI and IP (growth rates)



Altogether, we have got here 2-3 growth cycles as measured by trend deviations or growth rates of our reference indexes.

We shall assume that the major upper turning point was the first decrease of reference indicators in 1998, and not their second fall in 2000. By the same, more rigorous requirement will be placed onto ESIs as regards their capacity to signal major turning points.

The exact dating of the peak provides some problem. All our reference indexes taken as trend deviations or growth rates indicate the peak at the end of 1997 or at the beginning of 1998, except of the GDP growth rate which reaches its maximum in the last quarter of 1996. This is certainly an error in the official GDP statistics. It is rather impossible that the GDP rate of growth declined sooner than the IP growth rate, which was rising until November 1997. Therefore, we shall assume that the GDP growth rates started to decline in January 1998, as indicated by our control index GCI.

Let us now look at the relationship between the different measures of economic dynamics. Trend deviations of all the three reference indexes are closely correlated among themselves (correlation coefficients 0.82 – 0.92). Much of the same applies to the growth rates of the respective indicators (correlation coefficients 0.73 – 0.83). However, correlation between trend deviations and growth rates is insignificant, even for the same reference index. This is mainly because growth rates, even if discretely smoothed, are much more volatile than constant-base indexes and their trend deviations. Noteworthy is high correlation between GDP and our subsidiary reference index GCI. This is another proof of the usefulness of this indicator in cyclical analysis.

7. 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.

The conformity of survey-based ESIs with the actual development of the economy, will be assessed using two criteria: (a) correlation with the reference indicators over the whole period (with possible leads or lags); (b) turning point distribution and the behaviour around major turning points of the reference cycle. We shall also examine the ability of ESI to predict future economic development (short-term forecasts) on the basis of regression equations.

Table 4 presents the results of cross-correlation between different ESI variants and reference indicators. All the time series have been seasonally adjusted and MCD-smoothed. Undetrended ESI time series were correlated with the growth rates of reference indicators: GDP, GCI and IP, while detrended ESI time series were correlated with detrended reference indexes. The figures show the maximum value of correlation coefficient, observed at the indicated lead or lag (in brackets). Correlation was checked at 25 leads and lags. Correlation below 0.50 and/or inverted has been reported as insignificant (*ns*).

Table 4. Cross-correlation between ESIs and reference indicators

ESI*	GDP		GCI		IP	
	trend deviation (CGDPI)	growth rate (GDPG)	trend deviation (CGCI)	growth rate (GCIG)	trend deviation (CIPI)	growth rate (IPG)
ZHG1	0.714 (–4)	0.863 (–1)	0.601 (–8)	0.808 (–1)	0.722 (–3)	0.766 (–1)
ZHG1C	0.558 (–4)	0.868 (–1)	*ns*	0.771 (–1)	0.639 (–3)	0.821 (0)
ZHG3A	0.549 (–2)	0.808 (0)	*ns*	0.766 (+1)	0.644 (–1)	0.773 (+1)
ZHG4	0.587 (–3)	0.851 (–1)	*ns*	0.799 (0)	0.702 (–1)	0.828 (0)
ZGG1	0.839 (–4)	0.798 (+4	0.756 (–9)	0.808 (+4)	0.717 (–3)	*ns*
ZGG1C	0.836 (–6)	0.748 (+5)	0.785 (–9)	0.799 (+5)	0.644 (–3)	*ns*
ZGG3A	0.812 (–4)	0.823 (+4)	0.716 (–3)	0.873 (+3)	0.751 (–1)	0.698 (+3)
ZGG4	0.790 (–5)	0.774 (+3	0.767 (–4)	0.822 (+3)	0.654 (–2)	0.623 (+2)

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

Most RIED-based ESIs (ZHG) are significantly correlated with the annual growth rates of reference indicators almost synchronically (correlation coefficients 0.77 – 0.87). The CSO-based ESIs (ZGG) are also quite well correlated with the growth rates of reference indexes (0.62 –0.87), but they tend to lag behind the latter.

For cyclical components of our ESIs (seasonally adjusted, MCD-smoothed and detrended time series) confronted with the cyclical components of reference indices, the opposite is true. The CSO-based indicators are more closely correlated (0.64 – 0.84) with the detrended reference indexes and tend to show some leads while the RIED-based indicators have generally lower correlation coefficients and shorter leads. However, the analysis of time series shows that good correlation of the CSO-based indicators with the detrended reference indexes is rather spurious. It mainly reflects the conformity of general tendency over the whole period, and not so much the adequacy of short-term fluctuations. In our previous analyses, the RIED-based ESIs performed better than their CSO-founded equivalents both as confronted with the growth rates and trend deviations of reference indexes.

The diagnostic and prognostic performance of our ESIs is illustrated by Figures 4 – 7. The graphs show the evolution of two ESIs based on the RIED survey data (new EU formula and our own formula) and the analogous ESIs filled with the CSO survey data, compared with the GDP dynamics. All the indicators have been normalised as to adjust their amplitudes. The upper graph shows the evolution of the ESI (the dotted line) against the growth rates of GDP (the solid line). The lower graph shows the evolution of the detrended ESI and the detrended GDP index. The downward phases of the reference cycle have been marked by the shadow area. Looking at the graphs, we can see that the RIED-based ESIs performed generally better as compared with the CSO-based ESIs, both as regards their conformity with the GDP growth rates and GDP trend deviations.

Figure 4a
Economic sentiment indicator (ZHG1C) and GDP growth rates (GDPG)

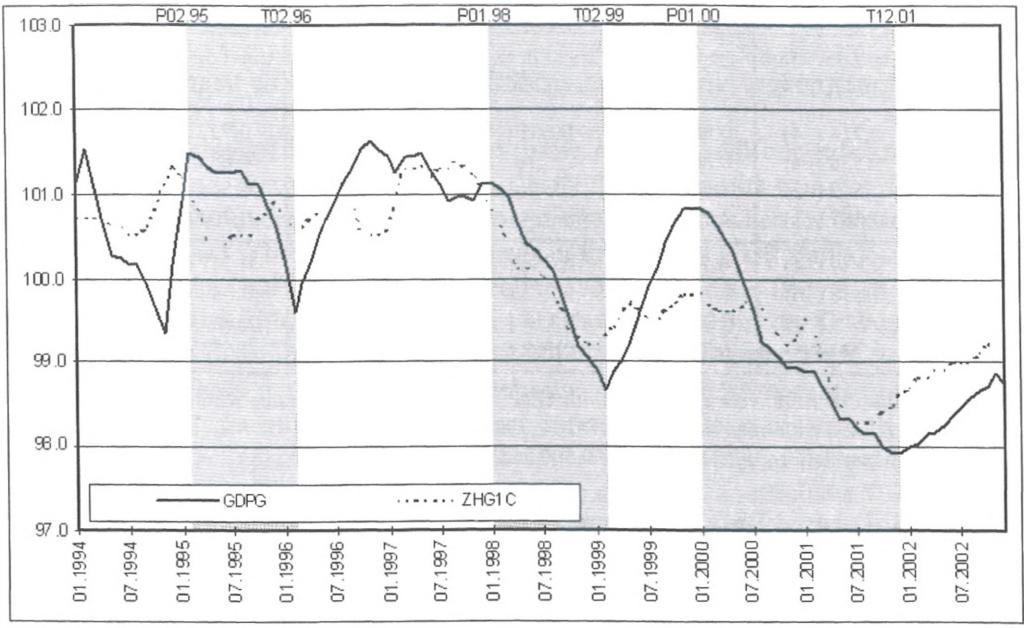


Figure 4b
Detrended ESI (CZHG1C) and the cyclical component of GDP (CGDPI)

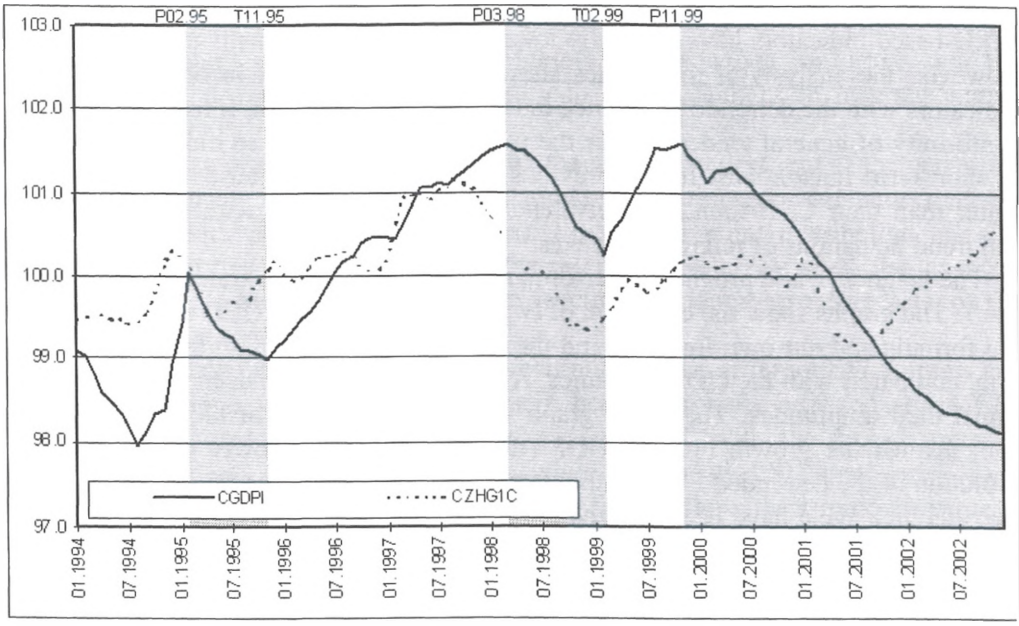


Figure 5a
Economic sentiment indicator (ZHG4) and GDP growth rates (GDPG)

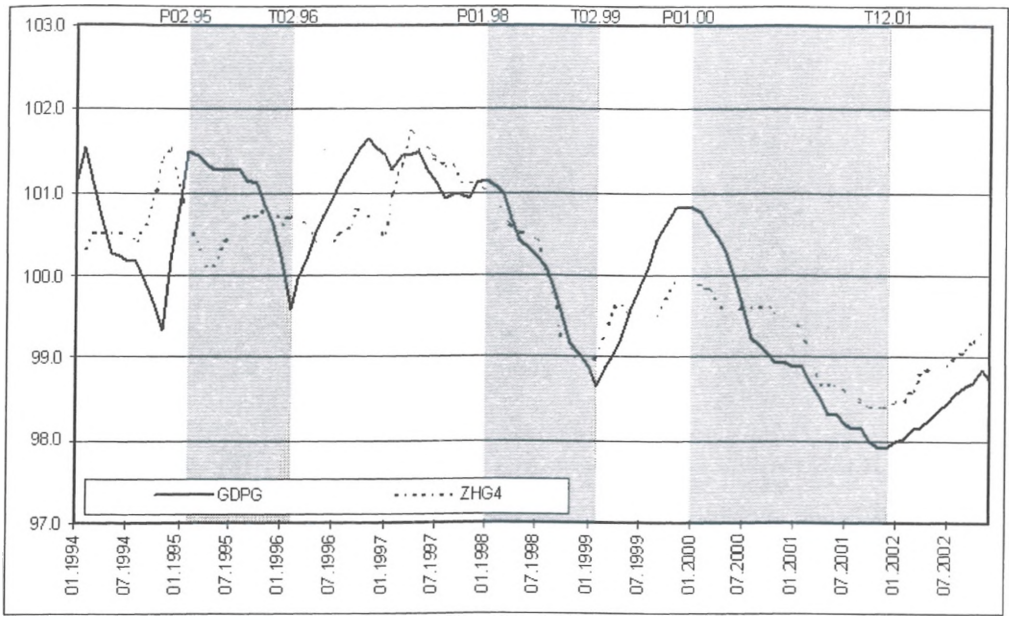


Figure 5b
Detrended ESI (CZHG4) and the cyclical component of GDP (CGDPI)

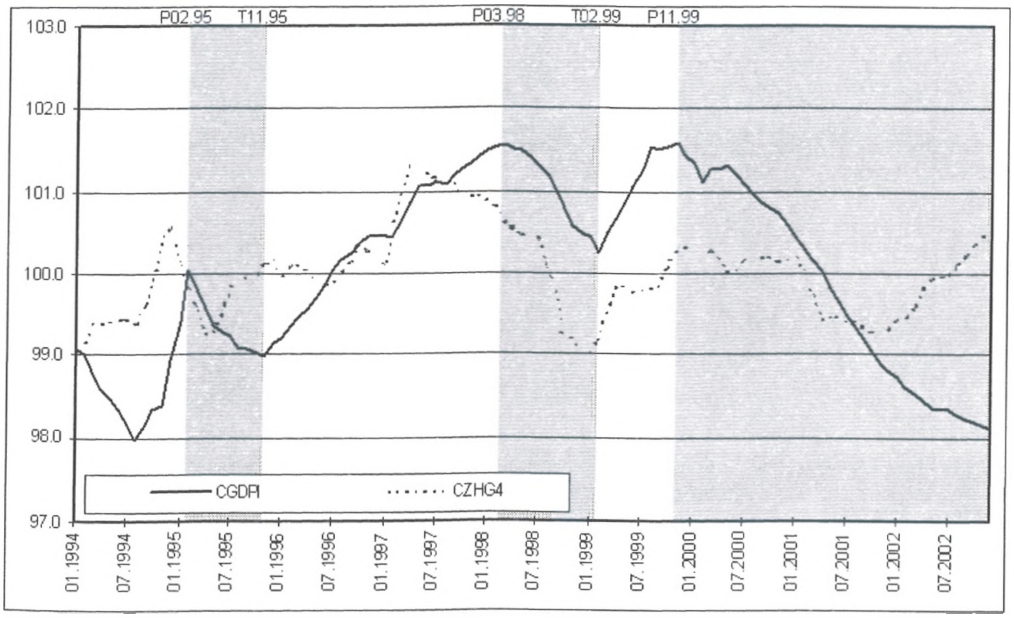


Figure 6a
Economic sentiment indicator (ZGG1C) and GDP growth rates (GDPG)

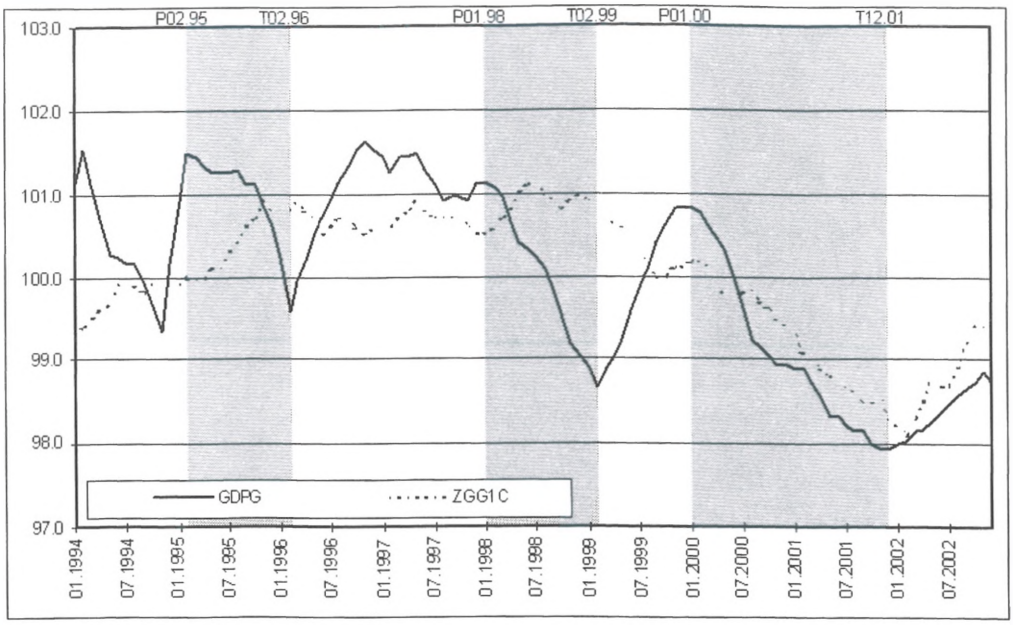


Figure 6b
Detrended ESI (CZGG1C) and the cyclical component of GDP (CGDPI)

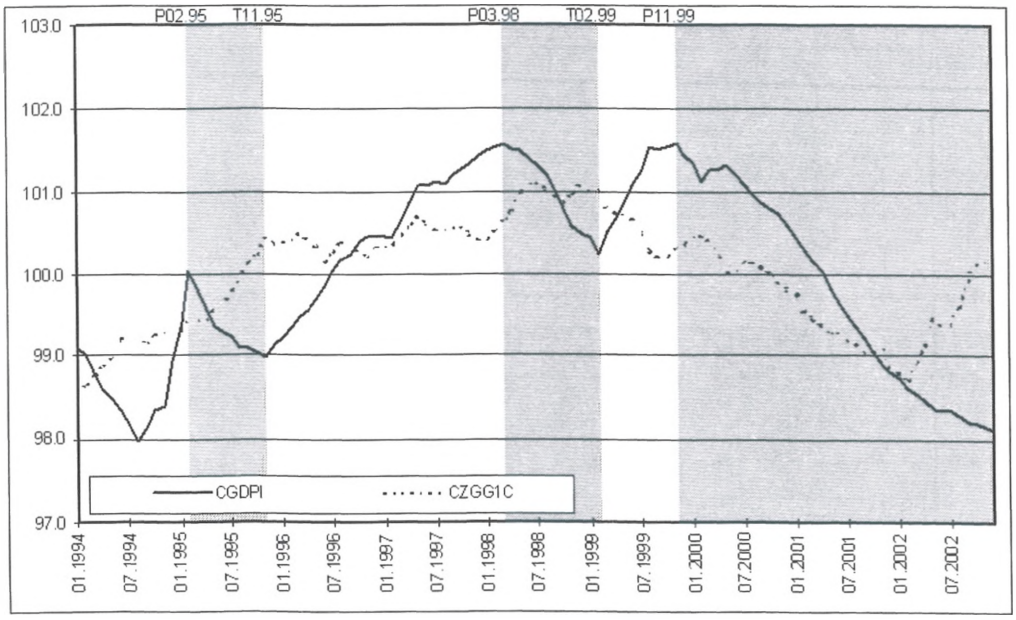


Figure 7a
Economic sentiment indicator (ZGG4) and GDP growth rates (GDPG)

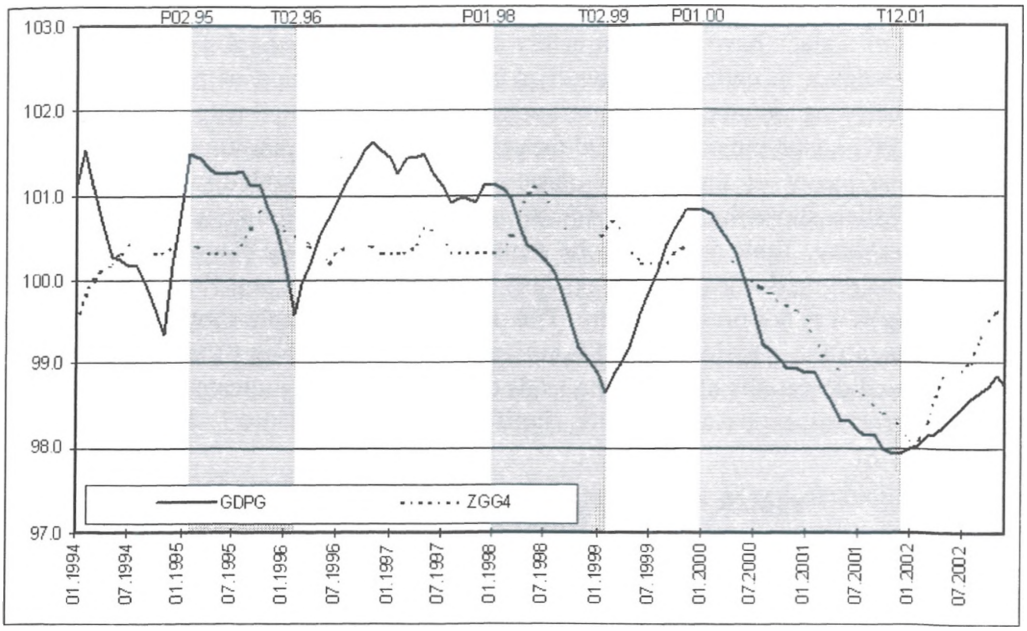
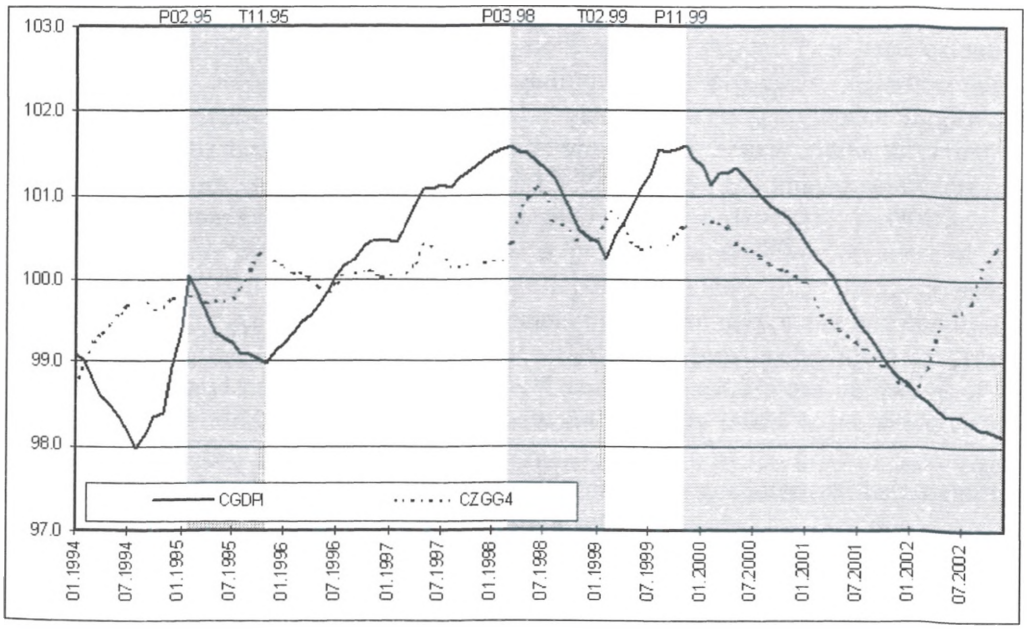


Figure 7b
Detrended ESI (CZGG4) and the cyclical component of GDP (CGDPI)



All the indicators reveal an economic slowdown in the second half of the period. 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 in 2001-02. At the end of period the RIED-based indicators announce some improvement of economic climate since mid-2001 while the CSO-based indicators signal the revival since the beginning of 2002.

Additional proof of the quality of our indicators is provided by the regression equations which show the ability of various ESIs to reflect the actual fluctuations in economic activity. Table 5 presents the regression results for GDP against our ESIs. A similar set of regression equations was also estimated for GCI and IP, but for the sake of conciseness it is not presented here. The upper part of the table shows the regression of GDP growth rates against our ESIs while the lower part shows the correspondence between trend deviations of both. The leads or lags have been indicated in brackets. All the parameter values are statistically significant, but not all the ESI variants give a satisfactory fit.

Table 5. Regression results for GDP against ESI

Dependent variable	Predictor	Lead (–) or lag (+)	Constant	Parameter	R^2
Undetrended time series					
GDPG	ZHG1	–1	–131.06 (–10.1)	2.35 (18.1)	0.76
	ZHG1C	–1	–130.07 (–10.2)	2.34 (18.5)	0.76
	ZHG3A	0	–139.44 (–8.1)	2.44 (14.1)	0.65
	ZHG4	–1	–122.85 (–9.2)	2.27 (17.1)	0.73
	ZGG1	+4	–149.18 (–8.4)	2.54 (14.4)	0.67
	ZGG1C	+5	–117.63 (–6.6)	2.22 (12.5)	0.61
	ZGG3A	+4	–100.56 (–8.1)	2.05 (16.4)	0.73
	ZGG4	+3	–152.11 (–7.7)	2.57 (13.1	0.62
Detrended time series					
CGDPI	CZHG1	–4	–181.66 (–7.0)	2.82 (10.9)	0.54
	CZHG1C	–4	–173.86 (–4.6)	2.74 (7.2)	0.34
	CZHG3A	–2	–127.91 (–3.9)	2.28 (6.9)	0.32
	CZHG4	–3	–144.65 (–4.5)	2.45 (7.6)	0.36
	CZGG1	–4	–200.43 (–11.2)	3.00 (16.8)	0.73
	CZGG1C	–6	–181.23 (–11.8)	2.81 (18.3)	0.77
	CZGG3A	–4	–143.46 (–9.0)	2.44 (15.2)	0.69
	CZGG4	–5	–232.85 (–10.2)	3.33 (14.6)	0.68

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

As regards the conformity of our ESIs with GDP growth rates, the best fit is provided by the ESI variant denoted ZHG1C (new EU formula, RIED data) whereas an alternative indicator ZGG1C (new EU formula, CSO data) seems to be best in representing the fluctuation of GDP trend deviation. However, trend deviations change with each updating. Therefore, in order to get a more or less firm conclusion on the

conformity of different ESI variants with the actual economic development, we should rather look at their conformity with the growth rates of GDP or of some other reference index. Time series of growth rates are fixed and not modified any more (save occasional data revisions).

Using the estimated regression equations, we can predict or notice without any delay all the major swings in the aggregate economic activity. Figures 8a and 8b illustrate such capacity of two ESIs based on the RIED survey data (ZHG1C and ZHG4) against the GDP growth rates. The thick line marks the actual growth cycles while the thin line gives the simulated picture obtained from the respective regression equation. The graphs show a very good fit to actual growth cycles. Figures 9a and 9b show the detrended GDP index and its simulation given by two CSO-based ESIs (ZGG1C and ZGG4).

Certainly, not all the 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 ESI variant.

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 given by the ESI formulas 1C 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 composite indicators based on survey data and the reference indicators based on statistical data 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 supply and demand decisions taken by economic agents, shaping the actual course of economic activity. Therefore, sentiment indicators, reflecting microeconomic assessments and attitudes, are a valuable tool in business cycle analysis.

These findings are very important for a proper interpretation of survey-based composite indicators. Such indicators, reflecting changes of certain economic variables, are very sensitive to any improvement or 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 ESIs 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 rise or fall in the absolute activity levels.

Another important test for our ESIs is their performance at the turning points of reference cycle and the ability to signal them in advance. Table 6 gives the turning

Figure 8a
Growth rates of GDP and their representation by the regression against ESI (ZHG1C)

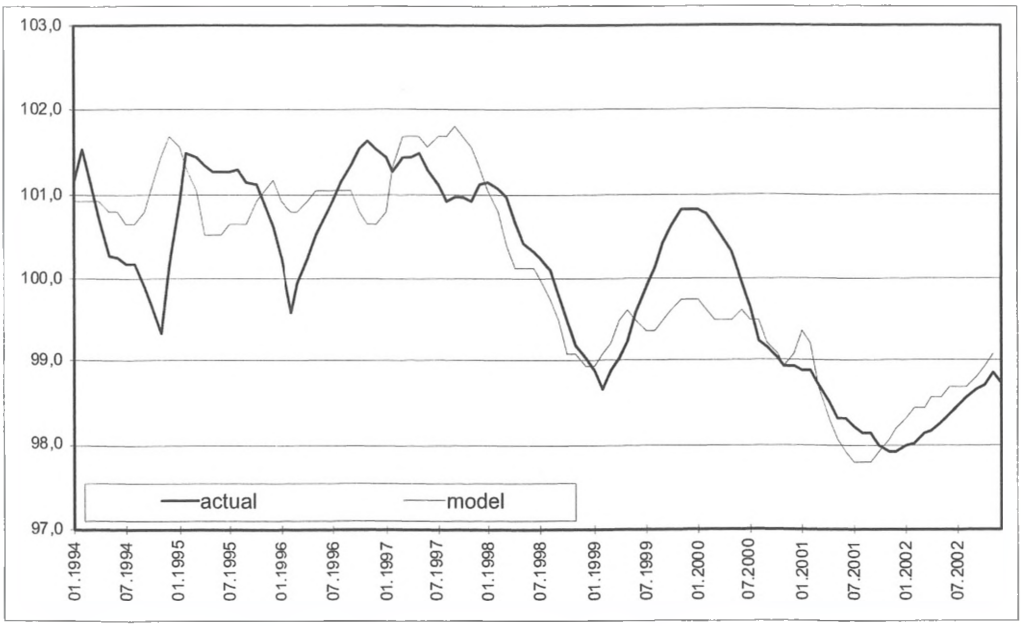


Figure 8b
Growth rates of GDP and their representation by the regression against ESI (ZHG4)

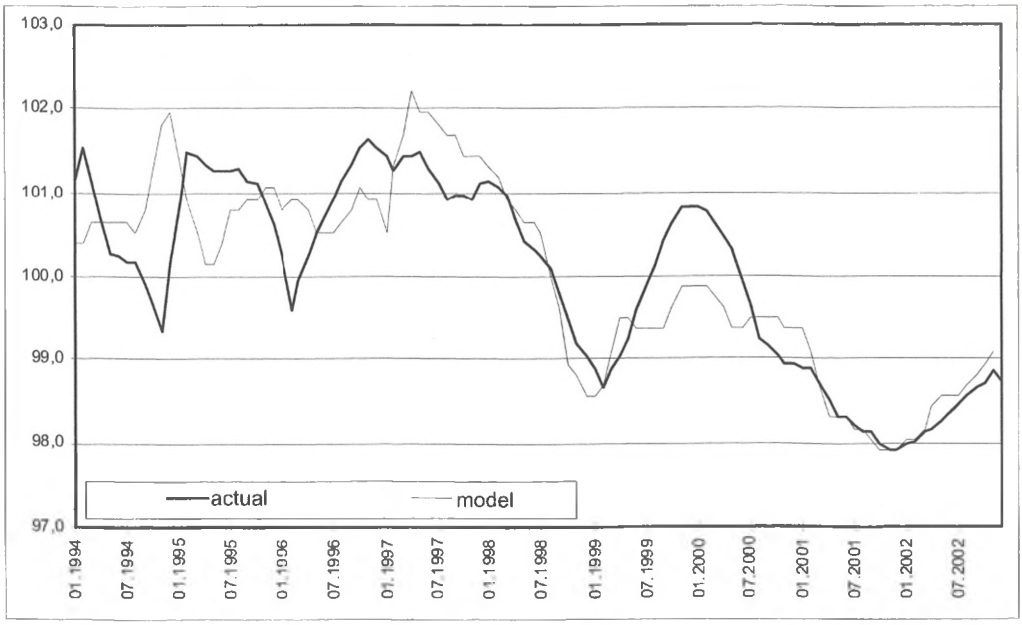


Figure 9a
Growth rates of GDP and their representation by the regression against ESI (ZGG1C)

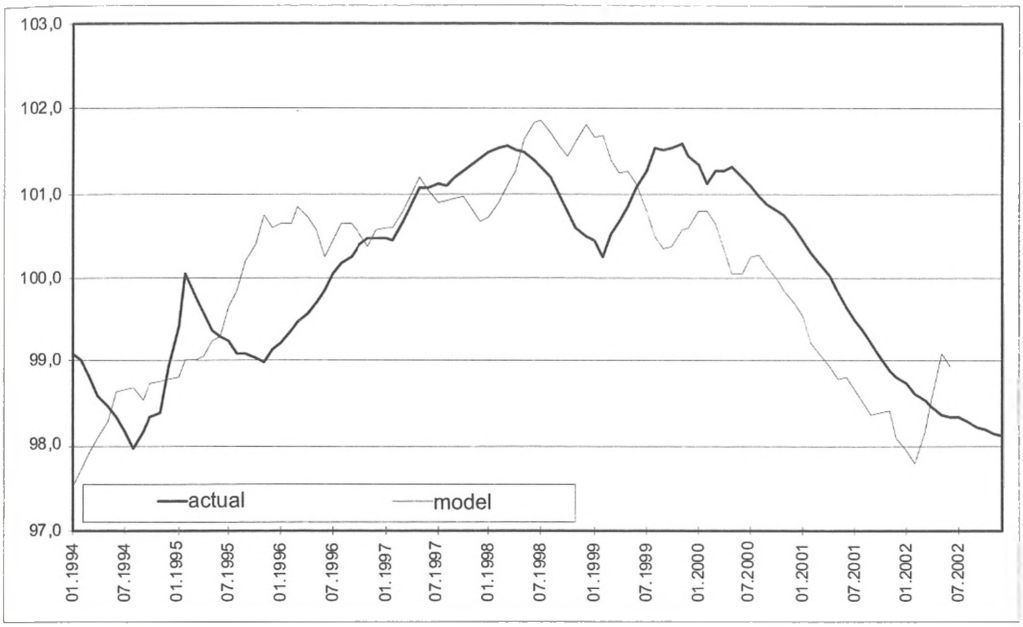


Figure 9b
Growth rates of GDP and their representation by the regression against ESI (ZGG4)

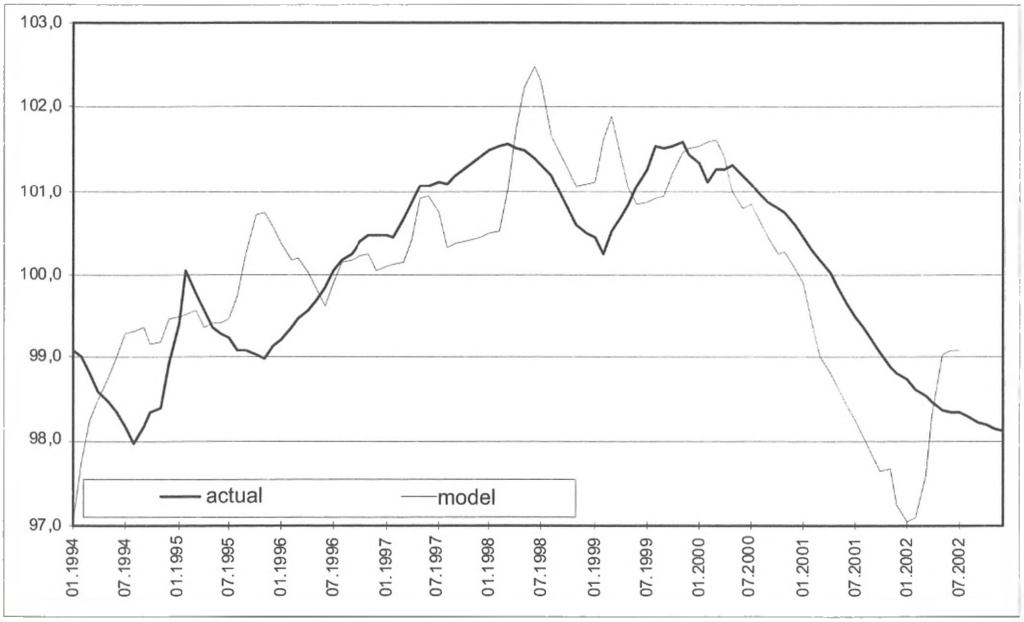


Table 6. Turning points of ESIs

Indicator	1994	1995	1996	1997	1998	1999	2000	2001	2002
ZHG1									
– index	T 08 P 12	T 08		P 09		T 02	P 01	T 09	
– trend deviation	P 12	T 07		P 09	T 12		P 08	T 07	
– tendency	T 08 P 12	T 07		P 09		T 01	P 03	T 09	
ZHG1C									
– index	T 08 P 12	T 06		P 09		T 01	P 01	T 09	
– trend deviation	P 12	T 04		P 09	T 12		P 06	T 07	
– tendency	T 07	P 01 T 07		P 09		T 01	P 01	T 09	
ZHG3A									
– index	T 05	P 01 T05P12	T 07	P 06		T 02		P 02	
– trend deviation	T 05	P 01 T 05		P 06		T 02		P 02 T 06	
– tendency	T 07	P 01	T 07	P 07		T 02	P 07	T 09	
ZHG4									
– index	P 12	T 05 P 12	T 06	P 04		T 01	P 02	T 12	
– trend deviation	P 12	T 04		P 04	T 12		P 02	T 10	
– tendency	P 12	T 06 P 12	T 07	P 06		T 01	P 01	T 09	
ZGG1									
– index		T 02		P 10		T 10	P 02		T 02
– trend deviation		T 01		P 10		T 09	P 02		T 02
– tendency		T 02		P 10		T 10	P 03		T 02
ZGG1C									
– index			P 03 T 11	P 05	T 01 P 07				T 02
– trend deviation			P 04 T 11	P 05 T 12	P 07	T 09	P 02		T 02
– tendency			P 02		T 01 P 08				T 03
ZGG3A									
– index		P 11	T 07	P 06	T 02 P 07				T 02
– trend deviation		P 11	T 06	P 06	T 02 P07T11		P 03		T 01
– tendency		P 11	T 07	P 07		T 10	P 02		T 01
ZGG4									
– index		P 11	T 06	P 06	T 02 P 06	T 09	P 03		T 02
– trend deviation		P 11	T 06		P 06 T 11	P 03			T 01
– tendency		P 12	T 08	P 06 T 12	P 07	T 08	P 02		T 01

points of different ESI variants represented by three time series: (a) seasonally adjusted and MCD-smoothed index, (b) trend deviation, (c) tendency (9- or 13-month moving average). Detrended ESIs show mostly the same or similar turning points as undetrended series. The tendency marked out by a longer moving average shifts more or less the turning points. For all the ESIs the constraint about the minimum length of a phase has been loosened to 3 months, as for the growth rates of reference indexes, due to their large variability.

Table 7. The behaviour of ESIs around the peak in 1997-98 (lead or lag)

Indicator	GDP		GCI		IP	
	growth rate	trend deviation	growth rate	trend deviation	growth rate	trend deviation
	01.1998	03.1998	01.1998	02.1998	11.1997	01.1998
ZHG1	-4	-6	-4	-5	-2	-4
ZHG1C	-4	-6	-4	-5	-2	-4
ZHG3A	-7	-9	-7	-8	-5	-7
ZHG4	-9	-11	-9	-10	-7	-9
ZGG1	-3	-5	-3	-4	-1	-3
ZGG1C	-8	-10	-8	-9	-6	-8
ZGG3A	-7	-9	-7	-8	-5	-7
ZGG4	-7	-9	-7	-8	-7	-9

The most important thing is the behaviour of our ESIs around the major peak in 1998. This is illustrated by Table 7, which shows the leads (in months) of our indicators before the peak of the growth cycle. We can see that all the ESI variants signalled the slowdown well in advance. The decrease in the GDP growth rate was signalled 3-9 months ahead, and the fall in the GDP trend deviation was signalled 5-11 months ahead.

We should also remember that the dates of the major peaks in reference indexes have been intentionally placed at the first turning point (affected by the Russian crisis), which was followed by some recovery in 1999 and a definite fall in 2000. If the major peak is placed at the second downturn, we would get a very long signal of the slowdown, 2-3 years in advance.

The major shortcoming of this analysis is the relative shortness of available time series, both for economic sentiment indicators and the reference data. 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. This very fact calls for the continuation of our research.

Nevertheless, the analysis has provided significant proof of the practical usefulness of our ESIs in assessing general economic activity, 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.

8. Performance of component indicators

Before we reach any conclusion about the most promising ESI formula and the most 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 8. Statistical properties of sectoral survey data

Code	Sector	QCS	MCD	Relative contribution to stationary variance			Average duration of run			ARIMA forecast
				I	S	TC	I	TC	MCD	
ZH01	Industry	0.57	1	2.3	36.6	62.4	2.1	8.9	5.1	yes
ZH03A		0.49	2	3.3	48.2	47.9	1.8	8.2	5.5	no
ZH05A		0.45	1	2.6	38.6	57.8	1.8	10.7	3.8	no
ZG01		0.54	1	2.5	17.0	83.7	1.9	9.7	3.1	no
ZG03A		0.33	3	2.8	76.6	19.3	1.8	7.1	3.9	yes
ZG05A		0.18	2	1.0	77.4	25.8	1.7	7.1	4.6	yes
ZH09	Construction	0.40	1	0.5	54.6	46.4	2.1	8.2	4.7	no
ZH11A		0.33	1	0.9	86.8	19.7	2.7	5.9	4.7	no
ZG06		0.30	1	0.8	88.4	13.7	2.0	5.6	3.5	yes
ZG08A		0.42	1	0.7	72.7	25.5	2.1	7.1	4.7	yes
ZG10A		0.41	1	0.5	68.6	34.0	2.1	6.3	4.3	yes
ZH17	Trade	0.68	1	5.0	72.5	23.9	2.6	5.4	4.5	no
ZH20A		0.61	1	1.4	38.0	54.5	2.5	8.2	6.3	yes
ZG13		0.19	1	0.8	21.7	72.8	1.7	9.7	3.2	no
ZG15A		0.19	2	1.3	36.6	59.8	1.7	8.2	4.8	yes
ZH25	Agriculture	0.29	1	0.5	14.5	80.4	1.9	7.6	5.6	yes
ZH28	Households	0.99	1	1.6	2.3	91.1	2.1	7.1	5.1	no
ZD06		1.26	2	2.9	1.1	97.1	2.1	7.6	4.0	yes
ZWR01	Stock exchange	0.82	1	2.8	4.8	90.0	2.1	7.1	3.8	yes

I – irregular, S – seasonal, TC – trend-cycle, QCS – quality control statistics (required QCS $\leq$ 1), MCD – months for cyclical dominance (required MCD $\leq$ 6).

Table 8 shows statistical properties of component indicators entering our ESIs. Most of them have good performance characteristics (QCS $<$ 1 and MCD $\leq$ 3). Irregular factor is insignificant while seasonal factor is strongly pronounced and sometimes it can obscure cyclical movement. This especially applies to business indicators for construction, but also to some indicators for industry and trade. Free of seasonal changes are practically only the indicators for households and stock-exchange. Surprisingly low is the amount of seasonal changes in agriculture (as reflected by the RIED survey). As told, in compiling our ESIs we used rough

component data, but seasonal adjustment was made for all the calculated ESI time series.

Table 9. Cross-correlation between ESI components and reference indexes

Code	Sector	Data source	Reference index	
			trend deviation[a]	growth rate
ZH01	Industry	RIED	0.628 (–1)	0.682 (+1)
ZH03A		RIED	0.660 (–1)	0.762 (0)
ZH05A		RIED	*ns*	0.892 (0)
ZG01		CSO	0.729 (–3)	0.805 (+2)
ZG03A		CSO	0.603 (–4)	0.796 (–1)
ZG05A		CSO	0.617 (–4)	*ns*
ZH09	Construction	RIED	0.770 (–10)	0.849 (–2)
ZH11A		RIED	0.656 (–10)	0.779 (0)
ZG06		CSO	0.739 (–3)	0.839 (0)
ZG08A		CSO	0.514 (–3)	0.805 (0)
ZG10A		CSO	0.771 (–5)	0.852 (0)
ZH11	Trade	RIED	*ns inv.*	*ns*
ZH17		RIED	*ns inv.*	*ns*
ZH20A		RIED	*ns inv.*	*ns*
ZG13		CSO	*ns*	0.615 (–1)
ZG15A		CSO	0.604 (–10)	0.638 (–1)
ZH25	Agriculture	RIED	–0.642 (+7) *inv.*	*ns*

[a] Detrended survey-based indicator against detrended statistical constant based index.
ns – insignificant, *inv* – inverted.

A very important thing is the conformity of sectoral survey data with the actual development of output and sales. Table 9 brings the results of cross-correlation between the survey-based indicators and their counterparts in output and sales statistics. As reference indicators we took the constant-base indexes of industrial production, construction and retail sales, and for agriculture we applied our own index of production sold. Detrended business survey indicators were correlated with the detrended reference indexes, and undetrended indicators were compared with y-o-y growth rates of the respective statistical indexes.

Confidence indicators for industry and construction based on both sources of survey data are quite well correlated with the growth rates of industrial production and construction output, usually synchronically. Trend deviations are less correlated because they depend on the trend of each indicator, but some of the component indicators reveal a short lead. Confidence indicators for trade from both sources of survey data do not correspond well with the statistical sale records. The confidence indicator for agriculture from the RIED survey is also weakly correlated with our reference index of production sold.[15]

[15] As the matter of fact, confidence indicator for agriculture is calculated as the tendency of farmers' revenue, corrected by confidence factor, so it may diverge from the output volume.

Figure 11a
Industrial confidence and industrial production growth

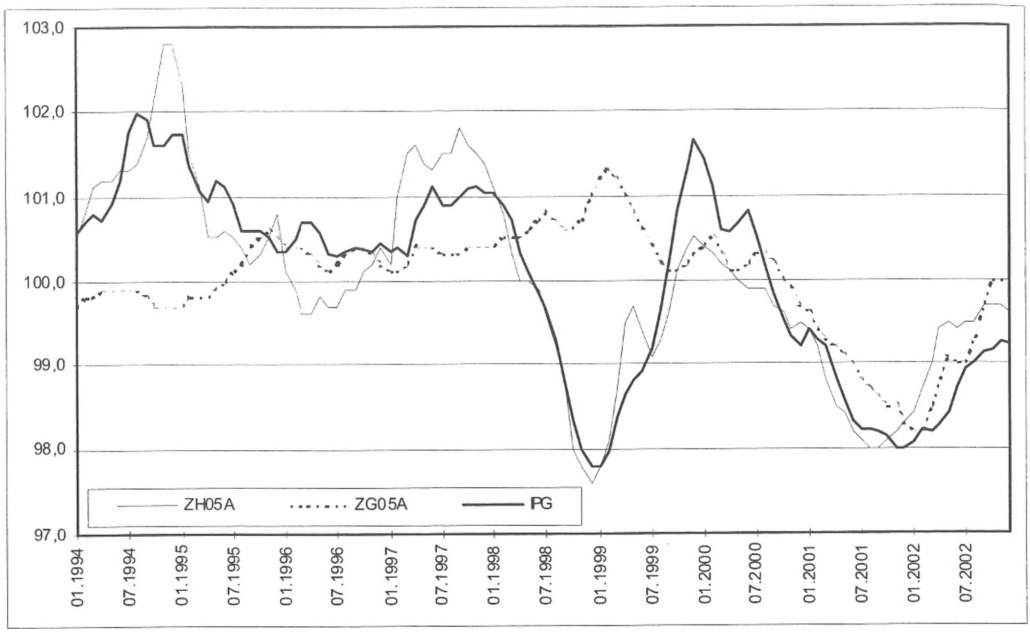


Figure 11b
Construction confidence and construction production growth

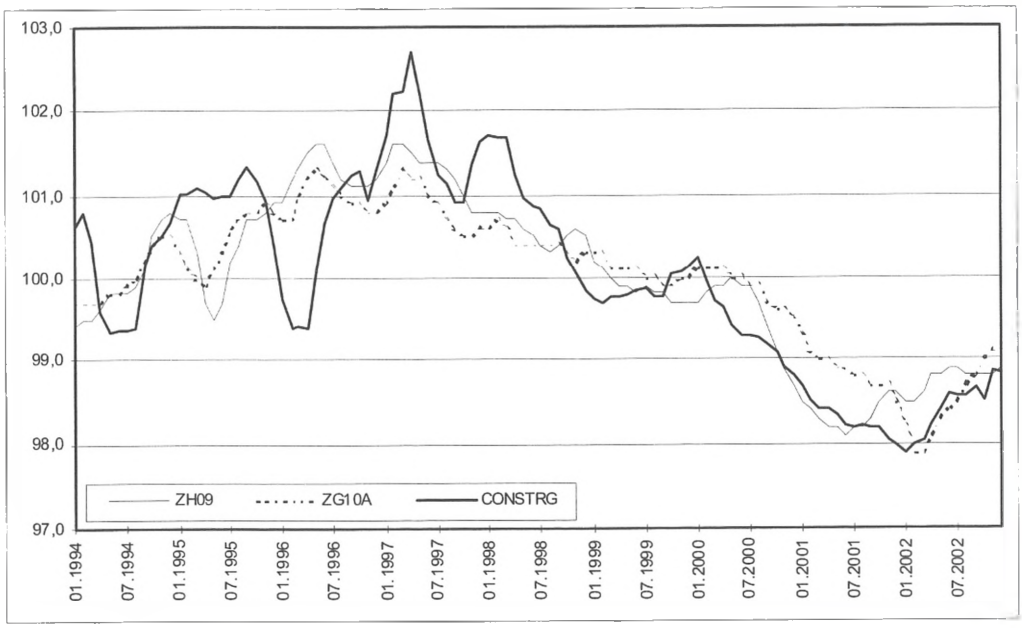


Figure 11c
Trade confidence and trade sales growth

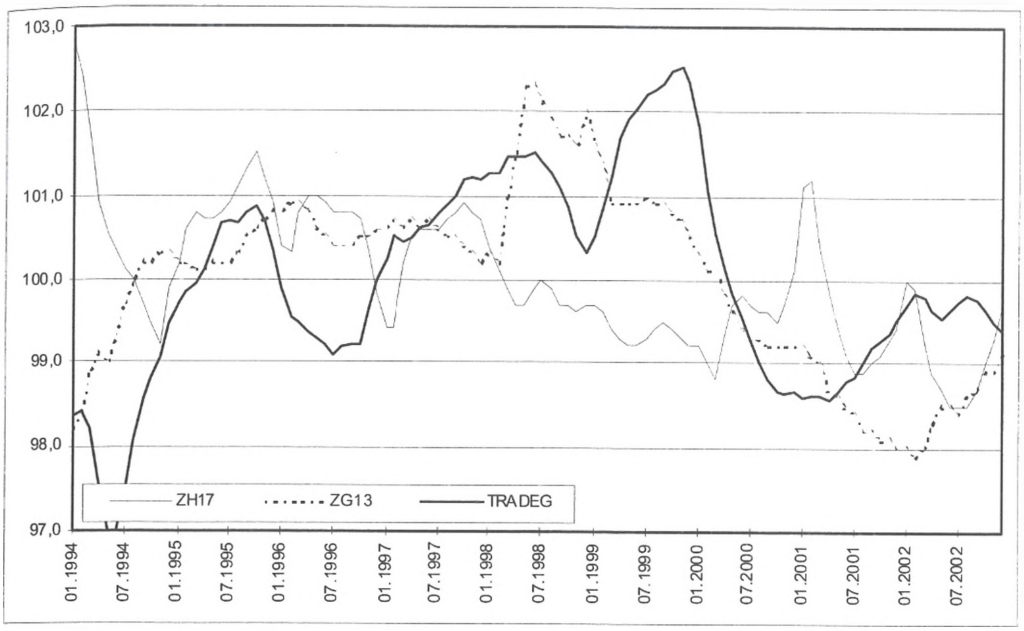
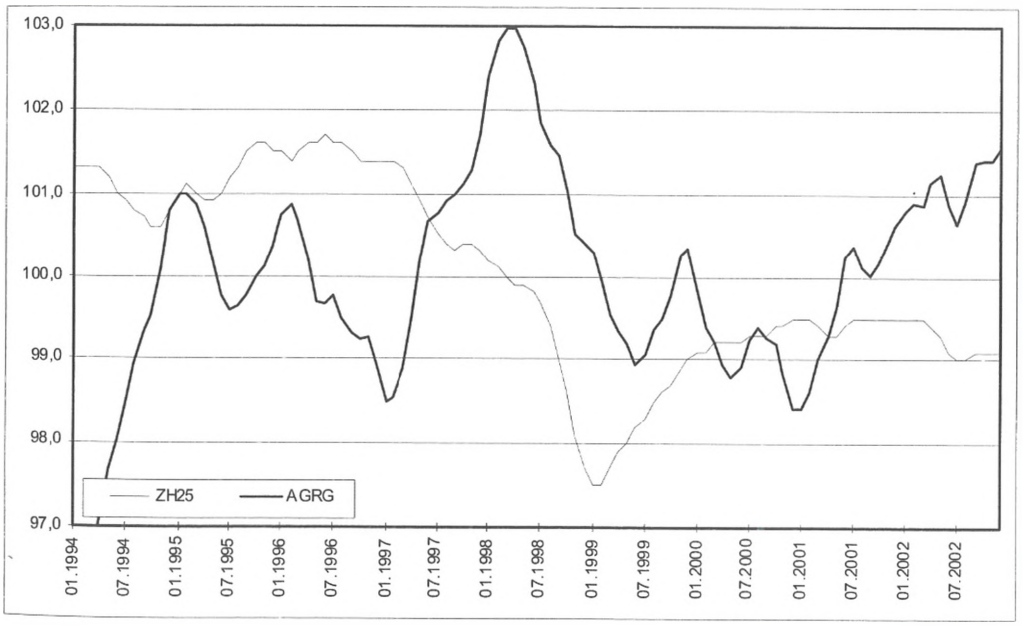


Figure 11d
Agriculture confidence and agricultural production growth



These observations are also evidenced by Figures 11a-d. The first two graphs illustrate quite a good conformity between the confidence indicators for industry and construction compiled from the RIED and CSO surveys and the growth rates of industrial and construction production. The next two graphs show significant differences between confidence indicators for trade and agriculture and the respective statistical data.

While the divergence of confidence indicator for agriculture is not a big problem (it is used only in two RIED-based ESIs and can eventually be dropped), more troublesome if the discrepancy between the confidence indicators and statistical data for trade, a sector representing about 20% of the GDP, entering our ESIs with considerable weights. Any inadequacy in the assessment of business tendency in trade affects the quality of the aggregate ESIs and their conformity with GDP data. We can hope that the progress in both surveying methods and the accuracy of statistical data will narrow the gap between qualitative and quantitative indicators for this sector.

Of course, one could speculate whether the discrepancy between the survey-based indicators and the reference statistical data points to the inadequacy of the first or to impreciseness of the second. Probably, both are true. However, in assessing the performance of survey-based indicators we have actually no other reference indexes than those provided by the official statistical data.

As to the households, the Ipsos-Demoskop and RIED surveys now are more or less comparable. Both are using the same EU concept of consumer confidence. However, the RIED survey was originally based on a questionnaire published in a women magazine, so it could not be considered representative.

By analysing survey data for individual sectors of the economy, we can arrive at the most effective ESI formula which may be compiled by combining the best fitted components taken from different survey sources. For example, the RIED indicator for industry can be merged with CSO indicators for construction and trade, and with the Ipsos-Demoskop indicator for households. All component indicators would then be available at monthly intervals, improving the timeliness of the aggregate indicator.

The analysis of ESI components supports our earlier observation about the relationship between confidence indicators based on survey data and statistical data describing 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. They should be confronted with the dynamics of the respective sectors rather than with the absolute changes in the activity levels.

7. Policy relevance and possible applications in other CEE countries

All the CEE & 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, as well as for policy purposes. 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.

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.

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 derived from survey data have become one of the most popular sources of information on current economic trends and prospects.

The EU has adopted harmonised rules for business and consumer surveys, and a common concept of a general indicator of aggregate economic activity derived from qualitative survey data, called economic sentiment indicator (ESI).

After EU accession, Poland and all the other new EU entrants will also be obliged to deliver its economic survey data to the common monitoring system. As a matter of fact, CEE accession countries are already included in the EU business indicator system. The only missing element is an aggregate economic indicator based on survey data for the economies concerned. Our research brings some new conceptual and analytical insights about the way how to compile and interpret such indicators.

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, they are now ready for operational use. The research team implementing this project has gathered enough analytical experience to compile an ESI for Poland on a monthly or quarterly basis, and to give a concise assessment of current trends and prospects of the economy and its major sectors. The results could be disseminated in 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 cost involved would be negligible as compared with information gains.

10. Conclusions

1. Composite indicators of economic activity based on business and consumer survey data are a powerful tool in assessing current economic trends and prospects. In all the EU member countries such an aggregate index, called economic sentiment indicator (ESI), is regularly compiled and published. 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 paper, several variants of economic sentiment indicator for Poland have been tested, based on four alternative formulas and two different data sources. The ultimate aim is to choose the most reliable version of the indicator, best suited for monitoring and forecasting purposes. Time series of the indicators have been compiled in monthly intervals for the period 1994–2002. The indicators have been analysed as to their economic merits and statistical properties, and their conformity with the actual economic development. The adequacy of component variables entering the composite indicator was also compared with output or sales data of the respective sectors.
3. Our analysis suggests that ESIs filled with the RIED survey data tend to be more indicative of the change in GDP growth rates as compared with the CSO-based ESIs. The latter however may be better in reflecting changes in the detrended GDP index.
4. Two ESI variants appear to be most promising. The first is based on the EU ESI concept while the second is the author's own formula. Probably, even better results could be obtained by filling the two alternative formulas with best fitted component variables taken from different sources of survey data.
5. Our analysis brings some important conclusions as to the practical use of composite indicators based on survey data and their 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. Second, survey-based indicators are indicative of changes in the growth rates rather than in absolute output levels. A decrease in the indicator may reflect a slowdown in economic growth, but not necessarily an absolute fall in total production.
6. Composite indicators of economic activity based on survey data can be easily 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 was signalled by our indicators at least 1-2 years in advance.
7. Composite indicators of economic activity based on survey data may be a helpful tool in assessing current economic trends. They are intended to supplement other instruments used in macroeconomic appraisals, but not to replace them. For a correct evaluation of the general state of economy we cannot rely on a single indicator, no matter how good it is.
8. All the CEE & FSU countries urgently need reliable monitoring and forecasting systems in order to assess their economic trends and prospects for business and policy purposes. Our experience in the ESIs for Poland might be helpful in developing similar indicators for the other countries in transition.

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