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The "Family 500+" programme
versus the economic activity of women in Poland

Introduction

Social policy is a huge system of communicating vessels. Every decision, every action in one area strongly, but often indirectly, affects another area. Examples of such mutual correlations include the manipulation of retirement age, which then influences social benefits and health care, or changes in housing policy, which then reduces pathologies within a given area while deteriorating the environmental conditions there. One such programme whose effects are still being studied is "Family 500+". Both at the stage of discussion and in the first months of its operation, there have been numerous arguments for and against this benefit. "Family 500+" should not be treated solely as a money transfer in terms of the hopes and controversies surrounding it, but also as an important instrument of state policy. It should be borne in mind that its statutory goal is to increase the fertility rate in Poland and to encourage people to establish families. However, it quickly became apparent that this benefit also had a strong impact on the poverty of families with children and on the economic activity of women.

This paper is only a contribution to a broader discussion on the consequences of "Family 500+" in the general labour market, with particular emphasis on the economic activity of women. The principal goal of the paper is to depict the relationship between "Family 500+" and the economic activities of women in Poland. This paper takes the following structure: The first part synthetically

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focuses on the essence of "Family 500+" and the macroeconomic consequences of its implementation. The second part, based on available statistical data, analyses the economic activity of women in Poland, with particular emphasis on young women aged 25–34 years. The final section, based on the logit model used by the authors, attempts to depict the impact of "Family 500+" on the economic activities of women.

THE ESSENCE AND GOAL OF "FAMILY 500+"

The topic of women, their economic activity and their willingness to start a family is at the heart of family policy. Polish women are delaying their decision to start a family and raise children. This may be because they seek professional accomplishment and to ensure adequate living and financial conditions for themselves and their families in the long run. One of the consequences of such a decision is a dramatic decline in the fertility rate in Poland in recent years. In 2017 this rate was only 1.35, or 0.75 lower than the level of generational replacement defined at 2.1 (Central Intelligence Agency, 2018). Statistical data show that 402.0 thousand children were born in Poland in 2017, 19.7 thousand more compared to 2016 (GUS, 2018a, p. 26), with preliminary data indicating that the number of births in 2018 was 388 thousand, 13 thousand lower than in the previous year. It can therefore be concluded that the increased fertility rate in 2017 was a combination of many factors, including the deferred procreation decisions of women born in the peak of the 1980s. Many women took their previously delayed decision to have a second (third) child, as they felt the need for greater job security due to an improved labour market situation. It should be clearly emphasised that the observed increase in births in Poland in 2017 is mainly attributable to the enlargement of families that already had a child. However, the overall number of women annually who decide to have a child is still falling.

One of the answers to this demographic disaster is the "Family 500+" programme, implemented in Poland on 1 April 2016. It was designed as a social investment in that its assumed prospective and current effects on the economy go far beyond the role of a typical social programme. On its normative side, the programme refers to the provisions of Articles 18 and 20 of the Constitution of the Republic of Poland, which define the essence and role of the State's protection of and care for the family, including the implementation of a social market economy. In accordance with the definition in the Polish Constitution, a social market economy, on the one hand, is based on the freedom to conduct business and on legally secured private property. In its assumptions, "Family 500+" aims to reduce the financial burden on families raising children, thereby increasing the fertility rate and leading to population growth in Poland. The programme

involves monthly payments of PLN 500 in parental benefits for the second and subsequent children. The benefit may also be awarded for the first child, depending on the income criterion (income per family member not higher than PLN 800 per capita or PLN 1,200 for a family raising a disabled child). "Family 500+" is thus a social investment on a much larger scale than the previously implemented family social policy, which chiefly involved payments of benefits as family allowances supplemented with extra allowances and one-off childbirth grants. The normative basis of the programme is provided by the Act of 11 February 2016 on State Aid for Child Support (Journal of Laws (Dz.U.) of 2017, item 1851). The beneficiaries of "Family 500+" are primarily Polish citizens. The programme also covers foreigners where the provisions on the coordination of social security systems apply to them if this follows from international bilateral agreements, where a person has a residence permit with the annotation "access to the labour market" but with the exclusion of third-country nationals: with a work permit for less than 12 months, who came to Poland to study and who can work on the basis of a visa. Foreigners are entitled to benefits provided that they reside in the territory of Poland for the period of receiving benefits. The only exceptions are situations where bilateral international agreements or provisions on the coordination of social security systems state otherwise. From April 2016 to January 2017, the beneficiaries of the programme were already 2.56 million families, including 3.82 million children, and the programme itself consumed over PLN 19 billion of state budget expenditure. The benefit is provided for 55% of children in Poland: 699 thousand families with one child under 18 years of age, 1.5 million families with two children, 288 thousand with three children, 53 thousand with four, almost 13 thousand with five, 5.6 thousand with six, and 278 with seven (Kisicka, 2017). The "Family 500+" budget constituted 0.93% of GDP in 2016 (Mroziński, 2017) and 0.95% of GDP in 2017. For comparison, the budget of the Ministry of National Defence in the same period amounted to approximately 2% of the GDP. In turn, in 2018 the programme cost PLN 22.1 billion, or every sixteenth zloty received by the state budget. Families tend to spend the "Family 500+" benefits on food and clothing (42.6%), expenses related to schools and kindergartens (34.2%) and extra-curricular activities for children (32%). Much of the money is spent on general consumption and only 16.2% of the beneficiaries decide to save any money (Białowolski, Dudek, 2016).

It is worth mentioning here that by 2016 financial support for families in Poland could be called modest. According to OECD data, in 2015, Poland spent about 1.8% of GDP on public support for families, slightly below the OECD average (Magda, 2018). "Family 500+" almost doubled this amount, and placed Poland among the countries that spend the largest amounts on helping families (Figure 1).
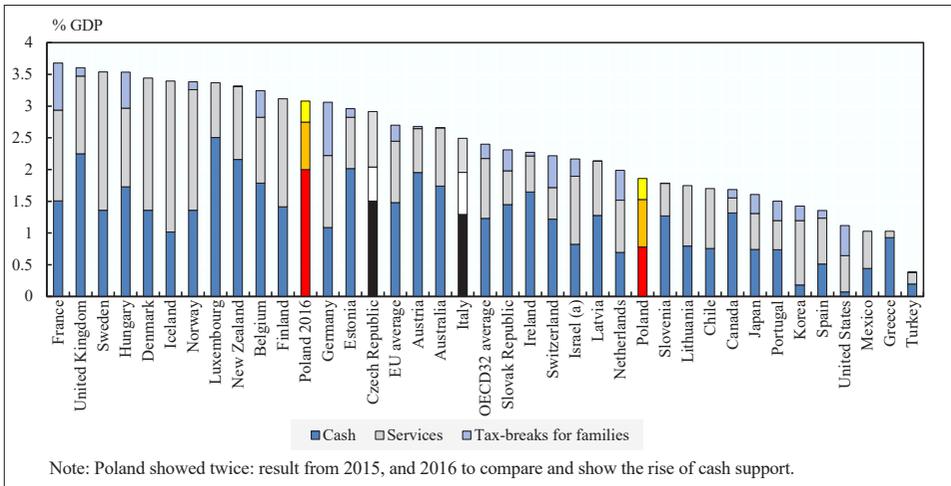
Figure 1. Public expenditure on family benefits by type of expenditure, in percentage of GDP, 2015 and latest available

Source: own study based on OECD Family Database 2015.

However, it should be remembered that the virtually unconditional support under "Family 500+" was not accompanied by additional measures, such as support for the family services sector or tax breaks for young people deciding to have and raise a child.

The above characteristics of "Family 500+" present a rather positive picture of the effects of this social benefit. The increase in public support for families, with sensible management of this support by the beneficiaries, leads to the conclusion that the programme works well. This also appears to be confirmed by the data on poverty, in particular child poverty. In 2015–2017, extreme poverty of families with children decreased by 54% and relative poverty by 30%. This means that, in comparison to 2015, there were 455 thousand fewer relatively poor children and 390 thousand fewer extremely poor children in Poland in 2017 (GUS, 2018c). This is a steep decline and a step forward in the implementation of two international plans to combat poverty: 2030 UN Agenda and Europe 2020 Strategy proposed by the EU (Szarfenberg, 2018).

While appreciating the potential effect of poverty reduction, it should however be considered whether this is a long-term strategy. If the extreme poverty line in 2017 was PLN 521.76 per person in the case of a working household with two children, a transfer of PLN 1,000 would automatically put such a family above this line (assuming that there is at least one person working full-time for the minimum wage). Certainly, it may be a great chance for such families to leave a difficult financial situation, and many people will surely use it well. Nonetheless, from the point of view of public policy, the question of sustainability of these solutions

should be asked. If 8.7% of children aged 0–14 in Poland live in households with no working adult (OECD, 2018), then a transfer of PLN 500 per month would certainly help to cover current expenses but without necessarily changing the structural position of such a family. It should also be borne in mind that it was not solely the PLN 500 benefit that contributed to the decline in extreme poverty. This change was a continuation of a long-term trend of increasing incomes of the population and occurred while the situation in the labour market improved. Thus the availability of more opportunities of finding a job (very low unemployment) and rising wages might also have reduced poverty.

In Poland, as in many other countries in Europe, we are facing a fertility crisis characterised by a lack of full generational replacement and population ageing. It is not difficult to accurately diagnose the projected potential consequences for the economy and social life. In observing similar demographic changes which began much earlier in other countries, many social and economic processes adversely affecting the national economy were noticed. Therefore, "Family 500+", in addition to combating poverty, was also designed as a response to the progressive ageing of the Polish population and a stimulus toward starting a family and increased fertility. How is this goal being achieved? According to GUS (Central Statistical Office) data, the fertility rate as the number of born children per female of childbearing age, i.e. 15–49 years, increased by about 13% in 2015–2017, which translated into over 30,000 more live births than in the base year (Figure 2).
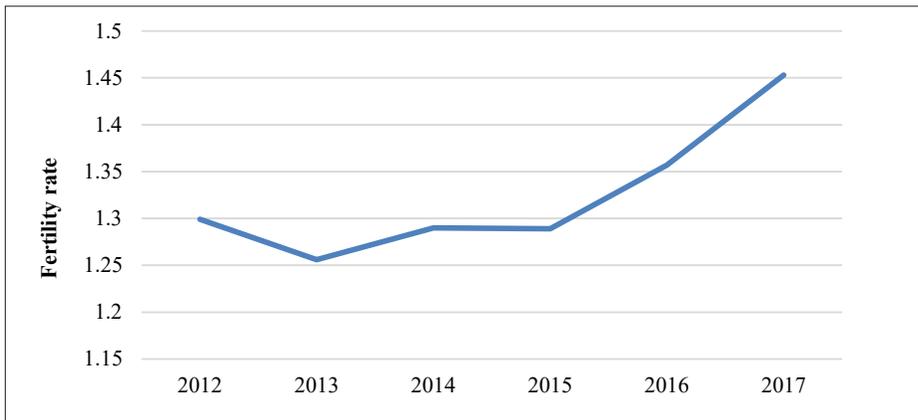
Figure 2. Fertility rate in Poland in 2012–2017

Source: own study based on (BAEL, 2018).

A fertility rate at 1.45 still ranks Poland in one of the lowest positions in Europe and does not ensure generational replacement. Nevertheless, this is a decisive step forward, especially considering the trend in 2012 and 2015 (Rudzik-Sierdzińska,

2018). It is currently difficult to assess whether this effect will be maintained in the longer term or will only be temporary. However, the history of European countries and research in this area indicate that the greatest success in increasing fertility rates was achieved by programmes allowing parents to combine work and child raising rather than direct cash transfers (Luci-Greulich, Thévenon, 2013). Women are better educated and want to develop and build their professional career; therefore, measures aimed at supporting their decision to start a family should be targeted at the support for the caring responsibilities, otherwise their effects may have negative consequences in the labour market.

DATA DESCRIPTION

The data used to analyse and verify the hypotheses and solve the research problem came from two studies: Labour Force Survey (LFS) conducted by Central Statistical Office (CSO) in Poland since 1992 and Human Capital Balance (HCB), a study organised by the Polish Agency for Enterprise Development (PARP).

The purpose of the LFS study was to provide information on the structure and size of the population of economically active, economically inactive, unemployed and employed people as well as to learn about the pace and directions of change in the economic activity of the population. The observation unit in the study are members of households aged 15 and above residing in randomly selected locations. The same group also constitutes the general population. For over twenty years, the main and overarching LFS question has been: "Did you perform any work that yielded income in the given week, or did you help free of charge in a family business?" Participation in the survey is voluntary and the survey itself is carried out at quarterly intervals. The quarterly sample in the survey (as of 2018) is 55,380 apartments and is divided into 13 weekly samples (reference period). The sample draw for LFS is carried out according to the principles of a two-stage draw divided into statistical regions and flats. The LFS results are widely used by institutions such as the National Bank of Poland, the United Nations, the World Bank, as well as many universities and scientific institutions (GUSa, 2018). HCB is a study aimed at monitoring competences on the labour market in Poland and directing institutions and public funds to implement tasks aimed at closing competence gaps at the national and regional levels. It is implemented by PARP in cooperation with experts from the Jagiellonian University. In addition to the main goal, it also implements a series of specific objectives, which can include:
• matching competences to the needs of employers;
• adjusting upper secondary school profiles to the needs of the labour market;
• determining the adjustment of profiles of inactive and unemployed people to the conditions of the labour market.

Particularly due to the implementation of the latter goal, the data from the study are extremely important and are an essential element of this work. The use of data is possible due to the cyclicality of the study, the use of a uniform methodology in subsequent editions, representativeness at the national and regional levels, as well as, and above all, the availability of a micro database for the needs of individual user analyses (which distinguishes this study from LFS and allows the use of the material to construct an econometric model). The questions posed in HCB focus primarily on competences, but they also touch on the subject of professional activity and also in recent editions raise the topic of the "Family 500+" programme, which makes them an excellent source that will translate the macro conclusions drawn from the CSO data 10.1057/ces.2012.3 into micro data from the study (PARP, 2017).

"Family 500+" and women's economic activity in Poland
– analysis of available data

The available data show that among 13.7 million economically passive people, the number and share of persons declaring that they do not participate in the labour market due to family and housekeeping responsibilities have been growing since 2010 (Rudzik-Sierdzińska, 2017, p. 8). It is worth emphasising that such statements appear in an improving situation in the labour market, hence it is rather not the difficulty in finding a job that "pushes" such people out of the labour market. It is therefore possible that either those already economically passive have begun to declare "family responsibilities" as a new reason for their economic inactivity, or that there has been a movement in two directions: some women with household responsibilities have left the labour market and other women have taken their place. Women constitute a predominant group of those economically passive. According to estimates provided by CenEA analysts using the SIMPL microsimulation model based on data on household size, composition and earnings, almost a quarter of a million people will give up work in the long term, with other conditions remaining the same. These will be: 230,000 women and 7,000 men living mainly in small towns (45.7%) and rural areas (46.4%), without higher education (85%), including 25,000 single parents (Myck, 2016). This means that those leaving their jobs will be chiefly women (as confirmed by the data available up to the third quarter of 2018), people with basic or secondary education, earning relatively little and living in smaller towns and rural areas. The research by Magda *et al*. (2018) shows that about 2.4 percentage points of the fall in the number of economically active mothers observed until mid-2017 was attributable to the "Family 500+" benefit. The above-mentioned study suggests that "Family 500+" increased the outflow of women not only from employment resources but also from unemployment resources into economic passivity. This means that some non-working mothers have given up an active job search.

The indication of poorly educated young women in small towns or rural areas as most susceptible to economic deactivation is in line with the report by Bargu and Morgandi (2018). They demonstrated that this programme strongly discourages people from taking up employment, especially adults in families in the lowest income distribution quintile. This impact is particularly pronounced in the case of single mothers and other adults in a family in which one parent already works and earns too low a wage. After taking into account the cost of private care for young children, the number of families that would be financially disadvantaged if another adult or a single parent took up work increases. Greater access to affordable and good quality care for young children would reduce the negative impact of this benefit on labour supply.

In order to depict the real impact of "Family 500+" on the economic activity of women in Poland, the numbers of working women should be analysed based on available statistical data (Figure 3).
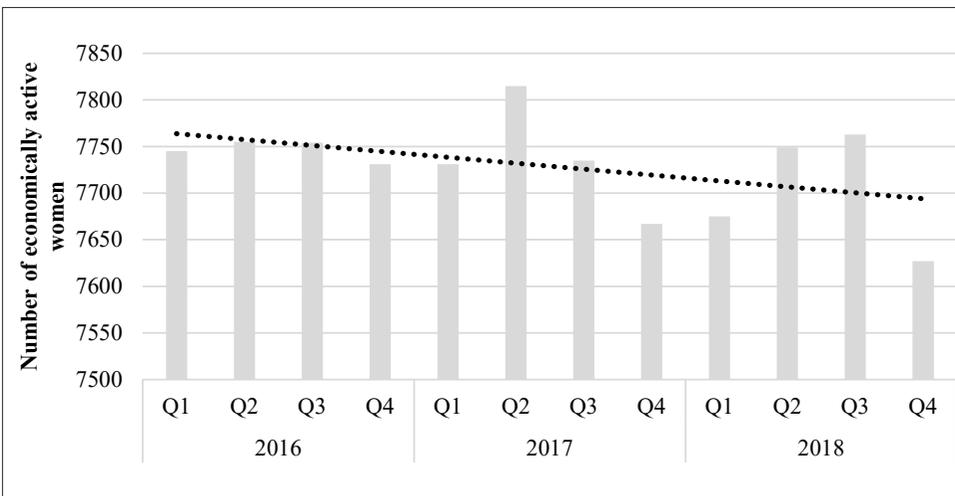
Figure 3. Quarterly numbers of economically active women in 2016–2018

Source: own study based on (BAEL, 2018).

In 2015–2018, the number of economically active women decreased by 70 thousand. This is clearly illustrated by the trend line, which features a negative slope and an angular coefficient below zero (this shows a general decrease in the analysed value). The absolute value, which is the number of economically active women, is however not the best measure for analysis. The value may be influenced by many factors, including demographic and emigration trends. A much better measure is the economic activity rate, which informs about the ratio of economically active people (i.e. employed and unemployed) at a given age to the total population at this age.
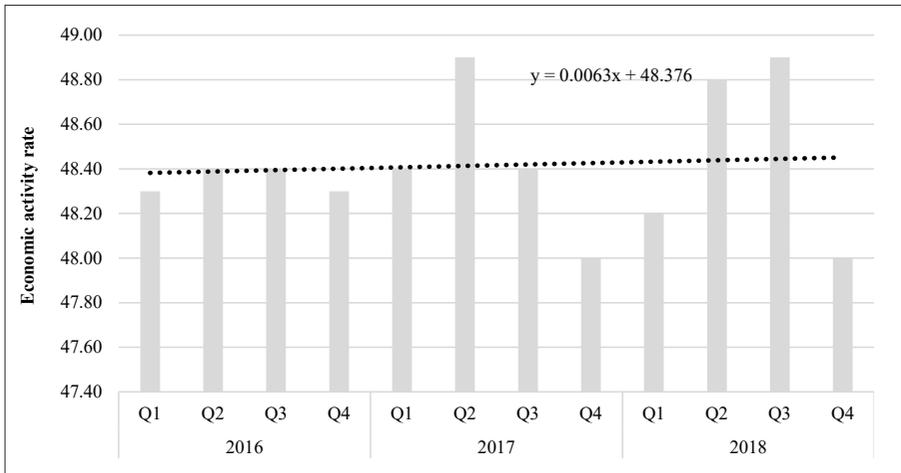
Figure 4. Quarterly economic activity rates of women in 2016–2018 (%)

Source: own study based on (BAEL, 2018).

The economic activity rate among women reveals that the preliminary interpretation of the data presented in the previous figure may be misleading. Obviously, similar trends (general decrease/increase) of activity rate are maintained in comparable periods, yet at the same time the total rate is on the rise, which is once again confirmed by the trend line. To clearly corroborate the above interpretation, a figure showing annual data was used in order to better present the data.
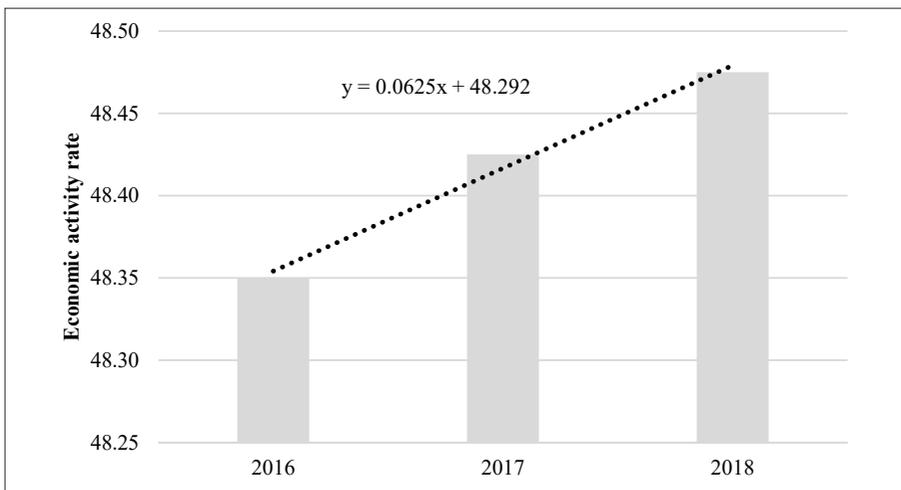
Figure 5. Annual economic activity rates of women in 2016–2018 (%)

Source: own study based on (BAEL, 2018).

A steady, slight increase in the average economic activity rate of women can be noted. It can therefore be concluded that "Family 500+" is unlikely to have a negative impact on the total economic activity rate of women. Another recommendation that can follow from the analysis concerns the analytical and interpretative advantage of the economic activity rate over the absolute number of economically active women.

The consequences of "Family 500+" for economic activity of women are particularly noticeable in the 25–34 age group, i.e. the group entering the labour market and making key decisions about their life regarding their professional career and starting a family. In Poland, women at this age most often decide to have children, which is directly correlated with the operation of the discussed "Family 500+" programme. To confirm the conjectures about the importance of this female age group for the research problem, Figure 6 is used to illustrate the quarterly economic activity rates of women in different age groups in 2016–2018.
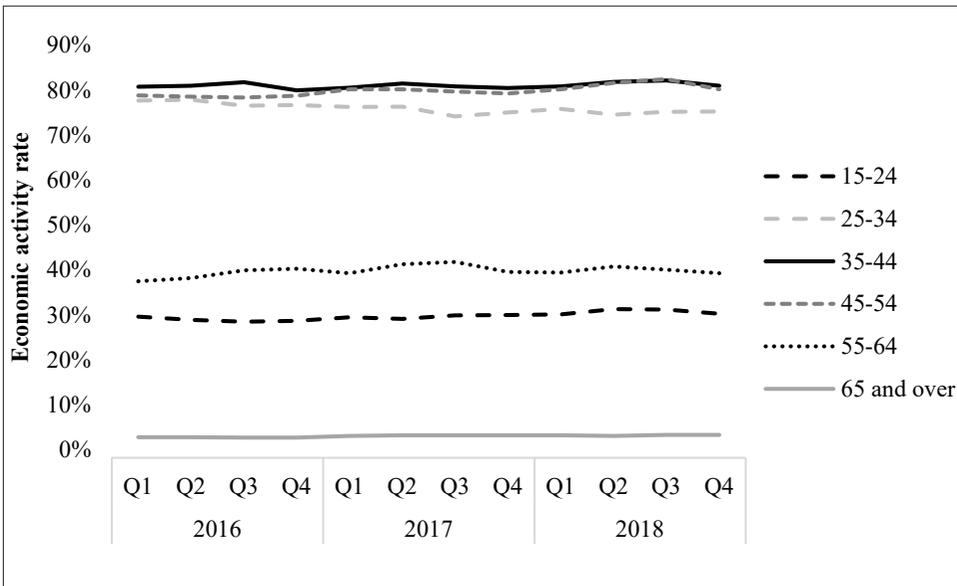
Figure 6. Quarterly economic activity rates of women in 2016–2018 divided by age (%)

Source: own study based on (BAEL, 2018).

In the 25–34 age group, there is a clear (negative) change in the economic activity rate among women. In the remaining age groups, this rate was practically unchanged or slightly increased. The quarterly economic activity rates of women in the 25–34 age group are more precisely illustrated in Figure 7.

$$y = -0.0026x + 0.7768$$
$$R^2 = 0.658$$
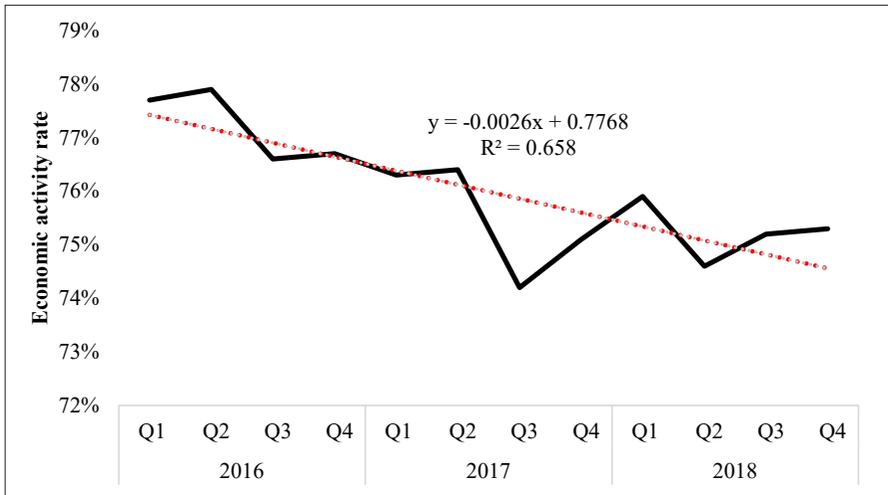
Figure 7. Quarterly economic activity rates of women aged 25–34 years for 2016–2018 (%)

Source: own study based on (BAEL, 2018).

The drop in the economic activity rate among women aged 25–34 from 77.9% at the beginning of the second quarter of 2016 to 75.3% at the end of 2018 is confirmed by a negative slope and angular coefficient of the trend line. The translation of these values into absolute values confirms that over 210 thousand women aged 25–34 left the labour market.

The analysis also included economic activity rates of women aged 25–34 in the long term.
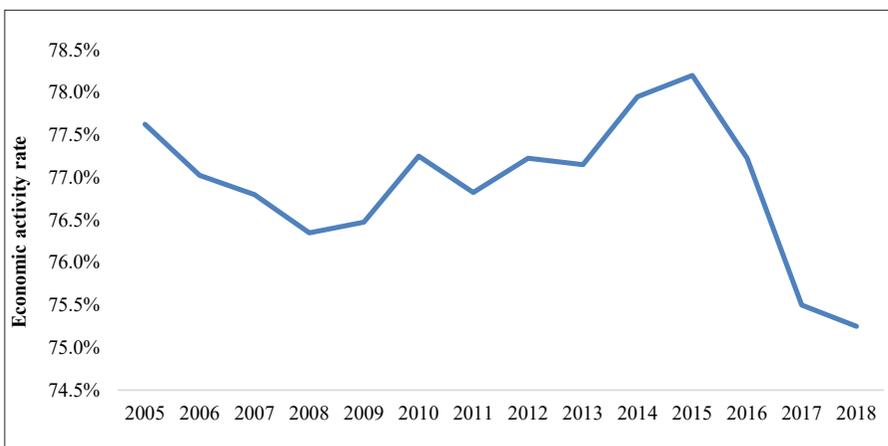
Figure 8. Economic activity rates of women aged 25–34 years for 2005–2018 (%)

Source: own study based on (BAEL, 2018).

The economic activity rate in 2018 was the lowest since 2005. By the end of 2015, its growth could be observed up to the record high of 78.2%. In turn, the 2016–2018 period saw a dynamic decline in the economic activity rate among women aged 25–34. The decrease in the number of professionally active women in the group of people just starting their professional career may have many reasons. They may include monetary incentives in the form of benefits for children – with deficiencies in the number of crèches, kindergartens or access to care for preschool children as accompanying factors.

The spatial distribution (by voivodship) is important to determine the impact of "Family 500+" on the economic activity rate among women.
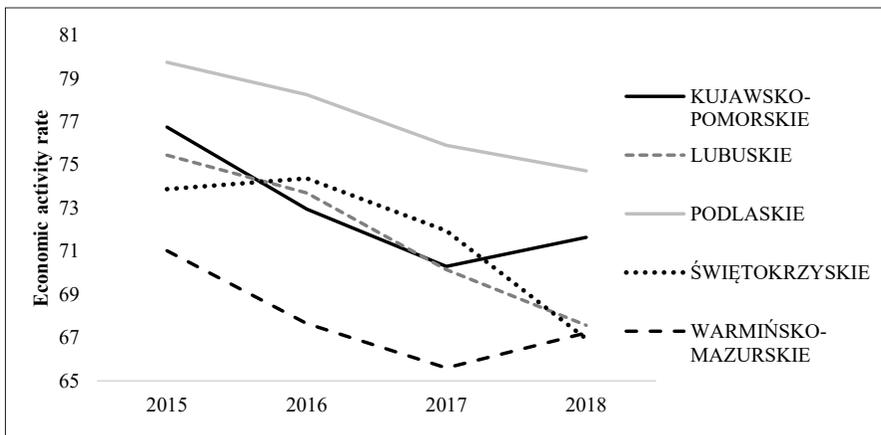
Figure 9. Economic activity rates of women in the 25–34 age group in selected voivodships in 2015–2018 (%)

Source: own study based on (BAEL, 2018).

Among the poorest voivodships (Podlaskie, Świętokrzyskie, Kujawsko-Pomorskie, Warmińsko-Mazurskie, Lubuskie), the economic activity rate among women aged 25–34 dropped most in Lubuskie (by almost 8%), Świętokrzyskie (7%) and Podlaskie (4%). These voivodships, where there is a visible decrease in the economic activity rate among women, are simultaneously those regions of Poland (with the exception of the Lubuskie Voivodship) where the unemployment rate is the highest, at over 8%. An increase in the number of non-working women aged 25–34 in voivodships where the economic situation is slightly more difficult than in others may indicate some influence of aid programmes on employment decisions. Having two or three children, a woman may voluntarily give up her job in order to raise the children. A simple calculation shows that a household with three children will receive PLN 1,000 or, if the income criterion is met, even PLN 1,500. In turn, the gross minimum wage in 2018 was set at PLN 2,100 (PLN 1,530 net). A simple calculation demonstrates that a household with four children will

receive a benefit in excess of the minimum wage. Undoubtedly, for some women, especially those in the poorest voivodships, this is a sufficient reason to give up their job and devote themselves to bringing up children.

Using Holt's linear model[3], the economic activity rate of women in Poland in the 25–34 age group can be forecast. This method involves smoothing a time series. Two constants, α and β, are responsible for the smoothing of the level of the variable and its trend, respectively.

The estimating equation for random variations is as follows:

$$F_t = \alpha \cdot y_t + (1-\alpha) \cdot (F_{t-1} + S_{t-1}) \quad \text{for} \quad \alpha \in <0,1> \tag{1}$$

The estimating equation for the trend is as follows:

$$S_t = \beta \cdot (F_t + F_{t-1}) + (1-\beta) \cdot S_{t-1} \quad \text{for} \quad \beta \in <0,1> \tag{2}$$

where:
t — subsequent period of time ($t = 2,...n – 1$),
F_t — smoothed value of the analysed time series in period t,
S_t — smoothed trend value in period t,
α, β — model parameters with values in the range [0–1].
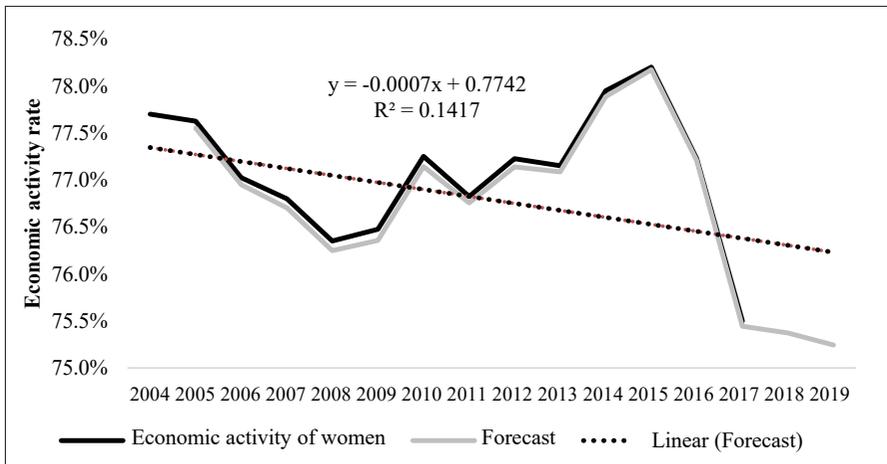
Figure 10. Forecast of the economic activity rate of women aged 25–34 years in 2018–2019 according to Holt's linear model

Source: own study based on (BAEL, 2018).

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[3] This model is used to smooth time series in which there are small random variations and a development trend but there is no seasonality. Smoothing covers the level and increment of the variable. Nonetheless, the time span should not be extended because this increases uncertainty.

The forecast from Holt's linear model seems to be a close fit to the real data. The forecast is smoothed, ideally adjusted to the primary data and reflects the observed trend. The forecast predicts a decrease in the activity rate of women aged 25–34 by 0.1 percentage points in the next period. The quality of the forecast is evidenced by the very low error values: *ME* = -0.074 and *RMSE* = 0.079. The first refers to the mean error of prediction and informs whether the forecast is overestimated or underestimated. The higher the result above zero, the poorer the forecast. In this forecast, the *ME* error slightly deviated from zero, which means that the forecast was very good in this respect. In turn, the *RMSE* error is probably the best and most popular method of assessing the quality of forecast. It answers the question of by how many units on average the solution values $\hat{y}_t$ positively or negatively deviate from y_t. For this forecast, the error was only 0.079. This proves that the forecast results deviated from the real results of the economic activity rate of women by only 0.079 percentage points (Skoczypiec, 2012).

"Family 500+" and women's economic activity in Poland – research hypotheses and methodology

In order to depict the correlation between "Family 500+" and the economic activity of women aged 25–34 years, a logistic regression model based on data from the BKL study was used where the dependent variable was the economic activity of women and independent variables the receipt of the "Family 500+" benefit. In order to show the relationship between the "Family 500+" benefits and the economic activity of women aged 25–34 in Poland, two research hypotheses were formulated:

H_1: "Family 500+" has a negative impact on the economic activity of women aged 25–34.

H_2: Women living in voivodships with the lowest wage modes in Poland more often decide to be economically passive due to receiving the "Family 500+" benefit than those living in voivodships with higher wage modes.

The data used to verify the hypotheses and solve the research problem came from two studies: Labour Force Survey (LFS) by Central Statistical Office in Poland and Human Capital Balance (HCB), a survey organised by the Polish Agency for Enterprise Development (PARP).

In order to analyse the variable of economic activity based on data from the HCB study, the logistic regression model[4] was used, based on the logistic

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[4] It is a mathematical model used to describe the influence of independent variables on the dependent variable with the following values: 1 – occurrence of the analysed phenomenon, 0 – lack thereof. Independent variables in the model can be both qualitative and quantitative. The condition

function that allows description of the influence of several variables $x_1, x_2, ... x_k$ on dichotomous variable Y. This function is described by the formula (Hosmer, Lemeshow, 2000):

$$f(z) = \frac{e^z}{1+e^z} = \frac{1}{1+e^{-z}}.$$
(3)

The logistic function takes values in the range <0; 1>, where 0 and 1 are the marginal values achieved between $+\infty$ and $-\infty$.

This function is particularly useful when analysing categorical data for two reasons. First, it takes values in the range <0; 1>, and can therefore describe the probability values of the occurrence or non-occurrence of any phenomenon (the probability takes values in the range of 0–1). Second, the dichotomous dependent variable takes only two values (usually coded as 0 and 1); the first value usually means no occurrence (e.g. no susceptibility to influence) and the second one means that a phenomenon occurred (e.g. susceptibility to social influence).

The logistic regression equation, like the linear regression equation (Ferguson, Takane, 1999), allows the calculation of the expected value of dependent variable. Since the logistic regression model applies to bicategorical dependent variables (i.e. taking only two values: 0 and 1), the expected value of dependent variable Y' has been replaced by the conditional probability that the dependent variable Y will take the value of 1 for independent variables x_1, x_2, ..., x_k. The properties of the logistic function suggest that both of these values (expected values of variable Y' and the conditional probability of taking the value of 1) are equal. Hence, the logistic regression model can be expressed by the formula (Kleinbaum, Klein, 2002):

$$P(Y' = 1 | x_1, x_2, ... x_k) = \frac{e^{\alpha + \sum_{i=1}^{k} \beta_i x_i}}{1 + e^{\alpha + \sum_{i=1}^{k} \beta_i X_i}}$$
(4)

where:
P(Y=1|x_1, x_2, ...x_k) – the probability of the dependent variable taking the value of 1 at given values of explanatory variables,
β_i – logistic regression coefficient of the i-th independent variable,
x_i – i-th independent (quantitative or qualitative) variable.

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for the use of logistic regression – in addition to the binary value of explained variable – is the sample size, which must be greater than 10 · (k + 1), where k is the number of independent variables.

The estimation results in logits, i.e. logarithms of the odds ratio, is expressed by the formula:

$$x_i'\beta = F^{-1}(p_i) = \ln\frac{p_i}{1-p_i}. \tag{5}$$

Thereby, it will be possible to calculate the quotients that will allow understanding of the effects on the explained variable. The β parameters were estimated using the maximum likelihood method. The likelihood function is described by the formula (Gruszczyński, 2012):

$$lnL = \sum_{i=1}^{n}[Y_i Z_i - \ln(1 + expZ_i)] \tag{6}$$

where:

$$Z_i = b_0 + b_1 x_{1i} + b_2 x_{2i} + \ldots + b_k x_{ki} \tag{7}$$

The set of data obtained from the HCB study contained over 850 variables and 4,056 records corresponding to respondents filling in the questionnaire. Given the size of the database, the variables were selected before modelling – their initial number was inadequate to establish econometric inference. The variables were meticulously filtered so as to ultimately allow for designing the most accurate, yet transparent and "sensible", model. The selection process was carried out in two stages:
1) Stage 1: based on a literature review, an initial selection of explanatory variables was made, taking into account their high substantive value and the purpose of the study.
2) Stage 2: from the variables selected in the first stage, the final variables were chosen on the basis of statistical criteria.

After the first stage of the analysis, 52 variables were selected from 855 variables. These variables represented appropriate "groups" of variables well. They were substantively justified and coincided with the observations of other authors examining the impact of "Family 500+" on the economic activity of women. Statistically insignificant variables and those that negatively affected the model quality were eliminated from the selected group (stepwise regression). As a result of the procedure applied, the model contained five explanatory variables. In order to check the assumption of no correlation among explanatory variables, a correlation matrix was drawn up and it was assumed that strongly correlated variables (an absolute value of correlation higher than 0.5 (strong correlation)) (Cohen, 1988) would be removed from the model. None of the variables were removed at that stage.

Table 1. Correlation matrix

	Specification	Constant	(1)	(2)	(3)	(4)	(5)
Step 1	Constant	1.000	-0.192	-0.638	-0.197	-0.239	-0.720
	Completed education (1)	-0.192	1.000	-0.114	-0.134	0.258	0.050
	Willingness to take responsibility for the performance of tasks (2)	-0.638	-0.114	1.000	-0.173	0.014	0.149
	Operation of machines, tools and technical devices (3)	-0.197	-0.134	-0.173	1.000	-0.050	0.090
	"Family 500+" – for how many children (4)	-0.239	0.258	0.014	-0.050	1.000	-0.077
	Age (5)	-0.720	0.050	0.149	0.090	-0.077	1.000

Source: own study.

Finally, the model included 6 variables, 1 dependent variable and 5 explanatory variables. The coding of variables is presented in Table 2.

Table 2. Recoding of variables – logit model

LFS_rekod	dependent, binary variable describing economic activity
m15	explanatory, quantitative variable describing for how many children the respondent receives the "Family 500+" benefit
k12	explanatory, qualitative, ordered variable taking values from 1 to 5, describing respondents' willingness to take responsibility for work tasks
k05	explanatory, qualitative, ordered variable taking values from 1 to 5, describing the degree to which respondents know how to operate machines, tools and technical devices
age	explanatory, quantitative variable specifying the respondent's age
educ	explanatory, qualitative, ordered variable taking values from 0 to 15, describing the respondent's education (LFS approach)

Source: own study.

The last action prior to the analysis of data was the reduction of the number of records in the database. In order for the data to be relevant to the issue in question, it was decided to confine the study only to women aged 15 or older. As a result of this procedure, 2,263 individual responses were left in the final file.

Results of the modelling and discussion

Assessment of the model quality

The model designed by means of logistic regression proved to be significant. This means that at the significance level of 0.05, we reject the null hypothesis about the total insignificance of explanatory variables to adopt the alternative hypothesis,

which means that at least one of the variables had a significant impact on the explained variable. Nagelkerke's parameter R^2 of the model is 0.277, denoting that the explanatory variables in the model explain 27.7% as belonging to one of two groups (active and inactive) (Kmieć, 2015). The value of the Hosmer-Lemeshow test is 0.442 and is statistically insignificant, which proves that the model was a good fit to the data. This means that the distribution of probabilities predicted on the basis of the estimated model does not differ significantly from the observed values.

Table 3. Classification table[a]

<table>
<tr><td rowspan="4">Step 1</td><td colspan="2" rowspan="3">Observed</td><td colspan="3">Predicted</td></tr>
<tr><td colspan="2">LFS recoded variable</td><td rowspan="2">Percentage of correct classifications</td></tr>
<tr><td>economically passive</td><td>economically active</td></tr>
<tr><td rowspan="2">LFS recoded variable</td><td>economically passive</td><td>68</td><td>79</td><td>46.3</td></tr>
<tr><td></td><td>economically active</td><td>35</td><td>258</td><td>88.1</td></tr>
<tr><td colspan="4">Total percentage</td><td>74.1</td></tr>
</table>

Note: [a] The division point is 0.500.

Source: own study.

The model, with the division point at $pi>0.5$, correctly classified 74.1% of the observations, including 46.3% of the 0 values – economically inactive (specificity) and 88.1% of the 1 values – economically active (sensitivity). With division point $pi>0.60$, the general correctness of the classification drops to 72.5%, the classification of the 1 values falls to 78.5%, and the percentage of correct classifications of the 0 values increases to 60.5%. It should be remembered that a model without any predictive power correctly predicts at least 50% of the observations. This proves that the designed model is of satisfactory quality and can be the basis for further conclusions.

Table 4. Classification table[b]

<table>
<tr><td rowspan="4">Step 1</td><td colspan="2" rowspan="3">Observed</td><td colspan="3">Predicted</td></tr>
<tr><td colspan="2">LFS recoded variable</td><td rowspan="2">Percentage of correct classifications</td></tr>
<tr><td>economically passive</td><td>economically active</td></tr>
<tr><td rowspan="2">LFS recoded variable</td><td>economically passive</td><td>89</td><td>58</td><td>60.5</td></tr>
<tr><td></td><td>economically active</td><td>63</td><td>230</td><td>78.5</td></tr>
<tr><td colspan="4">Total percentage</td><td>72.5</td></tr>
</table>

Note: [b] The division point is 0.600.

Source: own study.

Similar conclusions follow from the *ROC* (Receiver Operating Characteristic) curve presented below, which is a tool used to assess the correctness of the classifier, providing a combined description of its sensitivity and specificity. It illustrates the relationship between the sensitivity and specificity of a given model. For each possible cut-off point, we calculate the sensitivity and specificity, and then mark the results in a graph. Traditionally, they are marked in a coordinate system, with specificity on the abscissa axis and sensitivity on the ordinate axis (Figure 11). The obtained points are then linked. The more different values of the indicator, the smoother the curve. If equal costs of incorrect classifications are assumed, the optimal cut-off point is the point of the *ROC* curve that is closest to point (0.1). The point with such coordinates is a point with sensitivity equal to 1 (all objects in the selected class were detected) and specificity equal to 1 (no object was erroneously regarded as an object in the distinguished class). If for a certain cut-off point the classes are completely separated and the model indications are good, then the *ROC* curve passes through this point.
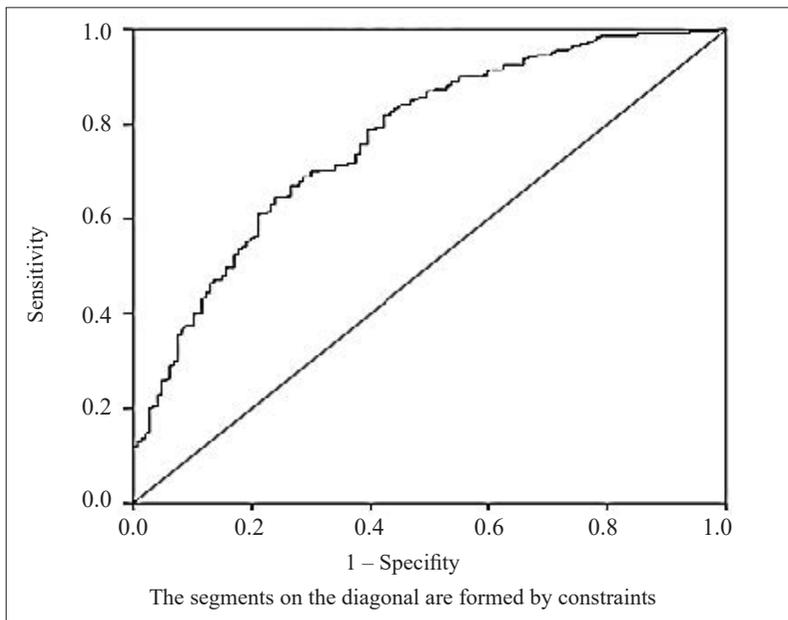
Figure 11. ROC curve

Source: own study.

The area under the ROC curve is designated as AUC (area under curve) and treated as a measure of the quality and validity of a given model. The measured value was 0.77. The high value of this indicator clearly confirms the earlier statement about the high quality of the model.

EVALUATION AND INTERPRETATION OF EXPLANATORY VARIABLES CONTAINED
IN THE MODEL

All variables contained in the model were statistically significant (with significance set at 0.05).

Table 5. Evaluation of variables in the logit model

Variables in the model							
	Specification	β	Standard error	Wald	df	Significance	Exp(β)
Step 1a	Completed education	0.138	0.035	15.689	1	0.000	1.148
	Willingness to take responsibility for the performance of tasks	0.529	0.158	11.141	1	0.001	1.697
	Operation of machines, tools and technical devices	0.291	0.112	6.827	1	0.005	1.338
	"Family 500+" – for how many children	-0.405	0.145	7.834	1	0.005	0.667
	Age	0.077	0.016	21.909	1	0.000	1.080

Source: own study.

Based on the obtained results, using the maximum likelihood method, it can be concluded that:
• along with an increase in education, the likelihood that a woman will be economically active increases by 14.8%, *ceteris paribus*;
• women who are more willing to take responsibility for the performance of tasks have a 69.7% better chance of being economically active, *ceteris paribus*;
• women who better operate machines and technical devices have a 33.8% better chance of being economically active than women who do not have such skills, *ceteris paribus*;
• with age, the likelihood of women's economic activity increases by 8%, *ceteris paribus*;
• the receipt of "Family 500+" benefits reduces the likelihood of the economic activity of women by 33.3%, *ceteris paribus*.

The analysis of the research problem and hypotheses was the pivot and key element of the study. An attempt was made to answer the question of what relationships existed between "Family 500+", in operation since 2016, and the economic activity of women in Poland. The analysis shows that in 2016–2018, the economic activity rate of women in Poland increased, and although this increase was minimal, it cannot be clearly stated that the introduction of the social benefit of PLN 500 per child caused a sudden outflow of women from the labour market.

Nonetheless, it should be noted that in the analysed period more than 210 thousand women aged 25–34 left the labour market. The economic activity rate of women in this age group fell by over 2% in 2016–2018. This is a very alarming signal and evidence that "Family 500+" has an impact on the labour market. Only to a certain extent does this confirm the first research hypothesis that "Family 500+" negatively affects the economic activity of women aged 25–34. As the authors of this paper, we wish to point out that we have failed to prove this hypothesis in a reliable way on the basis of the available statistical data and materials. Nonetheless, according to our own observations and the latest CSO surveys, the "Family 500+" benefit is conducive to economic passivity of young women. The fact that over 30% of families receiving 500+ benefits remain economically passive may mean that around 350–400 thousand adults, including women aged 25–34 and bringing up one child, are unemployed and are not looking for a job (https://gospodarka. dziennik.pl/praca/artykuly/568094,szokujace-dane-gus-niezbedna-reforma-500-plus.html). It can thus be supposed that if "Family 500+" had initially covered all children and had not foreseen an income threshold, the programme would have been neutral for the labour market. The second research hypothesis can, on the other hand, be considered as confirmed. The economic activity rate among women in the poorest voivodships decreased in 2016–2018. The strongest effect could be observed in the Świętokrzyskie, Podlaskie and Lubuskie Voivodships. The case of the Lubuskie Voivodship is particularly interesting as it cannot be classified as one of the poorest in Poland. The economic activity rate of women remained high there and only after the implementation of "Family 500+" in 2016 did it drop significantly.

Summing up the conclusions of the verification of research hypotheses, it can be concluded that "Family 500+" affects the economic activity of women in Poland, in particular younger ones, aged 25–34, who have low educational attainments and live in poorer voivodships. The analysis of micro data from the HCB study has clearly confirmed that "Family 500+" negatively affects the likelihood of being economically active, which holds true not only for women of a certain age or of a certain background but for all those surveyed.

A quantitative approach to the analysis of source material proved to be an effective method to verify the research problem. The analysis of macro data from the Central Statistical Office (CSO) allowed a holistic view on the impact of "Family 500+" on the economic activity of women in Poland.

Undoubtedly, the disadvantages of the study include the use, in some cases, of raw data on the number of economically passive women in Poland. This method of data presentation is strongly exposed to the impact of many other factors, for instance demographic or migration issues. Therefore, the conclusions can only serve to aid more complex analyses of the broadly understood labour market.

Another limitation of the study is certainly the lack of access to micro data from the LFS study – the authors used only data that was aggravated by CSO.

The use of a full set of data concerning the responses of all those surveyed by the Central Statistical Office would allow a more detailed analysis and would not be confined to examining various groups of women separately (age, voivodship, cause of passivity) but rather would allow the design of a comprehensive model in which the relationship between successive factors could be examined, as was done in the logit model based on HCB data.

Without a doubt, a further path that should be followed by researchers studying the impact of "Family 500+" on economic activity of women is a microeconometric analysis of data from the regular panel research. Supplementing quantitative research with a qualitative study, such as in-depth individual interviews or interviews with focus groups, would make it possible to better understand and deepen the knowledge about the issue in question.

Conclusions

The "Family 500+" benefit programme, implemented in 2016, differs from many other public policies in that it has deeply penetrated the awareness of Poles. This probably results from the amount of the benefit, the transparency of this instrument, media coverage and people feeling that this public policy affects them directly (Gromada, 2017, p. 2). Undoubtedly, "Family 500+" has various disadvantages. One of them is the perceived negative impact on economic activity of parents of young children, mainly women. In combination with the parental benefit available since 2016, paid out for a year after childbirth even to mothers who have not previously worked, the additional benefit weakens the willingness to work.

The results of the analysis allow the conclusion that the continuation of "Family 500+" should be subject to a thorough public debate, where all the arguments for and against would be considered. Obviously, this programme has a positive impact on poverty reduction in Poland. Its effect might also be visible in the context of an increased fertility rate. However, it cannot be denied that it also has an influence on the labour market, in particular on the economic activity of women. In particular, the economic passivity of young women who could work is worrying. The analysis makes it possible to conclude that "Family 500+" negatively affects the economic activity of young women aged 25–34 who have low educational attainments and most often live in the poorest voivodships. Therefore, it can be stated that the success in increasing the economic activity of women and fertility rates would be achieved through a state policy that facilitates combining work with having children. If the goal is intense economic activity and a high fertility rate at the same time, taking into account changes in the economic model of today's family, the state should actually support parents in their caring responsibilities by implementing policies fostering women's economic activity

(flexible part-time employment, flexible working hours, etc.), developing a network of nurseries and kindergartens, while introducing provisions that allow mothers and fathers to equally share childcare (longer paid holidays for both parents).

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Summary

The "Family 500+" programme was introduced by the Act on State Aid for Child Support. It differs from many other public programmes in that it has deeply penetrated the general awareness of Poles, which may result from the amount of the benefit, its simplicity, media coverage and the feeling that this policy directly affects people's lives. There are comments about the impact of the programme on the condition of the labour market. It is believed that to some extent it discourages some women from taking up work, thereby potentially causing their economic activity to decline and unemployment to increase over the longer time frame. Undoubtedly, "Family 500+" is already a very large challenge for the state budget. It is highly probable that the huge funding needed to cover benefits will grow each year, constituting an important government transfer.

The goal of the paper is to depict the relationship between "Family 500+" and the economic activity of women in Poland. This study is a research exercise. Quantitative methods were used, including: logistic regression modelling and Holt forecasting. The analysis suggests the conclusion that "Family 500+" has contributed to the reduction of extreme poverty in households with children but also has affected the economic activity of women in Poland, in particular younger ones, aged

25–34 years, who have low educational attainments and live in poorer voivodships. The analysis of micro data from the Human Capital Balance study has clearly confirmed that "Family 500+" negatively affects the likelihood of being economically active, which holds true not only for women at a certain age or of a certain background, but for all those surveyed.

Keywords: labour market, economic activity rate, parental benefits.

Program „Rodzina 500+" a aktywność zawodowa kobiet w Polsce

Streszczenie

Program „Rodzina 500+" został wprowadzony ustawą o pomocy państwa w wychowywaniu dzieci. Różni się on od wielu innych programów publicznych tym, że głęboko przeniknął do powszechnej świadomości Polaków, co może wynikać z wysokości świadczenia, jego prostoty, nagłośnienia medialnego i poczucia, że polityka ta bezpośrednio wpływa na los ludzi. Pojawiają się komentarze dotyczące wpływu wprowadzonego programu na kondycję rynku pracy. Przypuszcza się, że w pewnym stopniu zniechęca on część kobiet do podejmowania pracy, co w konsekwencji może spowodować spadek ich ekonomicznej aktywności oraz wzrost bezrobocia w dłuższym horyzoncie czasowym. Niewątpliwie program „Rodzina 500+" już teraz jest bardzo dużym wyzwaniem dla budżetu państwa. Z dużym prawdopodobieństwem można wnioskować, że olbrzymie kwoty przeznaczane na pokrycie świadczeń będą rosnąć z każdym rokiem, stanowiąc ważny transfer rządowy.

Celem artykułu jest uchwycenie zależności między programem „Rodzina 500+" a aktywnością zawodową kobiet w Polsce. Artykuł ma charakter badawczy. Skorzystano z metod ilościowych: między innymi modelowania przy pomocy regresji logistycznej oraz prognozowania metodą Holta. Z przeprowadzonej analizy można wnioskować, że program „Rodzina 500+" przyczynił się do zmniejszenia ubóstwa skrajnego w gospodarstwach domowych z dziećmi, ale także wpłynął na aktywność zawodową kobiet w Polsce, w szczególności tych młodszych, z grupy wiekowej 25–34 lata, legitymujących się niskim wykształceniem i zamieszkujących biedniejsze województwa. Analiza mikrodanych pochodzących z badania Bilans Kapitału Ludzkiego dobitnie potwierdziła, że program „Rodzina 500+" negatywnie wpływa na prawdopodobieństwo bycia aktywną zawodowo, nie tylko wśród kobiet w określonym wieku czy pochodzeniu, ale wszystkich uczestniczących w badaniu.

Słowa kluczowe: rynek pracy, współczynnik aktywności zawodowej, świadczenia wychowawcze.

JEL: H40, H53, J13.