SEASONALITY OF UNEMPLOYMENT ON THE LABOUR MARKETS OF THE WEST POMERANIAN VOIVODESHIP

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Abstract: This paper aims at the comparison of diversity of the seasonality of unemployment on the labour markets of the West Pomeranian Voivodeship. Analyses concerned the monthly and yearly fluctuations in seasonal unemployment. This paper has also attempted to verify whether on the studied markets there occur dependencies between the number of the unemployed and the number of the seasonally unemployed. The analysis concerned all communes in the West Pomeranian Voivodeship based on the adopted classification of administrative division into rural communes, urban and rural communes, and urban communes. Data applied in the research concerned the monthly number of the unemployed in general from the period of January 2001-December 2015 obtained from the Voivodeship Labour Office in Szczecin. Seasonal components of unemployment were distinguished with the Census X-12 ARIMA algorithm.

Keywords: unemployment, seasonality, labour market

1 Introduction

One of the commonly applied classification of labour markets in the spatial arrangement is a distribution into the urban, suburban and rural markets[1]. Each of these markets shows different specificity, while social and economic changes in the recent years have resulted in the evolution of their functioning. Currently, in many countries one observes the process of deindustrialisation of towns, especially the big ones. Urban labour markets are more and more frequently the providers of new technologies and public services[2], thus significantly affecting the functioning of local labour markets[3]. The second phenomenon observed in the recent years includes the process of multifunctional development of rural areas, which may affect a change in the functioning of rural labour markets, less and less connected with the agricultural production. The above-mentioned processes may result in the decline of some differences and the occurrence of new differences between the urban and rural labour markets.

Here it should be emphasised that the majority of conducted empirical analyses connected with the labour market concerns the issue of unemployment. They confirm the occurring spatial diversity of this phenomenon[4], simultaneously emphasising the fact that diversity among regional markets within one country is often larger than among countries[5]. They indicate the usually occurring permanent character of this[6]. Often the labour market analyses omit the aspect of seasonality, although full characteristics should consider also short-term changes. It should be agreed that seasonal fluctuations may constitute a significant part of short-term variability of economic phenomena[7].
The division of labour markets into the rural, urban, and urban and rural markets[8] seems to be justified, allowing for better description of seasonal fluctuations in unemployment. Thus, it has been decided that seasonal fluctuations may constitute the subject of analysis with consideration of the mentioned market classification. This paper aims at the comparison of diversity of the seasonality of unemployment in the West Pomeranian Voivodeship, Poland. In detailed analyses one applied data concerning the rural, urban, and urban and rural labour markets. The attempt was made to define differences in the size of seasonal fluctuations, trends of those changes and distribution of seasonal fluctuations in the course of the year. The subject of analyses was constituted also by the connection between changes in the number of the seasonally unemployed and changes in the total number of the unemployed.

2 Scope and method

The most common definition describes seasonality as regular and recurring changes in natural phenomena in a given place, usually connected with climate and seasons[9]. Due to seasonal fluctuations, business activity and employment differ regularly in the course of the year as a result of impact of various factors, mainly natural[10] and institutional[11]. From the point of view of the labour market functioning, seasonality should be regarded as a negative phenomenon, as reference to its positive consequences is rare in the literature[12].

In this paper, the research of the seasonality of unemployment covered all communes in the West Pomeranian Voivodeship classified based on an administrative criterion into urban (11 facilities), rural (49 facilities), and urban and rural (53 facilities) communes. The research included jointly 113 facilities. To analyse the seasonality of unemployment, one applied the data concerning the monthly number of the unemployed from the Voivodeship Labour Office in Szczecin. The research time scope included the years 2001-2015, that is 180 monthly observations in total.

An initial step in that research was the separation of seasonal components of unemployment from the original time series. Time series decomposition consists in the separation of the trend-cycle component (Tt), random component (It), effect of a various number of working days (Dt), effect of holidays (Et) and a seasonal component (St) from the initial series[13]:

$$Xt = Tt \blacksquare St \blacksquare It \blacksquare Et \blacksquare Dt$$

where ■ depending on the considered multiplicative or additive model means respectively the multiplication or plus sign. TRAMO/ SEATS and X-12 ARIMA constitute the most often applied methods of seasonal data equalisation[14]. In this research, the Census X-12 ARIMA procedure was applied to select a seasonal component, thus receiving time series for particular markets describing the number of the seasonally unemployed and relative deviations of the number of the seasonally unemployed from the total number of the unemployed.

At the second stage, average annual deviations of the number of the seasonally unemployed for particular years were calculated,

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[5] Taylor J., Bradley S., *Unemployment in Europe: a comparative analysis of regional disparities in Germany, Italy and the UK*. Kyklos, 50, 1997. p. 221-245.
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[7]Barsky R.B., Miron J.A. *The Seasonal Cycle and the Business Cycle*, Journal of Political Economy, 97(3) (June), 1989. p. 503-535.
[8]Farther on the classification of rural, urban and suburban corresponds with the classification of rural, urban, and urban- rural
[9]Allcock J.B., *Seasonality* in: *Tourism Marketing and Management Handbook*. ed. S.F. Witt, L. Moutinho. Prentice Hall, London, 1989. p. 387-392.
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[13]Grutkowska S., Paśnicka E., *X- 12 ARIMA i TRAMO/ SEATS- empiryczne porównanie metod wyrównania sezonowego w kontekście długości próby*, Materiał i Studia, Zeszyt nr 220, Narodowy Bank Polski, Warszawa, lipiec 2007, p. 8.
[14] Others method are: X- 11, X- 11 ARIMA, SABL, STAMP, BV4, DAINTIES. more in: B. Fischer, *Decomposition of Time Series Comparing Different Methods in Theory and Practice*, Luxembourg, 1995.

as well as for the whole analysed period – the average annual deviations of the number of the seasonally unemployed in particular months. Average annual seasonal fluctuations in the number of the unemployed MSV were calculated with use of the following formula:

$$MSV = \sum_{n=1}^{12} \left(\frac{\left| \frac{U_{u,n} - U_{a,n}}{U_{a,n}} \right|}{12} \right) \times 100$$

where $U_{u,n}$ is the not seasonal adjustment number of the unemployed in *n* month of a given year; $U_{u,n}$ – seasonal adjustment number of the unemployed in *n* month of a given year. With use of the same values, also average deviation of the seasonal number of the unemployed in particular months MMV was calculated as follows:

$$MMV = \sum_{i=1}^{j} \left(\frac{U_{u,i} - U_{a,i}}{U_{a,i}} - 1 \right) \cdot 100$$

where $U_{u,i}$ and $U_{a,i}$ are, respectively, not seasonal adjustment and seasonal adjustment number of the unemployed in a given month of an *i* year. The results obtained in such a manner allowed for the description of the size of seasonal unemployment on particular markets, tendencies of its changes and yearly distribution.

Another analysis conducted in the paper concerned the elasticity of seasonal unemployment towards the total unemployment. It was conducted with use of the regression function in the following form:

$$\Delta lnUs,i = a + b\Delta lnUt,i$$

where $\Delta lnU_{s\,i}$ means an increase in the number of the seasonally unemployed between extreme years in an *i* group of communes and $\Delta lnU_{t,i}$ is an increase in the total number of the unemployed between extreme years in an *i* group of communes. In the context of changes in the seasonality of unemployment, interpretation of the *b* coefficient is important. The coefficient below the unity means that the seasonality of unemployment decreases together with an increase in unemployment and increases together with a decrease in unemployment. It would imply the pro-cyclical character of the seasonality of unemployment.

3 Analysis of the labour market of the West Pomeranian voivodeship

Selection of the West Pomeranian Voivodeship for the unemployment seasonality research is justified, as according to the latest research results it is a region with one of the highest sensitivities to seasonal changes and is strongly internally diversified, mainly with regard to the unemployment intensity[15]. In part, it results from the labour market specificity, which is the occurrence of tourist and agricultural areas and the relatively low impact of cities on the Voivodeship economy[16].

In general, economic and social condition of the region is assessed as significantly poorer than of the most of other regions in Poland[17]. In the recent years, business activity of the Voivodeship has been subject to further weakening. Very unfavourable downward trend of the professional activity indicator has been observed – from 54.1 in 2005 to 52.2 in 2015[18]. Relatively low level of professional activity characterises mainly rural areas of the Voivodeship (50.1 as compared with 54.2 for towns). The West Pomeranian Voivodeship belongs to the group of voivodeships of lower human capital level than the average one in other regions in Poland (and it is still falling) [19]. Research in the area of labour market activity indicates that in this Voivodeship the entrepreneurship indicator (a number of enterprises per one thousand inhabitants) is higher than the average in the country and shows an increasing trend, i.e. from 122 in 2005 to 126.1 in 2012, which should be assessed positively. It could have affected the observed increase in employment in that region (employment rate increased from 41.8 in 2005 to 46.5 in 2012 and to 50 in the first quarter of 2016)[20]. Similarly, share of persons with higher education does not depart from the average level in the country. Within the region the following labour markets can be distinguished[21]:

- the City of Szczecin, capital city of the region and the largest local labour market, constitutes a growth pole covering a group of adjacent communes.
- labour markets established by the communes situated around towns, i.e. Koszalin, Kołobrzeg, with relatively favourable level of development (employment intensity is the lowest, a number of households supporting themselves on the non-agricultural activity and migration attractiveness is relatively high).
- labour markets of coastal communes with relatively strong, although seasonal, tourist economy, heterogeneous with regard to the level of social and economic development and to the structure of its components. Among them one can distinguish strongly urbanised communes[22], those with prevailing large-scale agriculture, and communes on the path of multifunctional growth[23];
- labour market of communes far from the coastal belt and the capital city of the region, with relatively very low, low or medium level of social and economic development, mainly monofunctional former State-Owned Funds based on wage-labour large-scale agriculture. They are characterised with low (against the country and the Voivodeship) use of labour resources, high registered and hidden unemployment (mainly rural communes of the Central Pomerania).

The West Pomeranian Voivodeship is characterised with high spatial internal diversity with regard to the average annual intensity of unemployment, which may indicate an unequal development of these areas (see Tab. 1).

[15]More in: Klonowska–Matynia M., Radlińska K., *Sezonowe zmiany na wielkomiejskich, podmiejskich i peryferyjnych rynkach pracy województwa zachodniopomorskiego*, in: Co *z tą pracą? Pomorze Zachodnie w perspektywie interdyscyplinarnej i międzynarodowej*, ed. S. Flejterski, Zapol, Szczecin 2013, p. 135-147.

[16]Klonowska-Matynia M., Radlińska K., *Zróżnicowanie sezonowości bezrobocia na wiejskich rynkach pracy województwa zachodniopomorskiego* Roczniki Naukowe SERiA, Wieś Jutra, t. XVII, zeszyt 5, 2015, p. 141-145.

[17]*Krajowy Raport o Rozwoju Społecznym Polska 2012. Rozwój regionalny i lokalny*, Raport UNDP, Warszawa 2012, p. 186–187.

[18]Klonowska-Matynia M., *Potencjał kapitału ludzkiego Pomorza Zachodniego. Analiza przestrzenna*, Przegląd Zachodniopomorski 2/2016, p. 187-208.

[19]Ibidem.

[20]*Kwartalna informacja o rynku pracy*, Monitoring Rynku Pracy, GUS, Warszawa, maj 2016.

[21]Klonowska-Matynia M., Radlińska K., *Przestrzenne zróżnicowanie sezonowości bezrobocia. Przykład gmin nadmorskich Województwa Zachodniopomorskiego w Polsce* Journal of Agribusiness and Rural Development 4(34), 2014, p. 79-90.

[22] Międzyzdroje, Dziwnów, Rewal, Ustronie Morskie, Mielno

[23] Kamień Pomorski, Trzebiatów, Kołobrzeg

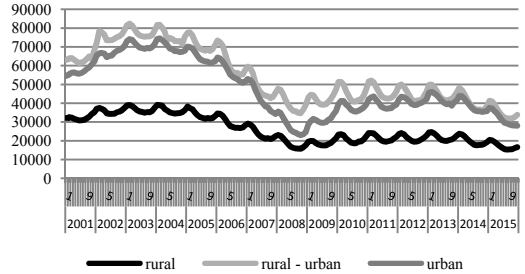
Table 1 Diversity of the unemployment intensity on the labour markets of the West Pomeranian Voivodeship from 2001 to 2015 (in %)

Years	Rural Markets			Urban Markets			Rural-urban Markets		
	Max	Min	Average	Max	Min	Average	Max	Min	Average
2001	33,4	7	20,4	22,4	7,2	15,2	33,0	9,4	20,0
2002	32,5	10,2	22,8	22,9	9,5	16,4	32,5	11,7	21,8
2003	32,0	10,6	22,8	22,1	10,7	16,5	31,9	12,5	22,2
2004	31,3	9,3	22,3	23,2	10,7	16,5	34,0	11,7	22,0
2005	29,4	8,4	20,5	21,6	9,8	15,2	29,9	10,4	20,3
2006	26,2	6,8	17,6	19,1	8,4	13,4	26,2	9,0	17,4
2007	23,2	5,6	14,0	17,5	6,2	10,3	22,9	6,9	13,7
2008	21,8	4,5	10,9	14,4	3,2	7,6	20,2	5,5	11,2
2009	19,9	4,7	11,1	13,5	4,3	8,0	19,5	5,7	11,7
2010	18,2	5,5	12,0	12,9	5,1	8,9	17,7	6,5	12,3
2011	20,0	5,6	12,4	13,4	5,3	9,2	20,2	6,8	12,7
2012	18,5	6,0	12,0	13,3	5,0	9,3	19,8	6,5	12,2
2013	18,8	6,1	12,1	13,7	5,1	9,1	19,3	6,5	12,2
2014	17,4	5,1	10,9	12,6	4,0	8,6	18,3	5,4	11,2
2015	15,7	4,1	9,5	11,4	3,7	7,5	16,9	4,2	9,9

Source: own elaboration and calculations based on data WUP in Szczecin (www.wup.pl)

An analysis of the number of the unemployed on the researched markets allowed to distinguish three subperiods within the whole period: a short period including only 24 observations from 2001 and 2002, probably the final stage of the phase of an increase in the number of the unemployed begun before year 2001. The second phase includes the years 2003-2008, characterised with a significant decrease in the number of the unemployed. The third phase occurred from 2009 to 2012, when an increase in the number of the unemployed on all market types was observed. The last months of observation from 2013 to 2015 indicated the change in an economic trend, as the number of the unemployed started to slowly decrease, while its decline was clearly visible since 2014. It should also be emphasised that despite the increased number of the unemployed in the third observed phase the number of the unemployed did not reach such a dramatically high level as in the preceding years (see Fig. 1). While assessing responses of changes in the number of the unemployed on the researched markets: rural, urban and rural, and urban, it was stated that they were similar in all phases of the analysed period. The average annual intensity was declining till 2007, after which the downturn in the markets happened, which was noticeable also on the regional markets in the increased unemployment, while its extreme values were on a significantly lower level than before 2007 (see Tab. 1).

Figure 1. Number of the unemployed in the West Pomeranian Voivodeship in the years 2001- 2015 (in thousands of people)

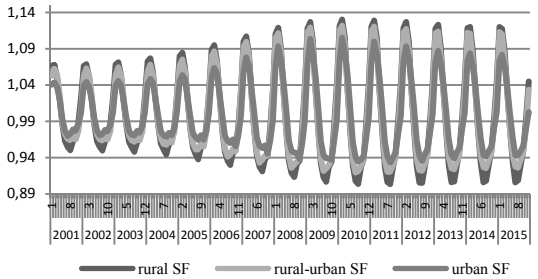


Source: own elaboration based on WUP in Szczecin (www.wup.pl)

4 Analysis of the seasonality of unemployment from 2001 to 2015

An analysis of the seasonality of unemployment in the system of rural, urban, and urban and rural labour markets indicated that on the level of averages differences in seasonal fluctuations in unemployment were small and showed one-way changes in time (Tab. 2). The size of fluctuations showed an increasing trend from 2001 to 2010. In the subsequent years the size of fluctuations was reduced. On the rural markets, a decrease in seasonality was observed with a one-year delay. The researched markets were characterised with significant diversity of seasonality, i.e. the lowest seasonality characterised the urban markets, while high extreme differences of seasonality occurred on the rural and mixed markets (Fig. 2).

Figure 2. Average annual seasonal fluctuations in unemployment according to the commune types in the years 2001 -2015



Source: own elaboration and calculations based on data WUP in Szczecin (www.wup.pl)

Specificity of the average annual components of the seasonality of unemployment inclines to the adoption of a thesis of relatively poor diversity of the researched markets, although noticeably stronger fluctuations occurred on typically rural and mixed markets that did not show any significant differences against each other. A response of the urban markets was different, as the fluctuations in seasonality were relatively the weakest there (see Tab. 2).

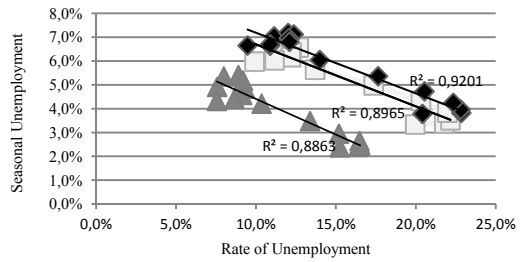
Table 2 Average annual seasonal components (in %)

Market / Years	Rural			Rural-urban			Urban		
	Average	min	max	Average	min	max	Average	min	max
2001	3,78	1,3	6,8	3,34	0,5	6,2	2,38	0,2	4,3
2002	3,83	1,4	6,9	3,39	1,0	6,3	2,40	0,2	4,4
2003	3,96	1,5	7,1	3,52	1,4	6,4	2,47	0,3	4,6

2004	4,25	1,7	7,7	3,84	1,6	6,8	2,64	0,3	4,8
2005	4,73	1,8	8,5	4,32	1,8	7,5	2,95	0,1	5,4
2006	5,36	1,8	9,5	4,98	2,0	8,6	3,48	0,1	6,3
2007	6,04	1,8	10,7	5,63	2,2	10,0	4,21	0,2	7,8
2008	6,65	1,8	11,9	6,19	2,3	11,1	4,92	0,6	9,3
2009	7,03	1,6	12,7	6,55	2,1	11,9	5,35	0,8	10,3
2010	7,18	1,3	13,0	6,65	1,8	12,2	5,41	0,4	10,5
2011	7,12	0,9	12,9	6,56	1,6	12,0	5,18	0,2	10,0
2012	6,96	0,8	12,7	6,35	1,6	11,7	4,85	0,0	9,3
2013	6,81	0,7	12,3	6,16	1,8	11,3	4,58	0,2	8,7
2014	6,70	0,7	12,0	6,03	1,9	11,2	4,41	0,2	8,4
2015	6,65	0,7	12,0	5,98	1,9	11,3	4,33	0,0	8,2

Source: own elaboration and calculations based on data WUP in Szczecin (www.wup.pl)

Figure 3. The relation between the unemployment intensity (Rate) and the level of seasonal fluctuations in unemployment (average annual data 2001-2015)



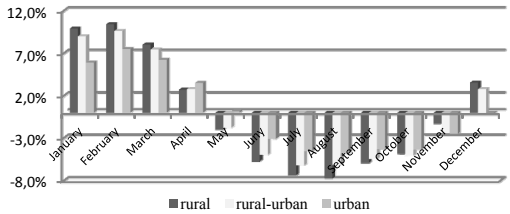
Legend: triangles – urban markets; rhombi – rural markets, squares – urban and rural markets.
Source: own elaboration and calculations based on data WUP in Szczecin (www.wup.pl)

The obtained results indicate the relatively strong relation between the seasonality of unemployment and the level of unemployment. On all the researched markets in the periods of an increase in unemployment (i.e. 2001-2007), the size of seasonal unemployment was smaller ($R^2 > 0.88$) than in the periods when unemployment was decreasing (after 2007). Then an increase in the size of seasonal unemployment was observed (Fig. 4).

5 Distribution of monthly fluctuations of unemployment

Differences in seasonality, apart from the size of fluctuations, may concern their different distribution in the course of the year. An analysis of the distribution of average monthly fluctuations in seasonal unemployment in the course of the year allows to distinguish two types of responses observed on all researched market types (r, u, u - r): an increase in seasonal unemployment observed from December to April and a decrease in seasonal unemployment from May to November. Although the researched markets (r, u, u - r) were characterised with a similar tendency of the distribution of fluctuations in the course of the year, the strength of their response was diversified. From December to March significantly higher fluctuations occurred on the rural and urban and rural markets. The lowest fluctuations were observed on the urban labour markets.

Figure 4. Average monthly fluctuations in the seasonality of unemployment from 2001 to 2015 (in %)



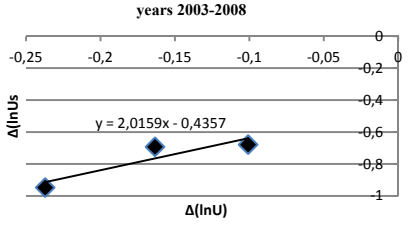
Source: own elaboration and calculations based on data WUP in Szczecin (www.wup.pl)

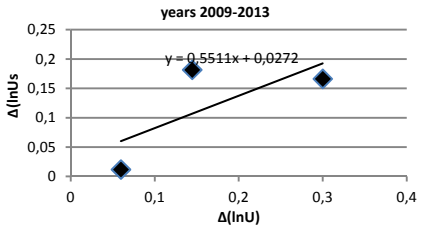
In April a change in behaviour of particular market types was observed, as, contrary to the previous months, the greater response of an increase in seasonal unemployment was observed on the urban markets, while from January to April the strongest fluctuations occurred on the rural markets. In the period of a decrease in seasonal unemployment, i.e. from May to November, diversified responses on particular market types were observed. It means that the strongest decrease in seasonal unemployment occurred on the rural markets, while the weakest – on the urban markets (such a response was observed from May to September). However, in October the largest decrease in seasonal unemployment occurred on the urban and rural markets, while typical rural and typical urban markets responded in a slightly weaker manner. In November the markets responded even more differently, as the weakest response was observed on the rural markets, while the urban markets indicated the strongest decrease in seasonal unemployment. While assessing the strength of fluctuations in seasonal unemployment (in %), it should be stated that both the strength of decrease in and of increase in seasonal unemployment characterised mostly the rural markets. In addition, the strength of an increase in seasonal unemployment was greater than the strength of its decrease, and this concerns all analysed market types (r, u, u- r).

6 Analysis of the elasticity of seasonal unemployment towards the total unemployment

In order to define the influence of a direction of changes in the number of the unemployed on the behaviour of unemployment seasonality, it was necessary to conduct analyses for the same markets, but separately for the period of a decreasing number of the unemployed and for the period of an increasing number of the unemployed. The elasticity test was conducted jointly for the rural, urban, and urban and rural markets in two subperiods: the first subperiod from 2003 to 2008, characterised with a decreasing number of the unemployed, and the second subperiod from 2009 to 2013 of an increasing number of the unemployed.

Figure 5 Changes in the number of the seasonally unemployed and changes in the total number of the unemployed





Source: own elaboration and calculations based on data WUP in Szczecin (www.wup.pl)

Results of elasticity estimated for a period of a decreasing number of the unemployed indicate that the elasticity of the number of the seasonally unemployed towards the total number of the unemployed was above the unity (b=2.01). As a consequence, a decrease in unemployment entailed a decrease in its seasonality, while the response of seasonal fluctuations was stronger than the response of the number of the unemployed. In turn, while assessing responses in the period of an increasing number of the unemployed, it was stated that elasticity was below the unity (b=0.55). It means that together with an increase in unemployment its seasonality grows, but its response is weaker than the response of the number of the unemployed (see Fig. 5).

7 Conclusions

In this paper, the phenomenon of unemployment seasonality was researched on the rural, urban, and urban- rural markets to define the size of seasonal fluctuations in particular years and their distribution in the course of the year. Based on those characteristics, it was stated that:

- The researched markets (rural, urban, urban- rural) did not show strong diversity concerning the size of fluctuations, however, in general stronger fluctuations in seasonal unemployment occurred on the rural markets. On all markets the strength of an increase in seasonal unemployment was greater than the strength of a decrease, while the strongest decrease in seasonal unemployment was observed on the rural markets.
- On all markets (rural, urban, urban-rural) one yearly cycle was observed. Seasonal increase in unemployment occurred in winter months. In spring and summer months its decrease was noticeable (which, in general, is a regularity confirmed in other research of the authors[24]).
- The research confirms strong internal diversity of the researched markets with regard to employment intensity. However, a joint analysis for three types of labour markets (rural, urban, urban- rural) indicates that differences in values of the average annual intensity of unemployment on the researched markets are surprisingly small. It is caused probably by strong internal diversity on those markets, especially the urban ones.
- Despite the significant diversity among the researched markets, it appeared that with regard to the average annual fluctuations in unemployment seasonality all of them responded similarly, i.e. in the period of economic growth characterised with a decrease in unemployment the size of seasonal unemployment increased on all markets. In the period of economic downturn a reduced size of seasonal unemployment was observed, with simultaneous increase in unemployment intensity.

A conclusion from the analysis of elasticity of the number of the seasonally unemployed against the total number of the unemployed is that the elasticity is diversified according to the economic trend on the labour market. Elasticity below the unity (b<1) for the period of an increasing number of the unemployed means that seasonality would behave as the pro-cyclical variable. In turn, elasticity above the unity (b>1) in the period of a decreasing number of the unemployed indicates its anticyclical character.

[24] excluding Germany

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Primary Paper Section: A

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