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ANALYSIS OF SEASONAL FLUCTUATIONS
OF WOMEN'S UNEMPLOYMENT IN POLAND

Abstract

The aim of this article was to estimate a diversification of the size and trends of seasonal changes in the number of unemployed women in Poland. The subject of major analysis was related to a level and disparity of monthly seasonal fluctuations of unemployed women during the year. The conducted study allowed the researchers to answer the following questions: how is the Polish market diversified in terms of gender and what are the level and disparity of seasonal fluctuations of unemployed women during the year? In order to separate a seasonal component of unemployment, the researchers used an algorithm – Census X-12 ARIMA. The analysis used data concerning monthly number of unemployed women during the period from January 2016 to December 2016, which were collected by the Central Statistical Office in Poland. Seasonal fluctuations in the number of unemployed women in Poland were low, lower than seasonal amount of unemployed men and they showed a slightly negative trend. Distribution of seasonal fluctuations in the number of unemployed women during the year was marked by one annual cycle, which is also similar in case of seasonal unemployment of men. The characteristic features for seasonal unemployment of women were a longer period of reducing seasonal fluctuations (from May to November) than in case of men and a smaller amplitude of fluctuations. The results of the study generally indicate that women are less exposed to the seasonal effects of unemployment.

Key words: seasonality, women, unemployment, labour market.

ANALIZA WAHAŃ SEZONOWYCH BEZROBOCIA KOBIET W POLSCE

Streszczenie

Celem artykułu była ocena zróżnicowania wielkości i tendencji zmian sezonowości liczby bezrobotnych kobiet w Polsce. Przedmiotem zasadniczych analiz był poziom i rozkład miesięcznych wahań sezonowych bezrobotnych kobiet w trakcie roku. Przeprowadzone badanie pozwoliło udzielić odpowiedzi na następujące pytania: jak zróżnicowany jest rynek pracy w Polsce pod względem płci oraz jaki jest poziom oraz rozkład wahań sezonowych liczby bezrobotnych kobiet w ciągu roku. Do wyodrębnienia składnika sezonowego zastosowano procedurę Census X-12 ARIMA. W analizie wykorzystano dane dotyczące miesięcznej liczby bezrobotnych kobiet w okresie od stycznia 2011 roku do grudnia 2016 roku gromadzone przez Główny Urząd Staty-

styczny. Wahania sezonowe liczby bezrobotnych kobiet w Polsce były niskie, niższe niż w sezonowość liczby bezrobotnych mężczyzn i wykazywały niewielką tendencję ujemną. Rozkład wahań sezonowych bezrobocia kobiet w trakcie roku cechował się jednym cyklem rocznym, podobnie jak w przypadku sezonowości bezrobocia mężczyzn. Cechami charakterystycznymi dla sezonowości kobiet były: dłuższy, niż dla mężczyzn, okres zmniejszania się wahań sezonowych (od maja do listopada) oraz mniejsza amplituda wahań. Wyniki badań zasadniczo wskazują, że kobiety są mniej narażone na zjawisko sezonowości bezrobocia.

Słowa kluczowe: sezonowość, kobieta, bezrobocie, rynek pracy.

Introduction

The phenomenon of unemployment is one of the most serious problem of the 21st century. Its level and course depend on economic, political and social conditions. A characteristic feature of modern economies is jobless growth, therefore the creation of new jobs is hampered. There is also an individual dimension of the problem of unemployment as it affects the standard of individual people's living and causes dysfunctions of all its spheres of functioning. The term unemployment is widely described in literature and it is analysed in different ways, explaining its types, conditions and results[1]. Notwithstanding the direction of conducted studies, the essence of the category refers to the situation where the person is unemployed, is looking for a job and is ready to start a job[2] or takes up an economic context of the category[3] which refers to the situation of mismatching of supply and demand for work.

Unemployment causes a number of negative effects, both for the whole economy and for the individual. National institutions try to counteract those effects. The labour markets in the European Union countries are highly varied in terms of the level of unemployment. Taking into account the unemployment rate, Poland holds a good position among other EU countries. According to Eurostat, the unemployment rate in Poland at the end of July was 7.7%, whereas the average rate for the EU-28 was 9.2%[4]. Taking into account the unemployment rate, the situation of the Polish labour market was better than the situation in other countries, such as Spain, Portugal, Lithuania or Slovakia. However, unemployment is one of the most important economic problems in Poland.

The difficult situation on the Polish labour market is determined by history, i.e. the liquidation of workplaces, collectives and state-owned farms (so-called PGR) after 1989, lack of investments and poor infrastructure in that period. The other reasons for the above-mentioned

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[1] O. Alonso-Villar, C. Del Rio, *Geographical concentration of unemployment: a male-female comparison in Spain,* „Regional Studies" 2008, No. 42, p. 401-412; P.S. Morrison, 2005, *Unemployment and urban labour markets,* „Urban Studies", No. 42(12), p. 2261-2288; F. Abraham, *Regional Adjustment and Wage Flexibility in the European Union*, University of Leuven, Mimeo1995, p. 51-75.

[2] E. Kwiatkowski, *Unemployment. Theoretical principles,* Polish Scientific Publishers PWN, Warsaw 2002, p. 20.

[3] J. Koral, *Culture aspects of Polish unemployment, Publishing House of Cardinal Stefan Wyszynski University,* Warsaw 2009, p. 11-19.

[4] EUROSTAT, http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Unemployment_rates,_ seasonally_adjusted,_July_2017_(%25)_F2.png#filehistory [30.08.2017].

situation are connected with contemporary economic and social conditions, i.e. the lack of matching of labour supply to demand for labour, insufficient business conditions, low efficiency of public services in terms of unemployment reduction, high seasonality of employment or reduction of job offers in the economy.

The ownership changes, the state of economy, social conditions cause negatively effects the development and employment structure, resulting in unemployment. An important feature of modern unemployment is the inclusion of certain groups which are less attractive on the labour market because of their characteristics. This phenomenon is especially acute in the case of women[5].

Women constitute a significant group among the unemployed on the Polish labour market[6] (at the end of July 2017 the share of unemployed women in the total unemployed group amounted to 55.65%). This can be explained by the role that women play in society and the family, their perception about opportunities on the labour market or the age limit that entitles women to the pension. Transitions in the modern labour market are gradually changing the situation of women. Changes in lawmaking, flexible forms of employment, gradual abandoning from the traditional family model and the development of social infrastructure are just some of the positive changes in the reduction of the number of unemployed women.

Unemployment among women may undergoes various changes. One of the directions of the study can be the analysis of changes over time. The most common trends of research in the literature are analyzes of long- and medium-term changes, which often omit the problem of short-term fluctuations, including seasonal fluctuations. Although seasonality constitutes a major part of the short-term volatility of most economic variables[7]. Labour markets are characterised by significant seasonal character and what is interesting, a common seasonal element can be isolated for some domestic labour markets[8].

Test method and data sources

Seasonality is a regular repetitive relationship between observations which are spaced apart by a fixed number of periods. In the case of economic phenomena, seasonality is usually considered during the calendar year. The seasonality analysis allows for determining the specific character of a country or region. In addition, the seasonal components enable to compare and interpret changes of the phenomenon from period to period. The seasonal analysis show phenomena that reflect changes do not results from purely seasonal and calendar reasons.

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[5] M. Gawrycka, *Size and structure of registered unemployment in Poland*, [in:] M. Gawrycka, J. Wasilczuk, P. Zwiech (eds.), *Glass ceiling and moving staircase – women on the labour market*, CeDeWu Publisher, Warsaw 2008, p. 81.

[6] M. Socha, U. Sztanderska, *Structural basis of unemployment in Poland*, Polish Scientific Publishers PWN, Warsaw 2000, p. 254.

[7] R.B. Barsky, J.A. Miron, *The Seasonal Cycle and the Business Cycle*, „Journal of Political Economy" 1989, No. 97(3), p. 503-535.

[8] R.F. Engle., S. Hylleberg, *Common Seasonal Features. Global Unemployment*, „Oxford Bulletin of Economics and Statistics" 1996, Vol. 58(4), p. 615-630.

Decomposition of time series consists in extracting, from an observed time series, the number of component series such as: trend-cycle (T_t), irregular component (I_t), the effect of different number of working days (D_t), holiday effect (E_t) and seasonal component (S_t)[9]. It may be written in the following way:

$$X_t = T_t \quad S_t \quad I_t \quad E_t \quad D_t,$$

where – the spaces between the components are filled with a sign of multiplication or addition, depending on the examined model – a multiplicative or additive model.

There are many methods of seasonal adjustment of data. The most common are TRAMO/ SEATS and X- 12 ARIMA[10].

Seasonality analysis was based on monthly data on the number of unemployed women. The Central Statistical Office (pl. GUS) was the source of information on the number of unemployed women. In the article, the authors used a multiplicative model, and the Census X-12 ARIMA procedure was used in order to decompose the seasonal component. This decision resulted from the properties of the time series of unemployed women. The study covered the period from January 2011 to December 2016.

The research procedure was planned according to the following scheme:

Stage 1. Analysis of the situation of unemployed women in Poland.

Stage 2. Analysis of the seasonality of the number of unemployed women in Poland in 2011-2016 and during the year.

Result

Situation of unemployed women in Poland

The situation of unemployed women in Poland can be described by a variety of measures, including the registered unemployment rate, the number of the unemployed or the percentage of women's economic activity. The situation of unemployed women on the Polish labour market is difficult and it is characterised by a higher registered unemployment rate and a larger number of unemployed people than in case of men (Figure 1). A positive change on the Polish labour market is the fact that both the number of unemployed women and the registered unemployment rate of women has shown a declining trend since 2013.

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[9] S. Grutkowska, E. Paśnicka, *X- 12 ARIMA and TRAMO/ SEATS- empirical comparison of seasonal alignment methods in the context of the length sample*, Material and Studies, Polish National Bank, Warsaw, July 2007, p. 8.

[10] The other methods are for example: X- 11, X- 11 ARIMA, SABL, STAMP, BV4, DAINTIES. See more: B. Fischer, *Decomposition of Time Series Comparing Different Methods in Theory and Practice*, Version 2.1, March/April 1995, p. 7-20.

Figure 1. Number of unemployed and registered unemployment rate in Poland in the years 2011- 2016

a) number of unemployed [people]

b) registered unemployment rate [%]
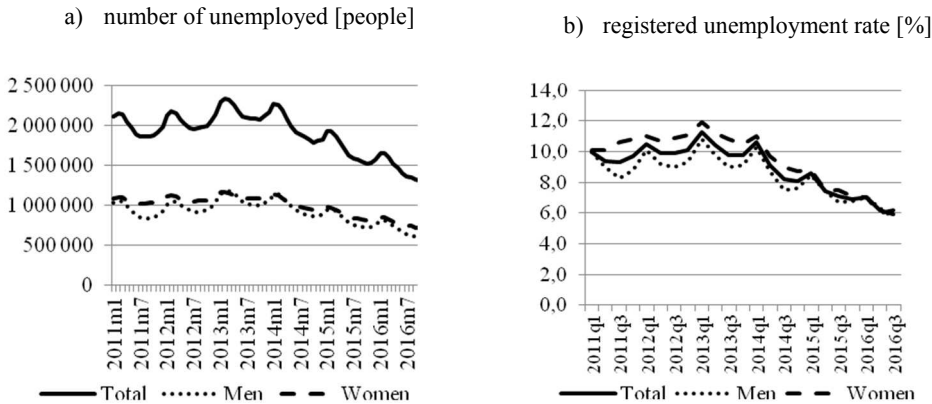
Source: Self study based on data from the Central Statistical Office.

Women's participation in the labour market is another rate describing the situation of women on the Polish labour market. This relationship is presented in Figure 2.

Figure 2. Percentage of economic activity of women in the total number of economically active population in Poland in 2011-2016 [%]
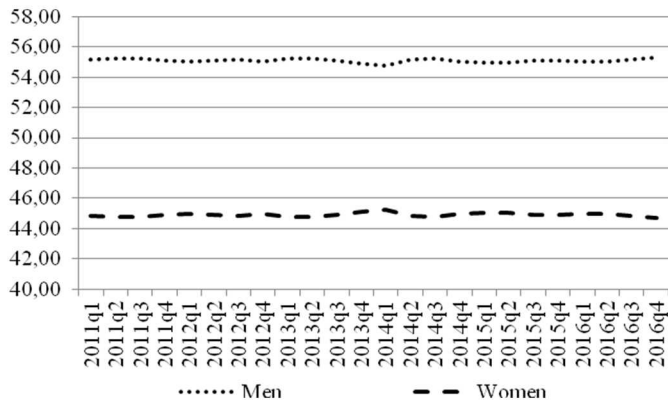
Source: Self study based on data from the Central Statistical Office.

The percentage of women's activity throughout the analysed period remained stable, on average around 45%, and it was lower than economic activity of men throughout the analysed period. The situation of women on Polish labour market described with simple indicators, i.e. the number of unemployed people, the unemployment rate and economic activity of women indicate their difficult situation and perpetuated the stereotypes of women's perception on the labour market.

Analysing these trends confirms the need to undertake more in-depth analysis and to seek new directions of research such as short-term time series analysis.

Seasonality of unemployed women in Poland in 2011-2016

The seasonality of the number of unemployed women in Poland was subjected to slightly changes over the time. The lowest level of seasonality was observed in the last two years of the analysis while the average annual seasonality rate of unemployed women was 2.68% and 5.66-5.63% for men. Taking into account the entire analysed period, the seasonality of the number of unemployed women decreased, similar to the seasonality of the number of unemployed men (Table 1).

Table 1. The average annual seasonality of the number of unemployed women in Poland in 2011-2016 [%]

Years	In total	Men	Women
2011	4,25	6,14	2,70
2012	4,23	6,05	2,69
2013	4,20	5,91	2,69
2014	4,16	5,76	2,69
2015	4,12	5,66	2,68
2016	4,10	5,63	2,68

Source: Own calculations based on data of the Central Statistical Office.

Another stage of the study was the analysis of distribution of seasonal fluctuations in the number of unemployed women during the year. Seasonal fluctuations during the year are similar for both women and men. In the analysed period, one annual cycle was observed, with the maximum of seasonal unemployment in December-April and highest decrease in months of August-October. Differences between certain groups were not significant. In the group of men, there was a slight increase in the seasonality of unemployment (Figure 3). A feature that differentiates the seasonality of the number of unemployed in the groups of women and men was the amplitude of fluctuations. The seasonal fluctuation of the number of unemployed women was significantly lower than in the group of men. This may suggest that women prefer long-term employment or the fact that the type of work done by women on the labour market is year-round.

Figure 3. The average monthly seasonality of the number of unemployed women in Poland during the year [%]
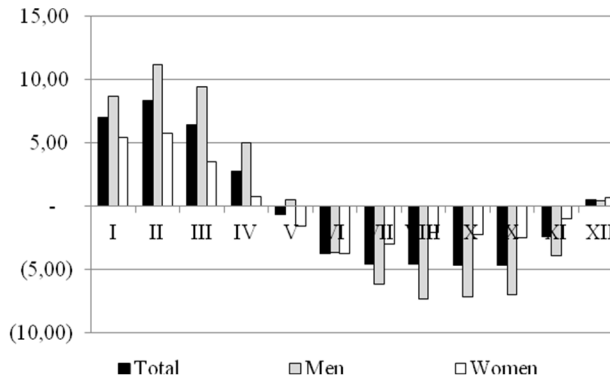
Source: Self study based on data from the Central Statistical Office.

There are considerable regional disparities in the labour market, including a variety of regional labour markets, both in terms of Polish and European conditions[11]. Therefore, the regional seasonal variety of the number of unemployed women was determined in the next stage of the analysis. The selected seasonality indicators for the number of unemployed women in the regional perspective are presented in Table 2.

Table 2. Regional differentiation of seasonality of the number of unemployed women in Poland in 2011-2016 [%]

Years	Total number of unemployed			Number of unemployed men			Number of unemployed women		
	Min. value	Max. value	Max- min range	Min. value	Max. value	Max-min range	Min. value	Max. value	Max-min range
2011	3,05 MAZ	5,53 ZACH	2,48	4,45 MAZ	7,62 WLP	3,16	1,69 MAZ	4,65 ZACH	2,96
2012	2,99 MAZ	5,53 ZACH	2,52	4,35 MAZ	7,49 OPL	3,14	1,67 MAZ	4,64 ZACH	2,97
2013	2,91 MAZ	5,52 ZACH	2,62	4,17 MAZ	7,42 OPL	3,25	1,65 MAZ	4,64 ZACH	3,00
2014	2,81 MAZ	5,52 ZACH	2,72	3,98 MAZ	7,34 OPL	3,36	1,62 MAZ	4,64 ZACH	3,02
2015	2,74 MAZ	5,52 ZACH	2,78	3,86 MAZ	7,27 OPL	3,41	1,60 MAZ	4,64 ZACH	3,04
2016	2,71 MAZ	5,51 ZACH	2,81	3,82 MAZ	7,23 OPL	3,41	1,60 MAZ	4,64 ZACH	3,04

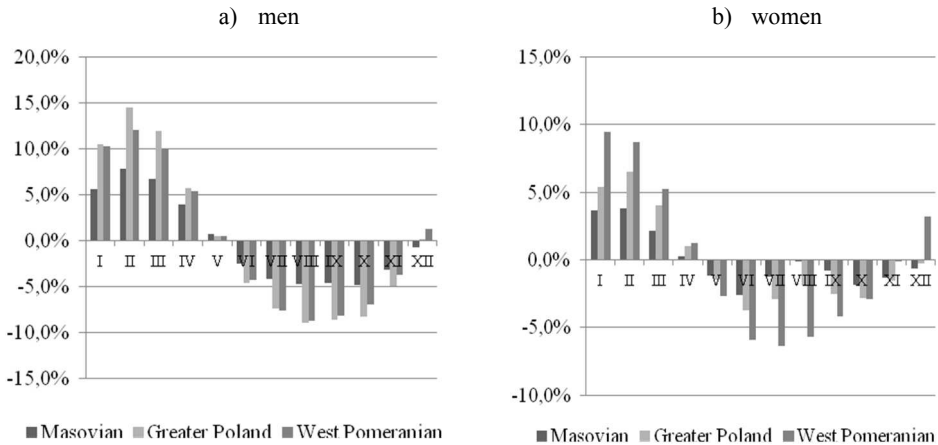Source: Own calculations based on data of the Central Statistical Office.

MAZ – Masovian Voivodship; ZACH – West Pomeranian Voivodship; WLP – Greater Poland Voivodship; OPL – Opole Voivodship.

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[11] D. Puga, *Geography Lessons*, „European Economic Perspectives" 1998, No. 18, p. 24-56 ; M. Góra, U. Sztanderska, *Introduction to the analysis of local labour market. Itinerary*, Ministry of Family, Labour and Social Policy (Poland), Department of Economic Analysis and Forecasts, Warsaw 2006, p. 101-135.

Generally, taking into account the average annual seasonality of the number of unemployed in a spatial arrangement, the labour market in Poland is characterised by a small internal diversity. The lowest level of seasonal unemployment is in the central voivodships (Masovian and Łódź), whereas the highest rate is in northern and north-western voivodships (West Pomeranian, Pomeranian, Kuyavian-Pomeranian, Warmian-Masurian). It pertains both to the situation of women and men in the labour market. These regions concur with voivodships which are marked by the lowest and highest rates of unemployment. The seasonality of the number of unemployed women and men, measured by the average annual seasonality rate, showed a decreasing trend. A slight increase was noted only in six voivodships, just for a group of women.

A factor that diversifies the seasonality of the number of unemployed women in the regional system is the amplitude of fluctuations during the year. A low level of seasonal unemployment of the number of unemployed women (lower than in the case of men) was observed in all voivodships. Low level of seasonal unemployment among women (lower than in case of men) was observed in all voivodships. The distribution of seasonal fluctuations during the year for selected voivodships is presented in Figure 4.

Figure 4. The average monthly seasonality of the number of unemployed women during the year in selected voivodships

Source: Own calculations based on data of the Central Statistical Office.

In general, the seasonality of the number of unemployed women during the year is similar in all voivodships. While analysing the seasonal fluctuations in the number of unemployed women one annual cycle can be noticed. This cycle is characterized by the increase of seasonality in December-April (except for the following voivodships: Łódź, Silesia, Mazovian and Greater Poland) and a decrease in seasonality from May to November. The above-mentioned trend is different for men – the period of declining seasonal unemployment in the case of men is shortened and generally lasts from June to November.

A characteristic feature of women's seasonality is also the lower amplitude of fluctuations. The voivodships were a relatively homogenous group in terms of amplitude of fluctuations. Masovian and West Pomeranian were the most distinctive voivodships. The former one had the smallest amplitude of fluctuations measured by the range between max. and min. 6.4%, whereas West Pomeranian voivodship had the highest amplitude (15.9%).

The conclusions from the seasonal analysis of the number of unemployed women contribute to the following remarks: women are diligent workers despite their difficult situation on the labour market[12] and take up jobs which are less affected by seasonality. It may be justified by psychological factors that motivate women to take up stable jobs, even at lower wages or under harsher working conditions.

Conclusions

The aim of the article was to determine the level and trends of seasonal changes in the number of unemployed women in Poland. The analysis was based on data on the number of registered unemployed women in Poland in the years 2011-2016 and the seasonal components of unemployment were isolated by the Census X-12 ARIMA algorithm.

The obtained results suggest that the seasonality of the number of unemployed women in Poland is low, lower than the seasonality of the number of unemployed men. Between 2011 and 2016 there was a slight decrease in the seasonality of women's unemployment. The seasonality of unemployed women was characterised by one annual cycle with a relatively small amplitude of fluctuations, especially in comparison with men's seasonality. In a regional basis, the seasonality of the number of unemployed women followed similar tendencies of changes and a similar distribution of seasonal fluctuations in unemployment during the year.

The conducted analysis shows that seasonal unemployment in Poland affects more men than women, and its course is milder in relation to unemployed women.

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