Elżbieta Adamowicz
Sławomir Dudek
Konrad Walczyk

Regional Business Activity in Light of Business Surveys Results

Abstract

The main goal of this paper is to compare regional business activity in Poland using regional official statistics and data obtained by the RIED from business surveys conducted in the manufacturing industry (NACE D). This is the first attempt to model regional output in the Polish NUTS2 regions using RIED survey data covering the 1999-2005 period. A two-stage analysis focuses first on comparative statistics and is aimed at identifying a level and dynamics of regional economic development. Next qualitative data (RIED surveys balance statistics) is used to analyse changes of industrial output in regions. Two monthly run survey balance statistics are used: total orders and sales of the manufacturing sector (NACE D); a yearly index of manufacturing production sold, published by the Central Statistical Office, is taken as a reference variable. Time series are seasonally adjusted and smoothed. Persisting differentiation of regional business activity makes us conjecture that: (1) economically dominating regions tend to strengthen their positions, (2) output gaps between most and least developed regions are not decreasing, and (3) structural changes that have been noticed in recent years in least developed regions make one expect that a map of regional differentiation will change.

Keywords: Business tendency surveys, Regional analysis
JEL classification: E32

1. Introduction

Poland is a medium-sized country of uneven regional development. Since the end of the World War II its administrative structure of the country has been changed three times, and at present a voivodship is the major administrative unit, being an equivalent of NUTS 2 of the European territorial classification. With the time passing, the number of voivodships ranged from post-war 17 to 49 in the mid-1970s until 1 January 1999

when it was established at 16 (NUTS 2), clustered into 6 macro-regions (corresponding to NUTS 1 units). The economic potential of the country is unequally distributed among regions what naturally results in a pace of their economic growth. This differentiation is deeply rooted in the history whereas in economic analyses the problem of economic differentiation, especially concerning the business cycles, has been rarely discussed.

The reason for this is largely a lack of statistical data; for a vast of national income statistics is calculated for the country as a whole and it has almost no regional equivalents. Even if such data is available, it is released rarely and irregularly. Moreover, restructuring of public administration system leads to cutting time series and the data is not recalculated back. It is therefore recommended to consider using BTS data. A pioneer research paper, which dealt with the problem, was published by Fundowicz.

This paper is an attempt to make use of data collected from business cycles research conducted in the manufacturing industry by RIED WSE. The survey is county-wide so it is possible to apply the data for regional analyses. The way the data base is managed enables to recalculate time series back so that time series were not affected by changes of the administrative division. Nevertheless, this particular research is narrowed down to 1999–2005, i.e. the period starting with the last administrative restructuring. Although we can observe only one full cycle in this period we are still able to test usefulness of the country-wide business cycles data from the perspective of their regional analyses applications.

The purpose of the analyses included in this paper is to provide answers to the following questions:

- Are voivodship (regional) and macro-regional fluctuations of business activity reflected by the country-wide ones or generated in a different way?
- Is it possible to determine impact of regional economic performance on the country's economic situation?
- Is it possible to analyse of regional economic activity based on data collected from RIED WSE business survey?
- Is it justified to regionalise the country's countercyclical policy?

2. Regional economic development in Poland

We have already mentioned that as for economic status regions (and macro-regions) vary both externally (between each other) and internally. One the whole, the larger a

region, the greater economic disparities between its parts; particularly considerable and evident are those between capital cities, which concentrate economic potential of regions, and the rest of their areas. Hereafter the focus is put on external disparities between regions (for statistical data see Table 1 in the Appendix) as internal ones require a much detailed analysis.

The Mazowieckie voivodship (Mazovia) is economically the most developed region in Poland, largely due to the importance and potential Warsaw, the capital of Poland, has. It contributes more than one fifth to the country's GDP, the same share of total industrial production is sold here, it consumes almost one third of total construction production and employs one sixth of the country working labour resources. The region is also the most dynamic one, in terms of investment activity, particularly in R&D sectors. The only area that requires much bigger advancement is transportation infrastructure (Warsaw and the Mazowieckie voivodship lacks even 1 km of public roads of the highest quality, ie highways).

Śląskie (Silesia) and Wielkopolskie voivodships combined dispose a bit more economic capacity than the Mazowieckie region, contributing almost one fourth to Poland's GDP and absorbing more than one fifth of total employment. Each of the regions has a different production profile. The former is characterised by high concentration of heavy industry (coal mining and steel mills) and automotive industry (located in the Katowicka Special Economic Zone and Bielsko-Biała city) and in order to sustain the rate of economic growth it needs to continue restructuring processes started in mid 1990s. The Wielkopolskie voivodship has a diversified production structure and continues augmenting production capacity. Both regions should however underpin high-tech-intensive sectors.

Dolnośląskie, Łódzkie, Małopolskie and Pomorskie (Pomerania) voivodships are well developed regions, each of which having its own specific strengths (academic centres in Wrocław and Kraków, capitals of Dolnośląskie and Małopolskie voivodships, access to the Baltic Sea of the Pomorskie region) and weaknesses (high unemployment in Dolnośląskie and Pomorskie regions, low investment in Łódzkie and Pomorskie regions). All four regions contribute more than one fourth to the total output and have the same share in total employment. They have good prospects but need selective policies to bolster balanced economic growth. For Łódzkie and Pomorskie voivodships raising investment level is a must, particularly in R&D areas, as performance of relevant indicators is much below the country average.

All the 9 remaining voivodships are amongst the least developed regions of the EU. Their total gross value added does not exceed 30 % of the country total and they use

one third of the country employed labour resources. All regions face tremendous challenges: high unemployment, low labour productivity, poor infrastructure and technological backwardness. Business activity is low as small- and medium-size firms are predominant. Low investment rates do not foster necessary transition from low value-added and unqualified labour-intensive production (agriculture and fishery, some services, small-scale manufacturing) in northern/eastern regions (Lubuskie, Zachodniopomorskie, Warmińsko-Mazurskie, Podlaskie, Lubelskie, Świętokrzyskie and Podkarpackie voivodships) and are not sufficient to support modernising machinery and chemical industries concentrated in central and southern regions (Kujawsko-Pomorskie and Opolskie voivodships).

Mazowieckie and Łódzkie regions form Central Macro-region, Śląskie and Małopolskie regions – South Macro-region, Kujawsko-Pomorskie, Pomorskie and Warmińsko-Mazurskie regions – North Macro-region, Dolnośląskie and Opolskie regions – South-West Macro-region, Wielkopolskie, Lubuskie and Zachodnio-pomorskie regions – North-West Macro-region, and the remaining four regions: Podlaskie, Lubelskie, Podkarpackie and Świętokrzyskie – East Macro-region (so called Eastern Wall).

3. Data used

The year-over-year index of nominal[47] manufacturing production sold [IPYOY], published by the Central Statistical Office of Poland (CSO), was assumed to be a reference variable. The selection of this index was based on our previous studies and other authors' analyses of the usefulness of the RIED industrial survey in forecasting (see: Adamowicz, Dudek, Walczyk (2004); Tomczyk (2001); Rocki, Tabeau (1995)). Whenever these authors compare qualitative and quantitative variables the problem how to define the index of a quantitative variable is a crucial point. This problem has been analysed by many researchers (see also: OECD (2003), p. 57-62; Bennett (1984)). In this paper we rely on results of our empirical analysis which showed that the year-over-year index can be treated as a reference variable for balances from the RIED industrial survey. The index is calculated assuming sales be equal to 100 in a corresponding period of a previous year.

The quantitative data is collected monthly and covers the period of January 2000 – December 2005 (72 observations). For some regions voivodship statistical offices were

[47] Real data are not available for regional sections.

able to calculate manufacturing production back to January 1998 (see footnote 1); thus, we managed year-over-year indices starting January 1999.

The reference index was analysed separately for: the whole country, 6 NUTS1 regions and 16 NUTS2 regions (voivodships), and was cross-correlated with two sets of BTS time series: macro-regional and regional. Four qualitative indicators were chosen to analyse the CSO indices:

- manufacturing production – state [PRODINDS] and expectations [PRODINDF],
- manufacturing total orders – state [ORDINDS] and expectations [ORDINDF].

In total, 88 qualitative indicators (64 regional and 24 macro-regional) were used to analyse the country index, 24 for macro-regional indices and 64 for regional ones. All BTS time series were taken with leads and lags up to 6 months.

All time series were adjusted of seasonal and irregular fluctuations, adapting TRAMO-SEATS procedures and using Demetra 2.04 software package. For two BTS time series: production state [PRODINDS] in Zachodniopomorskie region and total orders expectations [ORDINDF] in Małopolskie region decompositions were not admissible. In general, extracting cyclical component was very difficult due to very short time series.

4. Business fluctuations in regions and macro-regions

In spite of a huge structural diversity of Polish macro-regions and voivodships production fluctuations were present on each regional level and were quite similar to the cycle pattern observed in the whole economy. Cyclical components of industrial production in particular macro-regions were highly correlated with production in the whole economy. Correlation coefficients ranged from 0.863 to 0.950 (see Table 1). It means that business cycles in particular macro-regions were synchronized with business cycle in the total economy. The macro-regional fluctuations were also correlated between each other; correlation coefficients ranged from 0.668 to 0.950. Obviously, there were some differences betwen cycle patterns in macro-regions. In some macro-regions the amplitude of YoY index was higher than in others; the average growth rate was also a bit different. The lowest average growth of production was observed in the poorest macro-regions (East and North Macro-regions) but dispersion of growth rate was rather comparable to the country average. In the biggest macro-region (Central) the growth rate of industrial production was lower than in the total economy. In general, turning points in macro-regions were the same (or very close) as

turning points detected in the total economy (see Figure 1). In some macro-regions we observed short-term additional cycles (e.g. North Macro-region).

Table 1 Key characteristics of yearly growth rates of nominal manufacturing production sold in macro-regions

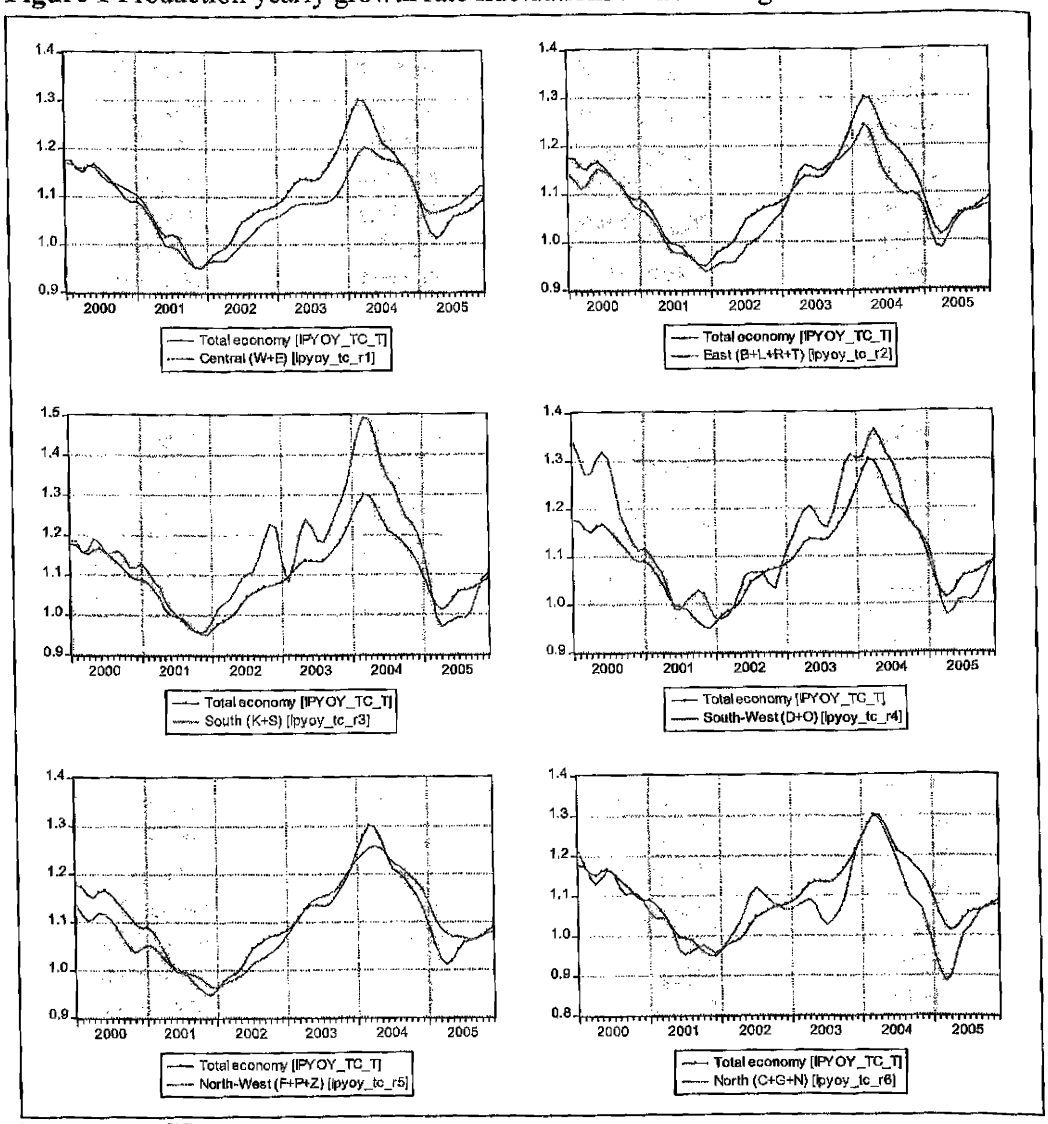
Macro-regions (NUTS1)	In percentage points of YoY index					Correlation with total economy
	Average	Max	Min	2005/2000	Standard deviation	
Total economy	10.0	30.1	-5.0	62.7	8.6	1.000
Central (W+E)	8.5	20.2	-4.8	60.5	6.8	0.899
East (B+L+R+T)	7.5	24.4	-6.1	50.5	7.9	0.950
South (K+S)	14.5	49.4	-4.4	67.7	13.3	0.937
South-West (D+O)	13.5	36.5	-3.1	90.1	12.0	0.931
North-West (F+P+Z)	9.3	25.7	-3.4	64.8	8.2	0.932
North (C+G+N)	7.6	30.0	-11.5	50.7	9.1	0.863

Data source: CSO.

The highest amplitude of fluctuations was noted for South and South-West Macro-regions. We conjecture the reason is that in these regions raw material industries are key regional product contributors. On the opposite side there is the biggest industrial region (Central), characterized by relatively smooth fluctuations.

As it was expected, taking into account NUTS2 level, differences betwen business cycles patterns were slightly larger than for macro-regions but still the pattern was very similar to the total economy fluctuations. Cyclical components for particular voivodships were also highly correlated with the total economy cycle; correlations coefficients ranged from 0.708 to 0.950 (see Table 2). The dispersion of correlation coefficients between voivodships is higher; correlation coefficients ranged from 0.390 to 0.950. There are differences in the average growth between particular voivodships; the highest growth in the analysed period was observed in Dolnośląskie region (22.0 pp.), the lowest in Łódzkie region (4.8 pp.). The highest variability of growth was observed in voivodships where raw materials industry is dominant (Śląskie, Dolnośląskie and Opolskie regions). In general, the industrial fluctuations are quite well synchronized with the cycle in the total industry.

Figure 1 Production yearly growth rate fluctuations in macro-regions



Data source: CSO.

In summary, it should be emphasised that we analysed very short time series and any conclusion of business cycle similarity in regions (voivodships) and macro-regions needs to be reproved after collecting longer time series. In the analysed period we observed only one full cycle in the Polish industry, much too less to use most advanced tools to investigate similarity of business cycles. Due to this the results we obtained should be interpreted with great caution. Nevertheless, we may conclude that business

cycles in regions and macro-regions are distinctly present and they fairly well match the total economy fluctuations. The major differences between regions and macro-regions in Poland concern the level of economic development and scale of industrialization rather than the general pattern of business activity fluctuations.

Table 2 Key characteristics of yearly growth rates of nominal manufacturing production sold in regions

Voivodships (Regions) (NUTS2)	In percentage points of YoY index					Correlation with total economy
	Average	Max	Min	2005/2000	Standard deviation	
Total economy	10.0	30.1	-5.0	62.7	8.6	1.000
Dolnośląskie (D)	22.0	44.5	3.2	102.0	12.2	0.884
Kujawsko-Pomorskie (C)	5.9	21.7	-5.9	35.8	7.3	0.923
Lubelskie (L)	5.7	19.8	-11.3	35.6	8.0	0.918
Lubuskie (F)	8.4	32.7	-5.5	58.0	9.3	0.919
Łódzkie (E)	4.8	11.4	-2.0	32.2	3.6	0.819
Małopolskie (K)	6.1	19.7	-7.1	39.9	7.0	0.882
Mazowieckie (W)	9.5	23.7	-6.0	68.8	8.0	0.878
Opolskie (O)	10.0	44.5	-16.2	64.2	15.8	0.774
Podkarpackie (R)	7.4	20.9	-8.8	48.8	8.7	0.829
Podlaskie (B)	8.4	19.6	3.7	59.9	4.3	0.950
Pomorskie (G)	10.2	32.6	-9.7	66.9	11.1	0.787
Śląskie (S)	19.2	60.8	-4.0	81.8	16.2	0.918
Świętokrzyskie (T)	9.8	37.0	-9.2	66.4	11.4	0.940
Warmińsko-Mazurskie (N)	7.0	22.6	-4.9	47.5	6.2	0.708
Wielkopolskie (P)	10.7	27.7	-2.1	78.3	8.1	0.898
Zachodniopomorskie (Z)	12.9	34.8	-7.1	29.3	12.4	0.907

Data source: CSO.

5. Regional business activity fluctuations in light of qualitative data

As it was mentioned earlier the quantitative official data in Poland are not so detailed and long enough to analyse efficiently and conclusively regional business fluctuations. These data shortcomings can be reduced by the use of regional business survey data. Business tendency survey in the manufacturing industry, conducted by RIED WSE, allows to some extent to analyse economic activity fluctuations on regional level (NUTS1 and NUTS2). The question is how well this qualitative regional data reflect fluctuations of yearly growth rate of manufacturing production. How firms

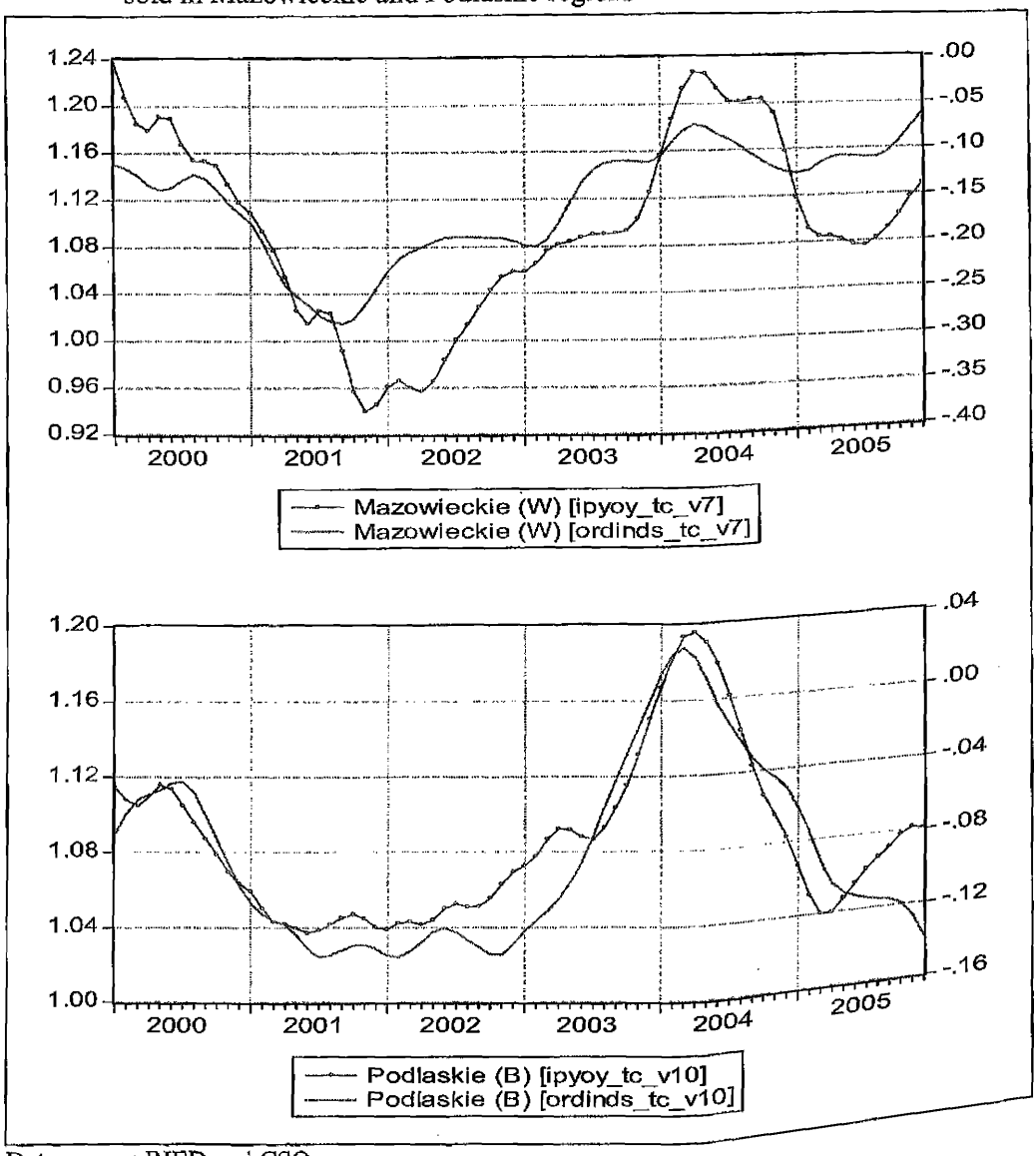
opinions on economic activity tendencies differ in particular regions and macro-regions. At this point it should be mentioned that the RIED WSE manufacturing survey is a country-wide survey, ie it was constructed to reflect business trends in the whole economy. Yet, it is possible to draw conclusions about business climate in macro-regions and - to some extent - in regions (voivodships). The consistency of results, in terms of interpretation, is much better for a higher level of regional aggregation (NUTS1). Nevertheless, for many voivodships we can draw some interesting conclusions. Unfortunately, qualitative balances for some voivodships cannot be decomposed to extract a cyclical component due to inappropriate sample structure in this regions and relatively strong variability of balances.

5.1. Descriptive statistics of business fluctuations

The comparison of firms opinions on production and orders showed that on average some voivodships or macro-regions were more optimistic and some more pessimistic. In some regions the variability of opinions was higher than in others. For example, average balances, concerning opinions on present change in production [PRODINDS] ranged from minus 4.8 pp. to plus 5.8 pp. Interestingly, the less developed voivodships were not the most pessimistic. There is no evident rule that pessimistic opinions dominate in less developed regions. The highest average balance on present production [PRODINDS] we found for Podkarpackie voivodship which is one of the least developed regions. On the contrary, the average balances on present production in Mazowieckie and Śląskie voivodships amounted to minus 1.8 pp. Similar results were obtained for other questions under the analysis (PRODINDF, ORDINDS, ORDINDF). In general, the scale of optimism/pessimism (measured as an average balance) does not depend on the level of development of particular regions and macro-regions.

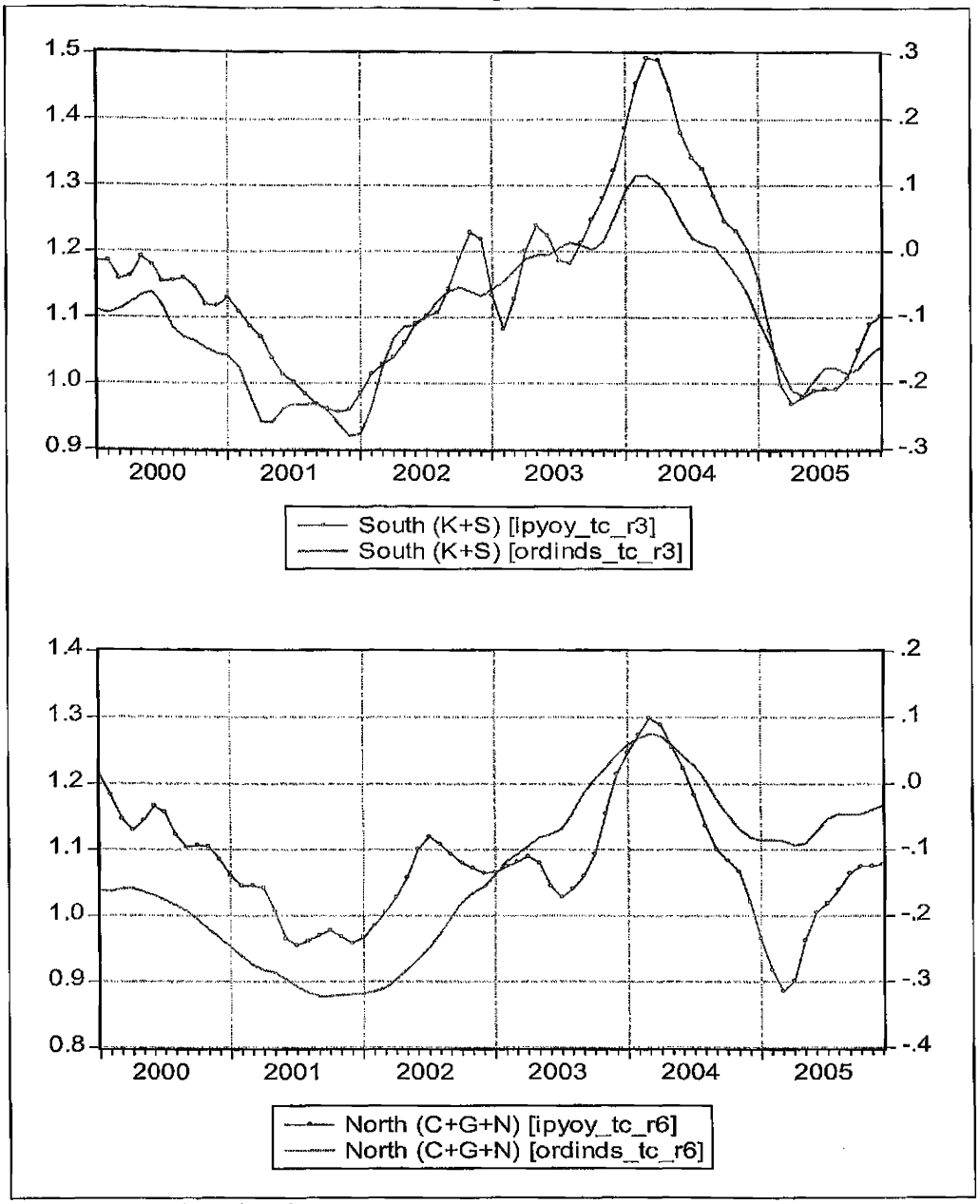
The variability of balances (measured by a standard deviation and a gap between maximum and minimum balances) was the highest in the less developed regions and lowest in the most developed regions. This rule was evident for all analysed questions. It means that opinions formed by firms in less developed voivodships were very sensitive to public and political feelings.

Figure 2 Total orders state [ORDINDS_TC] and nominal manufacturing production sold in Mazowieckie and Podlaskie regions



Data source: RIED and CSO.

Figure 3 Total orders state [ORDINDS_TC] and nominal manufacturing production sold in South and North macro-regions



Data source: RIED and CSO.

In general, qualitative balances (present and expected production, present and expected orders), analysed in this paper, quite well described business activity

fluctuations identified in the previous section. The results differed for particular voivodships and survey questions. On the whole, production state [PRODINDS_TC] and orders state [ORDINDS_TC] had good (in explaining production fluctuations) properties (see Figures 1-3 in Appendix). Orders state [ORDINDS_TC] in the poorly industrialised voivodship also quite well described production fluctuations, even better than the largest voivodships. Figure 2 presents the biggest voivodeship (Mazowieckie) and the smallest one (Podlaskie). Figure 3 illustrates orders state fluctuations in one of the largest macro-regions (South) and one of the smallest ones (North).

5.2. Cross-correlation analysis

Finally, we cross-correlated quantitative CSO time series we analysed in Section 4 with qualitative BTS of RIED WSE time series, analysed in the previous subsection, in order to see whether the latter might be used as leading indicators of the former. We were looking for strong and positive cross-correlations between the two.

At the regional level the highest coefficients of cross-correlation we found for total orders state [ORDINDS_TC] in Podlaskie (0.93, 1-month lag) and Śląskie (0.9, no lead or lag) regions and for production state [PRODINDS_TC] in Śląskie (no lead/lag) and Wielkopolskie (4-months lead) regions (both 0.89) (for details see Table 3). High coefficients resulted also in total orders expectations [ORDINDF_TC] in Śląskie voivodship (0.88, 1-month lead) and Kujawsko-Pomorskie (6-months lag) and Opolskie (2-months lag) regions (both 0.81). There are nine regional qualitative indicators of cross-correlation coefficients amounting to 0.7-0.8; four are leading, one is coincident and four are lagged. Leads and lags are not longer than two months, except for production expectations [PRODINDF_TC] in Kujawsko-Pomorskie voivodship (four months). Amongst the nine regional indicators six refer to total orders state [ORDINDS_TC].

Table 3 Highest coefficients of cross-correlation between the yearly indices of nominal manufacturing production sold in NUTS2 regions (trend+cycle component) and regional (NUTS2) BTS time series (seasonally adjusted and smoothed)

Regions (NUTS2)	Qualitative indicators, trend+cycle component							
	PRODINDS_TC		PRODINDF_TC		ORDINDS_TC		ORDINDF_TC	
	L	R	L	R	L	R	L	R
Dolnośląskie (D)	-3	0.332407	**2**	**0.771708**	0	0.374983	1	0.602335
Kujawsko-Pomorskie (C)	1	0.600942	**4**	**0.741575**	**2**	**0.704212**	**6**	**0.806592**
♦Lubelskie (L)	-6	0.355584	-5	0.56027	**-2**	**0.701365**	4	0.600992
Lubuskie (F)	-6	0.215819	-6	0.033897	-3	0.611196	6	-0.37867
♦Łódzkie (E)	0	0.274645	-5	0.574858	**2**	**0.738526**	-4	0.651295
♦Małopolskie (K)	6	-0.07458	6	0.079963	**0**	**0.759022**		NS
Mazowieckie (W)	0	0.04097	-2	0.668877	**-1**	**0.737048**	2	0.636176
Opolskie (O)	0	0.590639	-2	0.092585	-1	0.282014	**2**	**0.808025**
Podkarpackie (R)	-6	-0.17768	-6	-0.13231	5	0.619443	6	0.502361
♦Podlaskie (B)	**-1**	**0.744263**	6	-0.25186	**1**	**0.925862**	6	-0.27937
♦Pomorskie (G)	-1	0.336541	4	-0.46267	-3	0.159087	-6	0.117113
♦Śląskie (S)	**0**	**0.893196**	6	-0.40581	**0**	**0.89602**	**-1**	**0.877996**
Świętokrzyskie (T)	6	0.179865	6	0.206014	0	0.181373	0	0.207566
♦Warmińsko-Mazurskie (N)	1	0.378662	6	0.092028	**1**	**0.53913**	6	0.292084
Wielkopolskie (P)	**-4**	**0.887798**	6	-0.47367	**-2**	**0.746045**	6	0.563895
Zachodniopomorskie (Z)		NS	4	0.156269	-3	0.631052	1	0.600485

Reference variables: IPYOY_TC_V; sample: 01/1999:12/2005 (♦01/2000:12/2005) (max. no. of obs.: 84)
Symbols used: L – lead/lag (-/+); R – correlation coefficient; NS – no seasonality model found.

Data source: RIED and CSO data.

Even better cross-correlation results were obtained for the total (i.e. for the whole country) manufacturing production index as a reference variable (see Table 4). Total orders state [ORDINDS_TC] proved to be the best qualitative indicator as far as a cross-correlation coefficient is considered. The highest ones we found in Małopolskie (0.93, 1-month lead), Podlaskie (0.92, 1-month lag) and Kujawsko-Pomorskie (0.9, 2-months lead) regions. Three other regional [ORDINDS_TC] indicators are cross-correlated by 0.8-0.9 coefficients (all leading) and six of them are cross-correlated by 0.7-0.8 coef. (all leading except for one in Łódzkie region, lagged 1 month). Production state [PRODINDS_TC] might also be said to have good diagnostic qualities: 8 of 15 regional indicators we found highly cross-correlated with the CSO country production index; the coefficients amounted to 0.7-0.8. All the indicators are leading, except for one in Podlaskie voivodship which is coincident. Four regional indicators for total orders expectations [ORDINDF_TC] are highly cross-correlated (of 0.74-0.85) but only two – in Łódzkie and Śląskie regions – are leading.

On the whole, two qualitative indicators – total orders state [ORDINDS_TC] and production state [PRODINDS_TC] – we find useful in describing business activity in

Poland and some of its regions. Information about the situation in the country is given with a short (1-2-months) lead. For three regions: Kujawsko-Pomorskie, Wielkopolskie and Śląskie, the corresponding BTS time series give consistent indications and might serve as potential predictors of business activity in Poland. Both indicators, however, retain their descriptive power only for Wielkopolskie voivodship. For some other regions (e.g., Lubelskie, Mazowieckie) only [ORDINDS_TC] should be used. Unfortunately, there is a number of regions (Świętokrzyskie is a drastic example) for which RIED data is of no use; for these voivodships BTS time series reveal either upward/downward trends or extraordinary level shifts, no decomposition can be performed, cross-correlation coefficients are low or indicators are lagged (most lags are 6-month long). There are few possible explanations for poor quality of the data, however, in our opinion the reason is low representativeness of regional subsamples.

Table 4 Highest coefficients of cross-correlation between the yearly index of total nominal manufacturing production sold (trend+cycle component) and regional (NUTS2) BTS time series (seasonally adjusted and smoothed)

Regions (NUTS2)	Qualitative indicators, trend+cycle component							
	PRODINDS_TC		PRODINDF_TC		ORDINDS_TC		ORDINDF_TC	
	L	R	L	R	L	R	L	R
Dolnośląskie (D)	-6	**0.731683**	4	**0.778309**	-2	0.680135	6	0.544311
Kujawsko-Pomorskie (C)	-2	**0.892855**	1	**0.784045**	-2	**0.899978**	2	**0.832145**
Lubelskie (L)	-6	0.620472	-6	0.464433	-2	**0.766239**	6	0.562573
Lubuskie (F)	-6	0.443458	-6	0.343641	-4	**0.744484**	6	-0.28631
Łódzkie (E)	-6	0.32754	-4	0.609002	1	**0.787734**	-4	**0.736621**
Małopolskie (K)	-6	-0.32507	-6	0.277075	-1	**0.934847**		NS
Mazowieckie (W)	-6	0.341347	6	0.549881	-1	**0.754033**	6	0.490924
Opolskie (O)	-1	**0.774342**	-6	-0.32152	-2	0.63501	2	**0.740952**
Podkarpackie (R)	-6	0.327795	-6	0.341363	-1	**0.712341**	6	0.654071
Podlaskie (B)	0	**0.832835**	6	-0.23169	1	**0.918384**	-6	-0.32487
Pomorskie (G)	-1	**0.790694**	2	-0.27977	-3	0.565233	6	0.368773
Śląskie (S)	-2	**0.832486**	-6	-0.32597	-1	**0.798251**	-1	**0.846526**
Świętokrzyskie (T)	-6	0.327818	-6	0.341007	-6	0.416696	-6	0.435302
Warmińsko-Mazurskie (N)	-6	**0.702903**	-6	0.420868	-3	**0.811453**	3	0.49659
Wielkopolskie (P)	-3	**0.841561**	-6	-0.32739	-1	**0.805734**	6	0.351122
Zachodniopomorskie (Z)		NS	6	0.464884	-2	**0.752666**	6	0.567196

Reference variable: IPYOY_TC_T; sample: 01/2000:12/2005 (max. no. of observations: 72)
Symbols used: L – lead/lag (-/+); R – correlation coefficient; NS – no seasonality model found.

Data source: RIED and CSO.

It is striking to us that expectations BTS balance statistics (i.e. [PRODINDF_TC] and [ORDINDF_TC]) are, in general, poorly cross-correlated or lagged (mostly 6-months lags). Apparently, firms answering the RIED manufacturing survey make permanent mistakes when they anticipate orders and outcome.

Table 5 Highest coefficients of cross-correlation between the yearly indices of nominal manufacturing production sold in NUTS1 regions (trend+cycle component) and macro-regional (NUTS1) BTS time series (seasonally adjusted and smoothed)

Macroregions (NUTS1)	Qualitative indicators, trend+cycle component							
	PRODINDS_TC		PRODINDF_TC		ORDINDS_TC		ORDINDF_TC	
	L	R	L	R	L	R	L	R
♦Central (W+E)	**-4**	**0.736391**	-2	0.281167	**-2**	**0.874771**	**-3**	**0.766523**
♦East (B+L+R+T)	-3	0.504154	-2	0.540719	**-1**	**0.849257**	**-1**	**0.730305**
♦South (K+S)	**-2**	**0.892755**	6	0.332318	**-1**	**0.93464**		NS
South-West (D+O)	**0**	**0.70507**	-6	0.18705	2	0.542827	**4**	**0.726409**
North-West (F+P+Z)		NS	6	0.150047	-5	0.609016	**2**	**0.936568**
♦North (C+G+N)	0	0.52935	-3	0.489854	-1	0.53892	3	0.453493

Reference variables: IPYOY_TC_R; sample: 01/1999:12/2005 (♦01/2000:12/2005) (max. no. of obs.: 84)
Symbols used: L – lead/lag (-/+); R – correlation coefficient; NS – no seasonality model found.

Data source: RIED and CSO.

Table 6 Highest coefficients of cross-correlation between the yearly index of total nominal manufacturing production sold (trend+cycle component) and macro-regional (NUTS1) BTS time series (seasonally adjusted and smoothed)

Macroregions (NUTS1)	Qualitative indicators, trend+cycle component							
	PRODINDS_TC		PRODINDF_TC		ORDINDS_TC		ORDINDF_TC	
	L	R	L	R	L	R	L	R
Central (W+E)	-4	0.658306	-6	0.332784	**-1**	**0.827848**	-2	0.589134
East (B+L+R+T)	-6	0.646857	-5	0.57006	**-2**	**0.869631**	**-2**	**0.788946**
South (K+S)	**-3**	**0.901478**	-6	0.327052	**-1**	**0.911527**		NS
South-West (D+O)	**-2**	**0.917196**	-6	-0.32668	**0**	**0.791464**	**5**	**0.790403**
North-West (F+P+Z)		NS	-6	-0.3559	-5	0.636478	**3**	**0.948396**
North (C+G+N)	**-3**	**0.821373**	-4	0.672363	**-2**	**0.823363**	**2**	**0.747113**

Reference variable: IPYOY_TC_T; sample: 01/2000:12/2005 (max. no. of observations: 72)
Symbols used: L – lead/lag (-/+); R – correlation coefficient; NS – no seasonality model found.

Data source: RIED and CSO.

By and large, cross-correlation results for macro-regional indicators correspond to those calculated for regional ones. For NUTS1 year-over-year indices (as reference variables) we found two qualitative indicators – total orders state [ORDINDS_TC] and production state [PRODINDS_TC] – highly cross-correlated in three macro-regions: South, Central and East (see Table 5). All the indicators are leading and leads are 2-months long at most, except for [PRODINDS_TC] in Central unit (four months). The

highest cross-correlation coefficients were obtained for South macro-region: 0.93 for [ORDINDS_TC], 1-month lead, and 0.89 for [PRODINDS_TC], 2-months lead.

When we cross-correlated qualitative macro-regional indicators with total manufacturing production index we found four of six [ORDINDS_TC]-group indicators (South, East, Central, North) and three of five [PRODINDS_TC]-group ones (South-West, South, North) of high descriptive power. The respective cross-correlation coefficients are high, amounting to 0.82-0.92 and all the macro-regional indicators are 1-3-months leading (see Table 6). Generally speaking, BTS time series at the macro-regional level seem to describe general business activity better than industrial production of the corresponding macro-regions.

We also found high and very high cross-correlation coefficients for some total orders expectations [ORDINDF_TC] macro-regional indicators but they are mostly lagged (lags are quite long). Lags of indicators which nominally refer to business entities expectations make us doubt quality of the data.

6. Summary

The hitherto analyses based on available quantitative and qualitative data as well as methods of graphic and correlation analyses have proved that – in case of Poland – there is a considerable differentiation in economic activity level. The Mazovia, Silesia and Wielkopolskie voivodships are considered the most developed ones, assuming their share in the country's GDP and GDP *per capita*, the industrial output and job availability. The least advanced are the Lubuskie, Podlaskie and Świętokrzyskie voivodships. Similar differentiation is noticeable on macro-regional level, with the most developed: Central and South and the less advanced: East and North. The dominant position of leaders has been strengthening – thus increasing the gap between the most and less developed regions.

The RIED WSE business survey data well enough reflects the changes in regional economic activity. It is production and orders (states) that are characterised by good descriptive properties, however, some caution is necessary when deawing conclusions, mostly due to short period under analysis. In spite of a visibly mounting gap of regional economic development, significant differences in economic activity fluctuation in NUTS1 and NUTS2 have not been recorded. This refers to both the richest and the poorest regions. Some differences between NUTS1 and NUTS2 result from quality of available data. If it is impossible to determine different mechanisms of

cyclical fluctuations, regional differentiations of stabilisation policy does not seem justifiable. On the other hand a suitable regional policy differentiation is necessary in view of a growing gap in the level of regional development. Such an attitude is relevant especially nowadays, when it is possible for Poland to have access to the EU funds to support sustainable development.

Considering the fact that no significant differentiation between the country as a whole and regional fluctuations has been found, it is impossible to indicate an interdependence between them at least at this very stage.

Shortcomings of time series we dealt with have not allowed more sophisticated research instruments to be applied. Extending the time series would enable a more thorough analysis.

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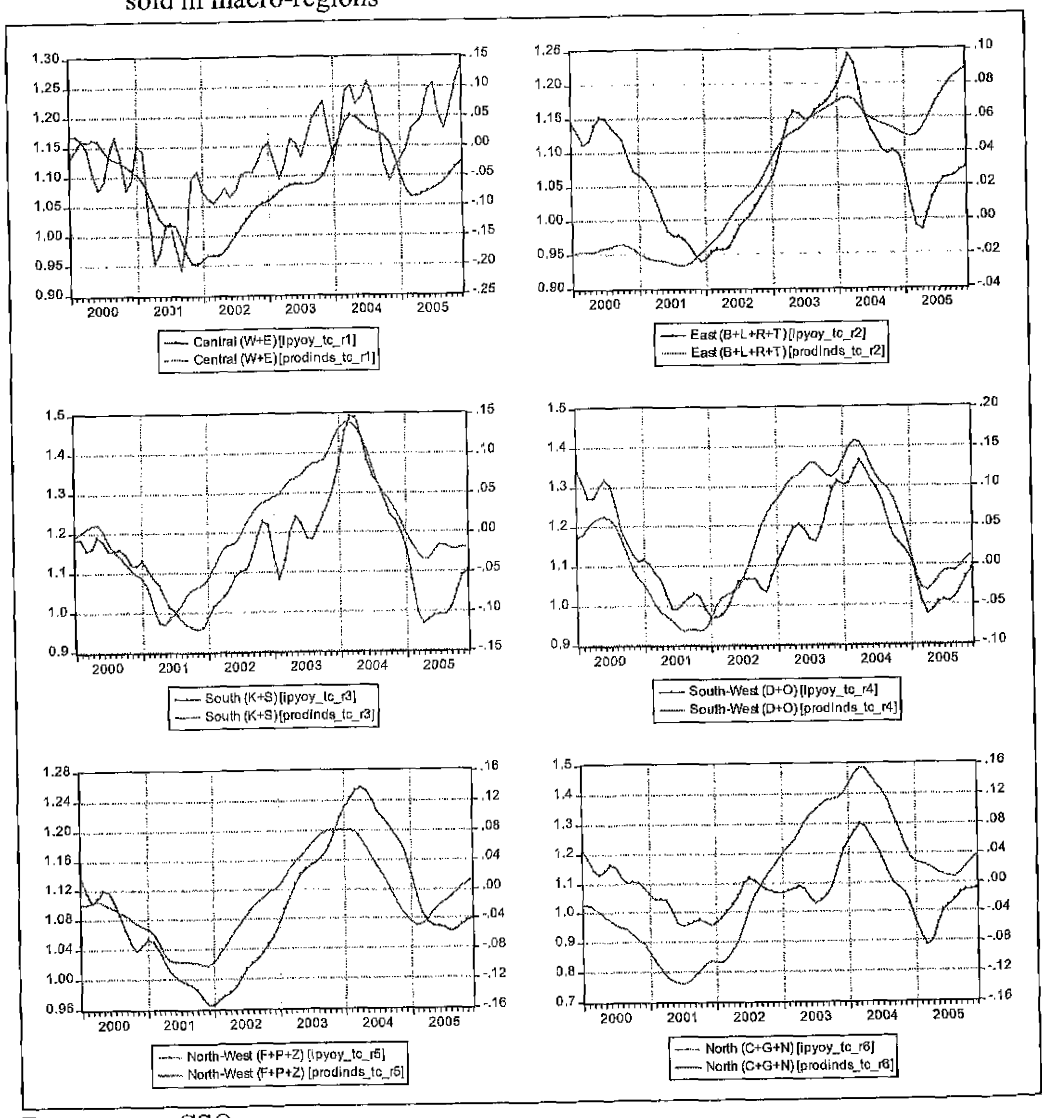
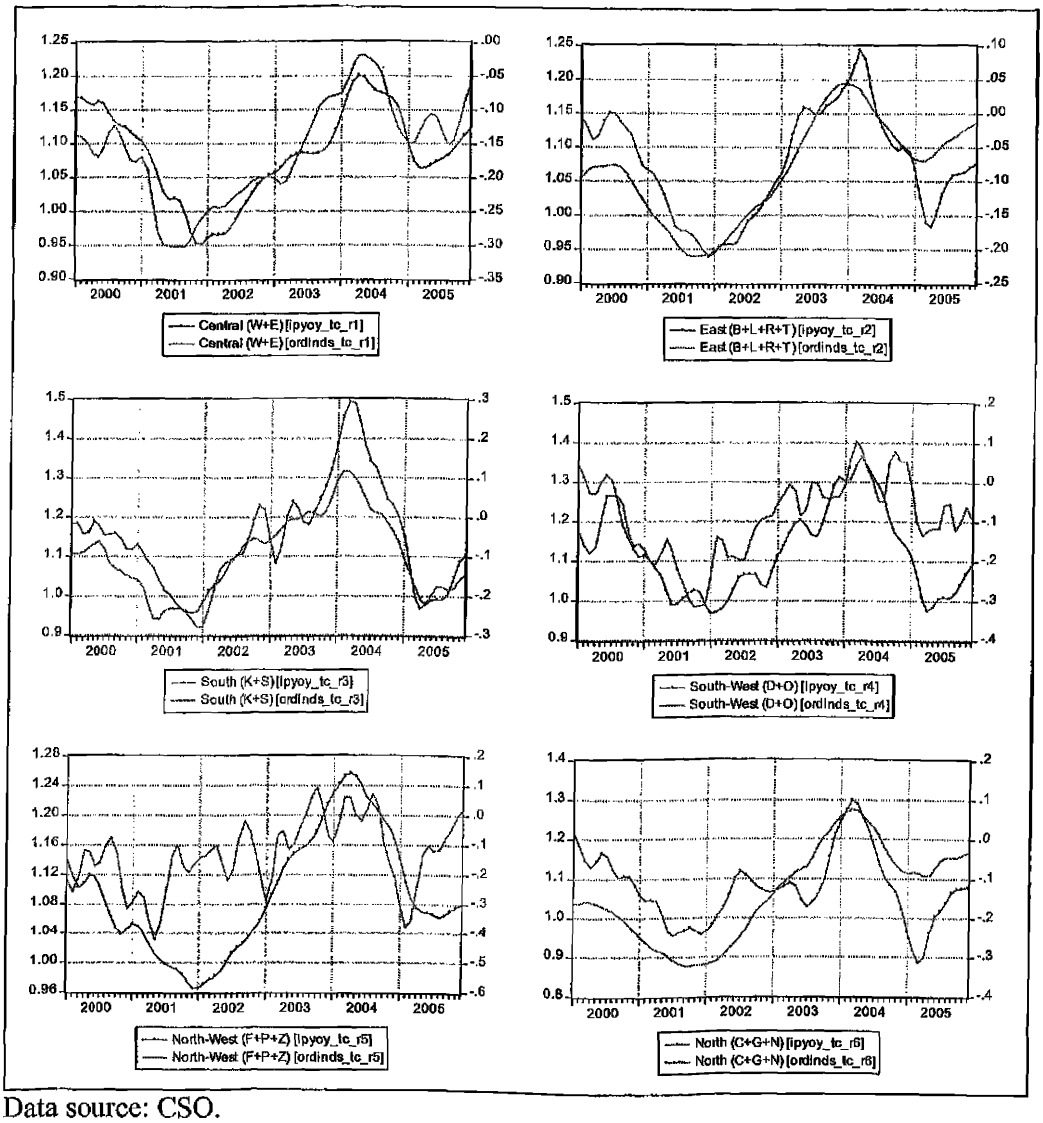
Appendix

Figure 1 Production state [PRODINDS_TC] and nominal manufacturing production sold in macro-regions



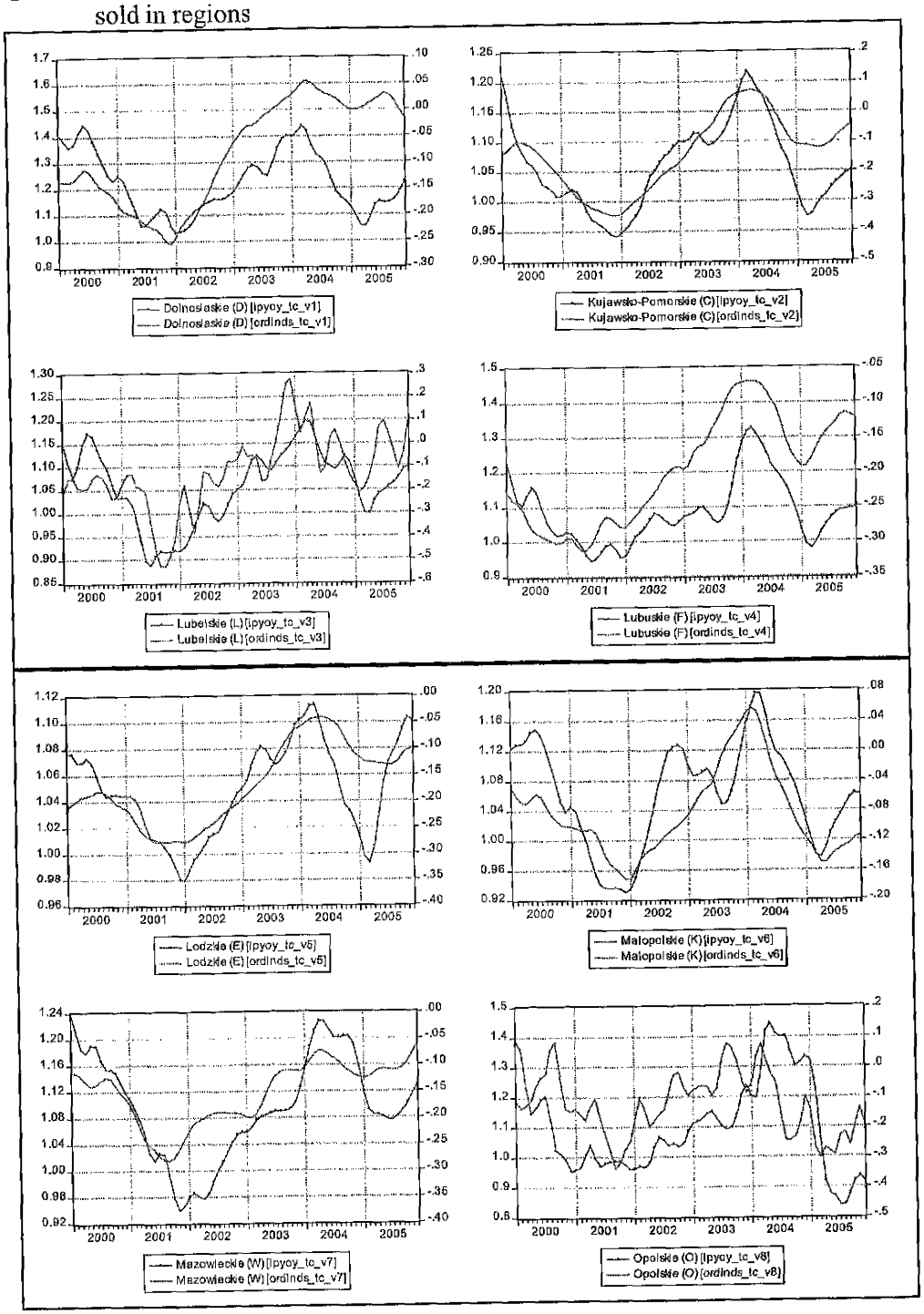
Data source: CSO.

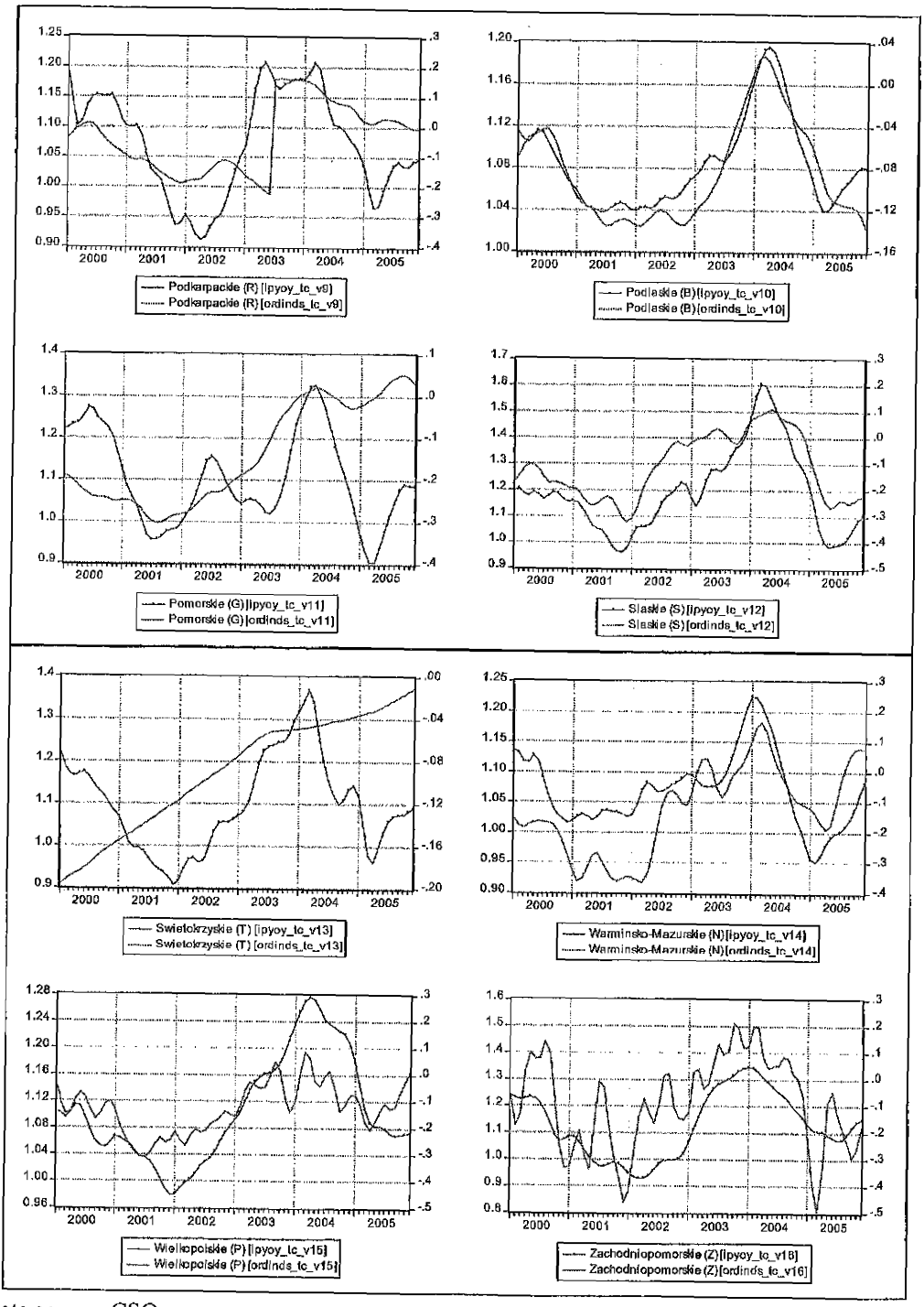
Figure 2 Total orders state [ORDINDS_TC] and nominal manufacturing production sold in macro-regions



Data source: CSO.

Figure 3 Total orders state [ORDINDS_TC] and nominal manufacturing production sold in regions





Data source: CSO.

Table 1 Key regional economic development indicators in Poland

Regions (NUTS2)		Labour market: Employed persons in	Labour market: Employed persons per 1000 population	Labour market: Registered unemployment rate in	Labour market: Unemployed persons per 1 work offer	Labour market: Average monthly gross wages	R&D: Expenditures on R&D in % of GDP	R&D: Researchers per 1000 economically active persons	Retail: Retail per capita	Infrastructure: Railway lines operated in km per 100 km² of total area	Infrastructure: Hard surface public roads in km per 100 km² of total area	Infrastructure: Telephone main line (public net) per 1000 population
Year		2004	2003	2004	2003	2004	2002	2003	2003	2004	2004	2004
PL	Poland	100	322,9	19,1	307	100	0,58	3,4	100	6,4	79,6	326,9
W	Mazowieckie	16,1	384,9	15,0	435	128,5	1,25	7,3	208,9	4,8	78,5	389,0
S	Śląskie	12,0	317,3	16,8	123	103,3	0,32	2,7	83,4	17,2	161,9	330,4
P	Wielkopolskie	9,7	352,8	16,2	246	91,5	0,46	2,7	109,7	6,8	81,8	316,9
D	Dolnośląskie	7,1	302,3	22,3	302	97,8	0,45	4,0	75,9	8,9	90,7	369,5
K	Małopolskie	8,1	309,4	15,0	166	92,0	0,87	5,7	101,5	7,4	141,7	309,3
G	Pomorskie	5,3	299,6	21,3	508	98,5	0,38	4,1	83,5	7,2	61,9	343,6
E	Łódzkie	7,1	339,9	19,6	246	88,1	0,62	2,4	92,6	5,8	89,0	341,5
C	Kujawsko-Pomorskie	5,2	310,2	23,5	425	86,6	0,29	2,3	74,3	7,1	75,7	309,6
R	Podkarpackie	5,2	305,2	19,1	605	83,8	0,39	1,0	68,0	5,3	77,6	248,5
Z	Zachodniopomorskie	3,9	279,7	27,4	363	92,2	0,26	2,3	78,3	5,1	56,9	343,2
L	Lubelskie	5,9	331,0	17,8	626	87,0	0,44	2,5	64,4	4,1	71,2	283,4
N	Warmińsko-Mazurskie	3,1	268,5	29,2	865	85,1	0,26	1,6	65,7	5,0	50,5	283,3
O	Opolskie	2,3	275,9	19,9	520	90,6	0,17	1,8	66,8	8,9	90,4	276,8
T	Świętokrzyskie	3,5	333,5	7,9	1172	87,9	0,07	1,1	62,9	6,0	100,1	252,9
F	Lubuskie	2,3	275,1	25,8	647	85,8	0,14	1,8	96,9	6,8	56,3	335,5
B	Podlaskie	3,2	326,0	15,9	813	87,5	0,20	2,3	81,8	3,3	52,9	349,5

Source: *Concise statistical yearbook of Poland, 2004*, Central Statistical Office, Warsaw 2005, www.stat.gov.pl.

Regions (NUTS2)		Investments: Investment expenditures in	Investments: Gross value of fixed capital in	Sales: industry in	Sales: construction in	Regional accounts: Share of gross added value in: agriculture	Regional accounts: Share of gross added value in: industry	Regional accounts: Share of gross added value in: construction	Regional accounts: GDP in	Regional accounts: GDP per capita	Regional accounts: Nominal gross disposable income of households per capita
Year		2003		2004		2002					
PL	Poland	100	100	100	100	3,1	23,6	6,2	100	100	100
W	Mazowieckie	23,2	21,6	20,2	30,9	2,6	19,0	5,4	20,4	152,3	127,8
S	Śląskie	12,1	12,2	19,6	12,6	1,0	31,6	6,4	13,7	110,7	113,9
P	Wielkopolskie	11,1	8,5	11,3	11,6	5,2	26,0	6,7	9,0	103,1	101,3
D	Dolnośląskie	8,2	7,6	7,3	5,5	2,6	25,9	6,5	7,9	103,7	106
K	Małopolskie	8,3	7,3	6,2	7,0	2,0	21,7	7,1	7,3	86,4	91,9
G	Pomorskie	5,2	5,4	5,8	5,3	2,3	23,5	6,8	5,7	99,6	96,6
E	Łódzkie	5,6	6	4,9	4,1	2,9	25,8	5,4	6,2	90,5	97,2
C	Kujawsko-Pomorskie	4,0	4,4	4,6	3,4	5,0	23,8	6,1	4,9	91,2	94,3
R	Podkarpackie	4,1	4,1	3,5	2,6	2,6	25,9	6,1	3,9	71,3	77,8
Z	Zachodniopomorskie	3,6	4,4	2,9	3,0	3,8	17,5	6,3	4,4	98,8	103,8
L	Lubelskie	3,3	4,6	2,4	2,5	5,0	17,5	6,1	4,0	70,0	80,6
N	Warmińsko-Mazurskie	2,6	3,1	2,4	2,4	4,3	21,2	5,7	2,8	74,7	80,1
O	Opolskie	1,9	2,9	2,7	1,8	4,7	26,2	6,6	2,3	81,9	82,8
T	Świętokrzyskie	2,3	2,9	2,2	3,7	5,1	22,5	7,8	2,7	78,2	86,4
F	Lubuskie	2,3	2,3	2,1	1,3	3,2	23,7	5,7	2,3	87,4	91,1
B	Podlaskie	2,2	2,7	1,7	2,3	6,0	18,7	6,1	2,4	76,9	82,6

Source: *Concise statistical yearbook of Poland, 2004*, Central Statistical Office, Warsaw 2005, www.stat.gov.pl.