

Impact of a child's disability on the probability of the mother taking up paid employment

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Abstract. Performing paid work is beneficial in many ways, but not every person has equal access to it because of their social and economic situation. Discrepancies in this field are especially visible in the case of mothers. The aim of the study is to assess the impact of the child's disability on the probability of the mother taking up paid employment. The empirical analysis used a decomposition method derived from the Blinder and Oaxaca approach and the logistic regression. The analysis was based on individual household-level data from the representative Household Budget Survey for the years 2005–2020. When analysing the average from all the years, the employment rate of mothers of children without disabilities reached 70.9%, and that of mothers of children with disabilities only 40.2%. This gap was widening throughout the studied period. The lower employment rate among mothers of children with disabilities is caused in the most part directly by the child's disability (and the resulting factors). However, the variable that had the greatest impact on the economic activity in both groups of mothers was education.

Keywords: employment rate, mothers of children with disabilities, Blinder-Oaxaca decomposition, logistic regression

JEL: J21, C21, I38

Wpływ niepełnosprawności dziecka na prawdopodobieństwo podjęcia pracy zawodowej przez matkę

Streszczenie. Praca zawodowa daje wiele korzyści, jednak nie wszyscy mają do niej równy dostęp ze względu na uwarunkowania społeczne i ekonomiczne. Nierówności w dostępie do pracy są szczególnie widoczne wśród matek. Celem badania omawianego w artykule jest ocena wpływu niepełnosprawności dziecka na prawdopodobieństwo podjęcia pracy zawodowej przez matkę. W analizie empirycznej wykorzystano metodę dekompozycji wywodzącą się z podejścia Blindera i Oaxaki oraz regresję logistyczną. Posłużono się jednostkowymi danymi za lata 2005–2020 dotyczącymi gospodarstw domowych, pochodzącymi z reprezentacyjnego badania budżetów gospodarstw domowych. Przeciętny wskaźnik zatrudnienia matek dzieci bez niepełnosprawności wynosił 70,9%, a matek dzieci z niepełnosprawnościami – 40,2%. Różnica jego wartości pomiędzy badanymi grupami matek zwiększała się w ciągu analizowanego okresu. Niższy wskaźnik zatrudnienia wśród matek dzieci z niepełnosprawnościami wynikał przede wszystkim z niepełnosprawności dziecka (i czynników, które są tego skutkiem). Zmien-

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ną, która miała największy wpływ na aktywność zawodową matek w obu grupach, było wykształcenie.

Słowa kluczowe: wskaźnik zatrudnienia, matki dzieci z niepełnosprawnościami, dekompozycja Blindera-Oaxaki, regresja logistyczna

1. Introduction

Work is an inseparable element of human life. Even though it involves effort on the part of the working person, it has substantial value in material, social and emotional terms. Work guarantees income and this, in most cases, makes it possible for the working person to satisfy the current and future needs of the household members (Giddens, 2008; Szyszka, 2016). The level of income marks the status of a household in society (Szymczak & Gawrycka, 2015). As regards individuals, work often gives them financial independency, increases the level of self-fulfilment, and improves the person's status in the family (Kuchařová, 1999; Sarkisian & Gerstel, 2004; Szyszka, 2016). In most cases, work also guarantees personal development, involves contacts with other people and helps to build self-identity and self-esteem (Giddens, 2008; Szyszka, 2016). Last but not least, work gives a feeling of safety through the provision of income (Gasińska, 2016).

Raising the share of women in the labour market and increasing the employment rate among women was one of the fundamental goals related to the labour market in the European Union. The 'Europe 2020' strategy set the target employment at 75% of the population aged 20–64 by 2020, which was possible to achieve by increasing the economic activity of women (European Commission, 2017). In Poland in 2005, the employment rate of women aged 25–49 was 66.1%, so one of the lowest in the EU. There were only four other countries where fewer women from this age group were employed, namely Spain, Greece, Italy and Malta. In 2020, the employment rate of women aged 25–49 grew in Poland to 76.7%, which promoted the country to 15th place among the 27 EU member states.

To compare, the three countries with the lowest employment rate among women aged 25–49 in 2005, i.e. Spain (64.5%), Greece (60.8%) and Italy (59.5%), still occupied the last three places 15 years later, with only a slight improvement in the case of Spain and Greece (68.0% and 58.7%, respectively), and a slight deterioration in the case of Italy (58.7%).

The economic activity of mothers is determined by a number of factors. An important group of such factors results from the culture of a given country and the traditional role of a woman in the family, as well as stereotypes related to women's work (Kurowska, 2012; Mosseri, 2021; Pufal-Struzik, 2017). Another group of determiners is directly related to the mother's resources, but also beliefs. Kurowska (2012) refers to the 'preference theory' (after C. Hakim), in which three groups of

women are distinguished: children- and home-oriented, work-oriented, and the combination of the two. Pufal-Struzik (2017) points to internal barriers, such as the lack of faith in one's abilities or fear of social rejection. Since women perform most of the care-related tasks in families (Klaus & Vogel, 2019), the volume of care burden is an important determiner of their economic activity (Perry-Jenkins & Gerstel, 2020; Pollmann-Schult, 2015).

Another group of factors influencing women's economic activity relates to the broadly understood household, i.e. the number of children (Boushey, 2008), the partner's income (Kurowska, 2012), and the support from other family members, which is particularly important when institutional support is lacking (Amah, 2021). An important role in this context is also played by factors resulting from the availability of state aid and effective family policy (Hegewisch & Gornick, 2011; Kay, 2000; Windebank, 2012). Legal regulations on paternity leave, flexible working hours and the access to institutional care all have a positive impact on the economic activity of women raising children (Castro-García & Pazos-Moran, 2016; Haasa & Hwang, 2008; Hegewisch & Gornick, 2011). However, state support should be distributed in a balanced way, because, as Misra et al. (2011) indicate, too long parental leaves might discourage employers from hiring employees raising children, and too high benefits may stifle the beneficiaries' willingness to return to the labour market.

Studies on the economic activity of mothers of children with disabilities show that paid work has an additional significance in their case. It benefits not only the mother, but the child with a disability and the family as a social unit as well. Engaged in performing her job, the mother can take a break from her everyday problems. It is likely to help her gain some distance to her situation and a different perspective on life. The mother's paid employment contributes to the improvement of the quality of life of the entire family (Komorowska & Kozłowski, 2021).

According to studies carried out in the United States, the health-related quality of life of mothers of children with a disability who were economically active was higher than the health-related quality of life of such mothers who did not work (Bourke-Taylor et al., 2011). As shown by the studies on families with an adult intellectually disabled person (Komorowska & Kozłowski, 2021), the fact that the mother is engaged in work and has less time for other obligations increases the independence of her child, and this translates to the improved quality of life of the entire family. The simulation of the future retirement pension of a mother of a child with a disability who is economically active and the one who receives the nursing benefit¹ indicated that the mother who is economically inactive will receive a significantly

¹ The nursing benefit is the benefit granted to the child's carer when they give up paid employment to take care of the child (legal status as of 26.04.2023).

lower future retirement pension (Borski, 2019; Gierusz & Komorowska, 2022). The smaller retirement pension, in turn, is very likely to translate into the lower quality of life of the family members (Główny Urząd Statystyczny [GUS], 2020).

The aim of the study is to assess the impact of the child's disability on the probability of the mother taking up paid employment. The analysis covers the period of 2005–2020 and encompasses the study of the employment rate as such and factors affecting it, in order to distinguish the causes of discrepancies resulting from different distributions of independent variables from the ones resulting from the sole fact of the child's disability. Banaszkiwicz et al. (2019) already performed a similar study for Poland, but it was limited to a single year and involved slightly different methods of analysis.

2. Research method

The empirical analysis uses unit data from the Household Budget Survey (HBS) procured from Statistics Poland for the years 2005–2020.² We chose this particular survey because it collects data on all the members of households participating in the it including information about disability certificates and the economic activity³ of household members. Additionally, the HBS shows kinship relations between household members. Among all the households participating in the HBS in a given year, the ones with at least one child aged 0–18 and his/her biological mother were selected for further analyses.

We studied the characteristics taken from the individual study of mothers and the characteristics of the entire household (also individual characteristics of other persons, if they were of significance to the mother's situation, e.g. the age of the youngest child). Another filtering factor was the mother's employment status: the study took into consideration the mothers who either were, or potentially could be, in paid employment, i.e. the persons who labelled themselves as 'working', 'working, but temporarily absent from work', 'unemployed', 'running the household', or

² The period of the analysis encompasses the first year of the COVID-19 pandemic (2020), when the performance of the HBS was slightly different than in previous years. First of all, the recruitment and interviews with the respondents, instead of being carried out in person, were made via telephone; not all of the sampled units were interviewed, and the resulting deficiencies were compensated by additional weighing (GUS, 2021). The results received for 2020 may thus differ from prior trends, and if this is the case, these divergences result from a change both in the method used by the HBS and in the overall life situation of the respondents, related to the pandemic. Therefore, the results for that year have to be treated with particular caution.

³ It should be noted, however, that the HBS is not specifically designed for the labour market statistics and the question regarding economic activity is not the one recommended by the International Labour Organization. Therefore, the general employment rates mentioned in the Introduction, which are based on the Labour Force Survey, should not be compared with the employment rates estimated below. For the purpose of the comparative analysis in this study, however, the definitions used in the HBS are sufficient.

‘other’ (the first two groups constituted the ‘in paid employment’ category, while the remaining three made up the ‘not in paid employment’ category). The analysis excluded persons who labelled themselves as ‘pensioner, retired’, ‘student, pupil’ or ‘incapable of working’ (in total, there were 3.5% of such persons). The study unit was the child’s mother.

The studied variable (dependent variable) was the binary variable indicating whether the mother performed paid work (1 – yes, 0 – no). The grouping variable was the occurrence of a disability⁴ in a child below 18 years of age. Based on the literature (Banaszkiewicz et al., 2019; Brown & Clark, 2017; Komorowska, 2017b; Komorowska & Kozłowski, 2021; Sapkota et al., 2017), the experience of one of the authors (cares for a child with a disability) and the availability of data, additional independent variables which were likely to affect the mother’s economic activity were singled out. These variables and their variants were:

- education level (lower secondary or below; basic vocational; upper secondary; tertiary);
- age of the youngest child (in 3-year intervals);
- age of the mother in years ([15, 25); [25, 35); [35, 45); [45, 55); 55+);
- class of locality (rural area; town with less than 20,000 inhabitants; town with 20,000–99,000 inhabitants; city with 100,000–199,000 inhabitants; city with 200,000–499,000 inhabitants; city with 500,000 and more inhabitants);
- number of children (1; 2; 3+);
- number of other adults in the household (0; 1; 2; 3+);
- spouse (partner) lives in the household (yes; no).

The main object of the analysis is the employment rate, defined for the needs of the study as the ratio of the number of mothers in paid employment to the number of all mothers in the study population. Based on the representative study, this rate may be estimated in the following way (Hájek estimator):

$$\hat{Y} = \frac{\sum_{i=1}^n w_i y_i}{\sum_{i=1}^n w_i}, \quad (1)$$

where:

y_i is the value of variable y for the i -th individual ($y_i = 1$, if the mother is in paid employment, $y_i = 0$, if the mother is not in paid employment),

w_i is the weight assigned to the i -th individual (resulting from the sampling design and potential adjustments),

n is the sample size.

⁴ In the HBS, the question about disability refers to whether a person has a certificate of disability (legal status).

The employment rate of mothers who are bringing up children with disabilities is different than that of mothers of children without disabilities. This discrepancy might be both caused by the sole fact of the child's disability (and the resulting specific situation of the mother, e.g. the necessity of providing continuous care to the child), as well as by other distributions of the independent variables (that affect the probability of the mother taking up work) in the two groups of mothers, which is not a direct consequence of the child's disability.

To estimate the share of a given source of variability in the total difference between the rates, we proposed a decomposition analogous to the one put forward independently by Blinder (1973) and Oaxaca (1973). The original proposals of Blinder and Oaxaca involved the decomposition of the difference in mean salaries of two groups of employees (separated on the basis of sex and skin colour), and its goal was to estimate the scale of discrimination against women and persons of colour. Since then, several other applications of this decomposition have been proposed and the methodology was generalised with respect to measures other than the mean. A review of such proposals can be found in Fortin et al. (2011).

While examining differences in the employment rates of mothers of children with disabilities and mothers of children without disabilities, the original decomposition method might be presented as follows:

$$\begin{aligned} \bar{Y}_{non} - \bar{Y}_{dis} &= \bar{X}_{non}^T \hat{\beta}_{non} - \bar{X}_{dis}^T \hat{\beta}_{dis} = \\ \bar{X}_{non}^T \hat{\beta}_{non} - \bar{X}_{dis}^T \hat{\beta}_{dis} &+ \bar{X}_{non}^T \hat{\beta}_{dis} - \bar{X}_{non}^T \hat{\beta}_{dis} = \\ (\bar{X}_{non}^T - \bar{X}_{dis}^T) \hat{\beta}_{dis} &+ \bar{X}_{non}^T (\hat{\beta}_{non} - \hat{\beta}_{dis}), \end{aligned} \quad (2)$$

where:

$\bar{Y}_{non}, \bar{Y}_{dis}$ are the employment rates in the sample of mothers of children without disabilities and mothers of children with disabilities, respectively,

$\bar{X}_{non}^T, \bar{X}_{dis}^T$ are the vectors of mean values of independent variables in the sample of mothers of children without disabilities and mothers of children with disabilities, respectively (one of these variables is in the form of 1 for every individual to account for the constant term in the linear model),

$\hat{\beta}_{non}, \hat{\beta}_{dis}$ are the vectors of the estimated linear regression coefficients in the sample of mothers of children without disabilities and mothers of children with disabilities, respectively.

In the last row of equation (2), the first element $(\bar{X}_{non}^T - \bar{X}_{dis}^T) \hat{\beta}_{dis}$ means the difference between the employment rates which results from different values of independent variables in the compared groups in the model adopted for the dependent variable. This is the part explained by different structures of the two populations which is called the composition effect or the endowment effect. The

second part of the last row of equation (2), $\bar{\mathbf{X}}_{non}^T (\hat{\boldsymbol{\beta}}_{non} - \hat{\boldsymbol{\beta}}_{dis})$, means the difference between the employment rates which is solely the consequence of the fact of belonging to the first or the second group (and of the resulting different probabilities of employment, dependent on the variants of independent variables) and is called, among other names, the structure effect or the unexplained residual. In the original works of Blinder and Oaxaca, it was the measure of wage discrimination. However, it must be remembered that the size of the unexplained residual is affected both by the fact of belonging to a specific group (here: women bringing up children with or without a disability) and by differences in the values of independent variables, which were not included in the model.

Additionally, attention should be paid to the value of $\bar{\mathbf{X}}_{non}^T \hat{\boldsymbol{\beta}}_{dis}$, which is the counterfactual employment rate of mothers of children with disabilities, i.e. the employment rate that would be achieved by those mothers if they had the same average values of independent variables as the mothers of children without disabilities.

In our study, the decomposition refers to differences in fractions, and a fraction is also a mean. Thus the application of the original proposals of Blinder and Oaxaca were possible. However, we did two modifications for the purpose of the analysis. First, we included the weights resulting from the fact that the data derive from a random sample (where the probability of individuals getting into a sample was different for each individual) in a similar way as Anastasiade and Tillé (2017). The second modification is the consequence of the fact that the studied variable is binary and thus the use of a linear model might not be appropriate. Because of that, the model of logistic regression was applied,⁵ while the decomposition was made in the way similar to what Fairlie (2005) proposed:

$$\hat{Y}_{non} - \hat{Y}_{dis} = \left[\frac{\sum_{i=1}^{n_{non}} F(\mathbf{X}_{non,i}^T \hat{\boldsymbol{\beta}}_{dis}^{(w)}) w_i}{\sum_{i=1}^{n_{non}} w_i} - \frac{\sum_{i=1}^{n_{dis}} F(\mathbf{X}_{dis,i}^T \hat{\boldsymbol{\beta}}_{dis}^{(w)}) w_i}{\sum_{i=1}^{n_{dis}} w_i} \right] + \left[\frac{\sum_{i=1}^{n_{non}} F(\mathbf{X}_{non,i}^T \hat{\boldsymbol{\beta}}_{non}^{(w)}) w_i}{\sum_{i=1}^{n_{non}} w_i} - \frac{\sum_{i=1}^{n_{non}} F(\mathbf{X}_{non,i}^T \hat{\boldsymbol{\beta}}_{dis}^{(w)}) w_i}{\sum_{i=1}^{n_{non}} w_i} \right], \tag{3}$$

where:

$\hat{Y}_{non}, \hat{Y}_{dis}$ are the estimates of the employment rate according to formula (1) for the population of mothers of children without disabilities and mothers of children with disabilities, respectively,

⁵ For the sake of comparison, the entire analysis was performed by means of a linear model, and the results were very similar.

$X_{non,i}^T, X_{dis,i}^T$ are the vectors of the values of independent variables for the i -th individual in the sample of mothers of children without disabilities and mothers of children with disabilities, respectively,

$\hat{\beta}_{non}^{(w)}, \hat{\beta}_{dis}^{(w)}$ are the vectors of the estimated weighted logistic regression coefficients in the sample of mothers of children without disabilities and mothers of children with disabilities, respectively,

n_{non}, n_{dis} are the sizes of samples of mothers of children without disabilities and mothers of children with disabilities, respectively, and

F is the cumulative distribution function of the logistic distribution.

In the above equation, the summing is made for the individuals that belong to a given group, which is indicated by the summation limit (n_{non} or n_{dis}). The counterfactual employment rate of mothers with children with disabilities is, in this case, calculated as $\frac{\sum_{i=1}^{n_{non}} F(X_{non,i}^T \hat{\beta}_{dis}^{(w)}) w_i}{\sum_{i=1}^{n_{non}} w_i}$, i.e. it is the weighted average of the estimated probabilities of taking up paid work for a sample of mothers of children without disabilities with the use of the dependences observed in the sample of mothers of children with disabilities.

An additional analysis in the study involves the direct use of the logistic regression model (Harrell, 2015) to model the probability of the mother taking up paid work. In this case, given the relatively small size of the sample of mothers of children with disabilities, two approaches were adopted. The first one consisted in estimating two models using pooled data from all the studied years, one for mothers of children with disabilities and one for mothers of children without disabilities. The second involved estimating the models separately for each year but combining the set of mothers of children with disabilities with the set of mothers of children without disabilities, and adding an explanatory dummy variable indicating whether the particular mother's child has a disability. The weights resulting from the sampling design and subsequent calibration were also used in the models.

Some comparisons of the distributions of explanatory variables were made using the overlap coefficient Z as a slightly modified version of Weitzman's measure (Weitzman, 1970). The formula for the coefficient for variable p reads:

$$Z_p = \frac{\sum_k \min(f_{p,non,k}, f_{p,dis,k})}{\sum_k \max(f_{p,non,k}, f_{p,dis,k})}, \quad (4)$$

where:

$f_{p,non,k}$ is the proportion of mothers of children without disabilities with variant k of variable p , and

$f_{p,dis,k}$ is the proportion of mothers of children with disabilities with variant k of variable p .

The coefficient measures the similarity of (discrete) distributions of a variable between two groups (here: mothers of children with disabilities and mothers of children without disabilities). The coefficient is constrained to the range $[0, 1]$. $Z = 0$ means that the distributions are completely different, while $Z = 1$ indicates that the distributions are exactly the same.

3. Employment rate of mothers in the studied period

The estimated⁶ number of mothers meeting the criteria presented above averaged 5.08 million, including 231,000 mothers who brought up children with disabilities. In the sample from the HBS, the number of mothers was systematically decreasing. In 2006 (the year with the largest number of mothers taking part in the HBS), there were 15,623 of them, and in 2020 only 10,675 (in 2020, the sample in the HBS was generally smaller than expected, yet the number of mothers with children studied in that year did not differ significantly from the negative trend observed in preceding years). These numbers also include mothers of children with disabilities, whose number decreased as well (670 on average between 2005 and 2007, 550 on average between 2017 and 2019, and only 407 in 2020).

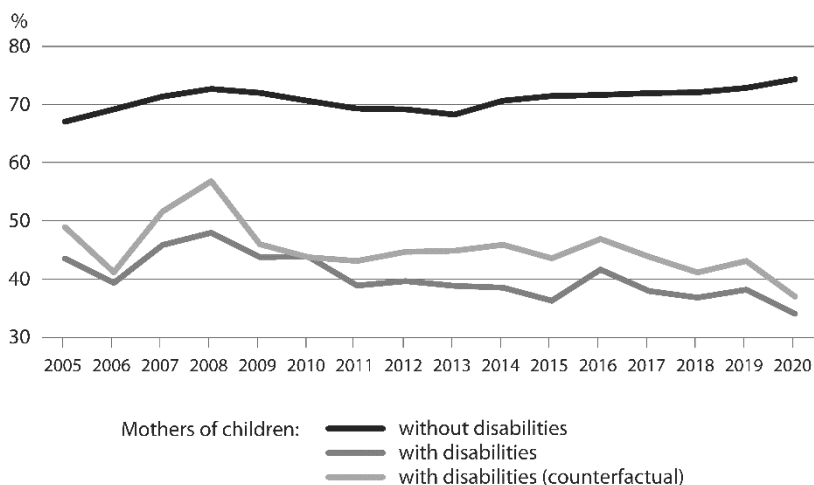
The employment rate of mothers was calculated as the estimated number of working mothers divided by the estimated number of mothers in the study population. There were two occurrences of a change in the trend of the employment rate of mothers of children without disabilities in the studied period (cf. Figure). Until 2008, their employment rate was increasing (from 67.1% in 2005 to 72.7% in 2008). Subsequently, it started decreasing, and dropped to 68.3% in 2013. Later, it returned to an upward trend, in 2020 reaching 74.3%. Changes in the employment rate of mothers bringing up children in this period were analogous to the changes in the employment rate of women in general in the 25–34 and 35–44 age groups, while they differed slightly from the changes in the employment rate in general, in the case of which no significant drop after the outbreak of the crisis of 2008 was observed (GUS, 2022).

A different dynamic of changes throughout the studied period could be observed in the case of mothers bringing up children with disabilities. Disregarding any

⁶ On the basis of the weights assigned to the study units in the HBS, it is possible to estimate the size of the studied population. Such weights are calculated by Statistics Poland and result both from the fact that a sample was selected by a composite sampling scheme (design weights), as well as from additional adjustments that make use of auxiliary information, aimed at reducing the sampling error and some non-random errors (calibration weights; GUS, 2018).

greater irregularities in the rate values, which result from a larger sampling error caused by a much smaller size of the sample, the overall tendency shows a definite decrease. In the best years of 2007 and 2008, the employment rate in this group of mothers exceeded 45%, while after 2011 it remained below 40%, with the exception of 2016. As a consequence, the difference in the employment rate of mothers of children with disabilities and mothers of children without disabilities, already significant at the beginning of the study period, widened even more over its course. Before 2010, this difference did not exceed 30 p.p.; between 2011 and 2016 it was approximately 30 p.p., and from 2017 to 2020 it exceeded 30 p.p. (in the latter year, it grew to over 40 p.p., but it was a specific year due to the pandemic, as mentioned above).

Figure. Employment rate of mothers, depending on whether their child has / does not have a disability



Source: authors' calculation based on the HBS data.

It should be mentioned that among mothers in paid employment, the percentage of those who worked part-time was gradually decreasing. As regards mothers of children without disabilities, 15.2% of them worked part-time in 2005, and only 7% in 2020. The same negative trend occurred among mothers of children with disabilities, but their part-time-working percentage was in most cases approximately 5–10 p.p. higher than that of mothers of children without disabilities (in 2005–2007, 22.6% on average, and in 2018–2020, 14.1%).

The employment rate differs depending on the characteristics of the mother and her overall life situation (independent variables). Changes observed over time might result both from the changes in the frequency of taking up work in various groups of mothers and from changes in the composition of the population of mothers. The

greatest changes in the distribution of explanatory variables in the sample of all mothers throughout the study period were observed as regards the education level. Throughout the study period, the share of mothers with tertiary education grew sharply (from 15.2% in 2005 to 44.8% in 2020), which caused changes in the numbers of mothers with lower levels of education. The proportion of mothers with basic vocational education decreased in the studied period (from 32.7% in 2005 to 17.5% in 2020), as did the proportion of mothers with upper secondary education (from 38.5% in 2005 to 33.7% in 2020), and lower secondary or below education (from 12.7% in 2005 to 3.9% in 2020).

In the case of the mother's age, the share of mothers in the [35, 45] age range was continuously growing (from 38.7% in 2005 to 48.3% in 2020) at the expense of all other age ranges. As regards the age of the youngest child, an increase in the share of youngest children was observed (in the [0, 3) and [3, 6) age ranges) and a drop in the share of the oldest children (in the [12, 15) and [15, 18) ranges). For every age range, these were changes of several percentage points throughout the entire period studied.

With respect to the number of children, a continuous decrease in the number of mothers with three or more children was observed (the share of such mothers dropped from 17.3% in 2005 to 12.8% in 2020), whereas at the same time the number of mothers with two children increased (from 35.8% in 2005 to 40.5% in 2020). Similar tendencies occurred in the case of the number of other adult persons in the household, apart from the mother. The share of households where there were additionally two or three or more other adults decreased, while at the same time the share of households where there was only one other adult person increased. In each case, the changes were regular, yet not very strong.

When comparing the distributions of independent variables among households of mothers of children with disabilities and households of mothers of children without disabilities, the greatest differences could be observed with respect to the number of children and the mothers' education level. The average overlap coefficients for these characteristics stood at 0.676 and 0.750, respectively. The difference in the number of children consisted in the fact that among mothers of children with disabilities, the share of mothers with three and more children was higher, while the share of mothers with one child was lower. These disparities came to be reduced over the years: at the beginning of the study period, they totalled 20 p.p., whereas at the end of it, they decreased to 15 p.p. As far as differences in the level of education are concerned, among mothers of children with disabilities, the share of those with tertiary education was smaller than the share of persons with tertiary education among mothers of children without disabilities. On the other hand, the proportion of persons with basic vocational or lower education among mothers of children with disabilities was larger than this proportion among mothers of children without disabilities (the difference in the 'tertiary' category in the majority of years exceeds 10 p.p.).

4. Decomposition of differences in the employment rate

In general, the differences in the distributions of independent variables between the two groups of mothers resulted in the observable employment rate among mothers of children with disabilities lower almost every year (except 2010) than the counterfactual index, i.e. the rate that would have been observed if the average levels of independent characteristics had been the same as for mothers of children without disabilities (cf. Figure). This means that the mothers of children with disabilities more often had the attributes associated with lower employment rates (e.g. lower level of education). The detailed results of the decomposition carried out in line with equation (3) are presented in Table 1. In the logistic regression models, explanatory variables listed earlier in the paper were used, except for the 'spouse (partner) in the household', which turned out to be statistically insignificant for both groups of mothers.

Table 1. Detailed results of the decomposition of differences in the employment rate

Year	\hat{Y}_{non}	\hat{Y}_{dis}	$\hat{Y}_{non} - \hat{Y}_{dis}$	Composition effect	Unexplained residual	\hat{Y}_{dis} (counterfactual)
2005	0.671	0.435	0.236	0.054	0.182	0.489
2006	0.692	0.393	0.299	0.019	0.280	0.412
2007	0.714	0.458	0.255	0.057	0.198	0.516
2008	0.727	0.480	0.247	0.088	0.159	0.568
2009	0.720	0.438	0.282	0.022	0.260	0.460
2010	0.706	0.438	0.268	-0.001	0.269	0.437
2011	0.693	0.389	0.304	0.042	0.262	0.431
2012	0.692	0.396	0.295	0.050	0.245	0.447
2013	0.683	0.388	0.295	0.060	0.234	0.448
2014	0.707	0.385	0.321	0.074	0.248	0.459
2015	0.715	0.362	0.352	0.073	0.279	0.435
2016	0.716	0.416	0.300	0.052	0.248	0.469
2017	0.719	0.379	0.340	0.059	0.281	0.438
2018	0.721	0.368	0.353	0.043	0.310	0.411
2019	0.729	0.382	0.347	0.049	0.298	0.431
2020	0.743	0.340	0.403	0.030	0.374	0.370
Overall	0.709	0.402	0.307	0.043	0.264	0.445

Note. \hat{Y}_{non} and \hat{Y}_{dis} are the estimates of the employment rate according to formula (1) for the population of mothers of children without disabilities and mothers of children with disabilities, respectively.

Source: authors' calculation based on the HBS data.

When analysing all the years together, the employment rate of mothers of children without disabilities was 70.9%, and that of mothers of children with disabilities 40.2%. The difference (30.7 p.p.) is predominantly the result of having a child with a disability (and potentially also the consequence of other explanatory variables, which were not included in the model), which altogether accounts for 26.4

p.p., i.e. 85.8% of the difference. The remaining 4.4 p.p., i.e. 14.2% of the difference, results from different distributions of explanatory variables. We can therefore see that the differences in the distributions of independent variables are responsible for the difference in the employment rates between the analysed groups of mothers only to a relatively small degree. It may thus be concluded that the much lower employment rate of mothers of children with disabilities is in the largest part caused directly by the child's disability and the resulting factors (see the 'Discussion' section).

5. Probability of the mother taking up paid work

With a view to assessing the type of impact of the socio-demographic characteristics of the mother and her environment on the probability of taking up paid work, the parameters of the logistic regression model were assessed, separately for mothers of children with disabilities and mothers of children without disabilities. Given the small size of the sample of mothers of children with disabilities, the results of the estimation of parameters in individual years were considerably varied. On average, however, no significant changes were observed in the study period in either group of mothers (apart from some exceptions, discussed below), so only the results for the models performed on the data for all the years together are presented in this work. Table 2 contains the evaluation of the impact of every variant of the independent variable on the probability of the mother taking up paid work. To illustrate this impact more clearly, it was shown in the form of points, as used in credit scoring (Jackowska & Wycinka, 2011; Thomas et al., 2002). The estimates of the parameters were transformed into points in such a way that their range fell between 0 and 100. The more points scored by a mother with a given attribute, the more probable it was that she would take up paid work. This way, the impacts of individual variants became easy to compare.

Table 2. Points for the characteristics in the logistic regression models for the probability of the mother taking up paid work

Variable	Variant	Points (and standard errors in brackets) in the model for mothers of children	
		without disabilities	with disabilities
Education level	lower secondary or below	0 (1.3)	0 (6.0)
	basic vocational	24 (1.1)	16 (5.4)
	upper secondary	47 (1.0)	40 (5.2)
	tertiary	100 (1.0)	100 (5.2)
Age of the mother in years	[15, 25)	0 (1.2)	0 (10.7)
	[25, 35)	28 (0.8)	23 (4.7)
	[35, 45)	41 (1.0)	41 (5.2)
	[45, 55)	26 (1.2)	35 (5.9)
	[55+)	10 (2.3)	26 (9.7)

Table 2. Points for the characteristics in the logistic regression models for the probability of the mother taking up paid work (cont.)

Variable	Variant	Points (and standard errors in brackets) in the model for mothers of children	
		without disabilities	with disabilities
Age of the youngest child in years	[0, 3)	0 (1.0)	0 (5.2)
	[3, 6)	31 (1.0)	18 (4.7)
	[6, 9)	49 (1.0)	31 (4.5)
	[9, 12)	59 (1.0)	34 (4.4)
	[12, 15)	67 (1.1)	52 (4.7)
	[15, 18]	70 (1.0)	55 (4.6)
Class of locality	rural	13 (1.0)	30 (5.2)
	urban: ≥20k	0 (1.1)	0 (5.7)
	20– 99k	1 (1.1)	8 (5.3)
	100–199k	1 (1.2)	11 (6.2)
	200–499k	4 (1.2)	9 (6.1)
	>500k	18 (1.2)	7 (6.2)
Number of children	1	17 (1.0)	3 (5.2)
	2	10 (0.9)	9 (4.6)
	3+	0 (0.9)	0 (4.2)
Number of other adults in the household	0	13 (1.6)	0 (6.5)
	1	0 (1.0)	6 (5.2)
	2	2 (1.1)	6 (5.7)
	3+	2 (1.1)	8 (5.8)

Source: authors' calculation based on the HBS data.

The variable which had the greatest impact on the probability of the mother taking up paid work, both in the case of mothers of children without disabilities and mothers of children with disabilities, was the mother's education level. Only in the case of this variable the maximum of points (i.e. 100) was possible to achieve – for mothers with tertiary education. The basic vocational and upper secondary education in the case of mothers of children with disabilities translated into fewer points and thus increased their chances to take up paid work to a lesser degree (in comparison to the lower secondary or below education) than it was the case in the case of mothers of children without disabilities.

The age of the youngest child, irrespective of whether or not he/she had a disability, proved significant for the mother's economic activity. The dependence between the probability of taking up paid work by the mother and the age of her youngest child was positive: the older the child, the greater the probability that the mother would take up paid work (the points for subsequent age ranges of the child increase in a strictly monotonic way).

As regards the mother's age, the youngest mothers in the [15, 25) age range had the lowest chance for paid work, whereas those in the [35, 45) age range had the highest. When comparing the impact of this characteristic on our two groups of mothers, it can be noted that the mothers of children with disabilities have a slightly

lower chance of taking up work at a younger age [25, 35) than the mothers of children without disabilities, but a significantly higher chance when they are aged 45 and older.

The remaining variables in the model have a significantly lower impact on the probability of taking up paid work, which is reflected in the scope of points which might be received for the extreme variants of a given variable. However, all the explanatory variables are statistically significant, based on Wald χ^2 statistics, with the exception of the 'number of other adults in the household' for the mothers of children with disabilities. Additionally, Table 3 presents the quality measures of the models, which indicate that both models in total have a statistically significant impact on the dependent variable, but the degree of their fit to data is moderate.

Table 3. Quality measures of logistic regression models for the probability of the mother taking up paid work

Specification	Model for mothers of children	
	without disabilities	with disabilities
Number of observations	203,465	9,391
Nagelkerke R^2	0.20	0.16
Area under the curve (AUC)	0.73	0.69
Likelihood ratio test $\chi^2_{v=22}$	30,894.628 $p < 0.0001$	1,150.148 $p < 0.0001$

Source: authors' calculation based on the HBS data.

To demonstrate the changes in time in the impact of individual independent variables, separate models, analogous to the ones presented above, were prepared from samples from every year. However, because of a small size of the sample of mothers of children with disabilities, only one model for each year was made per the sample in total, where a binary explanatory variable was added, indicating whether the mother was raising a child with or without a disability. When interpreting the results of these models using the same convention of points for individual variants of variables (range 0–100), it can be seen that, in the majority of cases, the individual variants of variables retained their relative significance. Certain fluctuations occurred, but they did not initiate longer trends.

Nevertheless, there were two exceptions to this rule. The first was the binary characteristic indicating if the mother had or did not have a child with a disability. The range of points for the variants of this variable, and thus its significance, increased over the years. Each year within the studied period, bringing up a child with a disability added 0 points, while bringing up a child without a disability contributed a growing number of points (36 points in 2005 and 76 points in 2020). As regards the odds ratio, the values amounted to 2.45 in 2005 and 5.46 in 2020. This means that the odds of paid work for a mother of a child without a disability was

2.54 times higher in 2005 and 5.46 times higher in 2020 than the odds of paid work for a mother of a child with a disability in the same period.

The second exception was the 'class of locality' variable and its 'rural' variant. The chance of getting paid work for the residents of rural areas dropped sharply in the study period. Between 2005 and 2007, this variant of the place of residence was able to contribute 27–28 points (most from all variants of this variable), while at the end of the study period, between 2019 and 2020, it became the least advantageous variant for which no points could be received. Therefore, even though the score for the 'rural' variant, presented in Table 2, shows its relatively positive impact on the mother's chance of taking up paid work, it has to be remembered that this is the averaged value for all years. At the same time, we have to bear in mind that the place of residence was one of the least significant variables in the model.

6. Discussion

A positive diagnosis of a child's disability brings changes of the emotional, professional and financial character to the entire life of his or her family. The additional obligations related to the child's rehabilitation, treatment and care resurface. It is often the case that the expenses on the medications and supplementary classes or treatment supporting the child's development are higher than those borne by the parents of children without disabilities (Komorowska, 2017b). Often, one of the carers – most often the mother⁷ – either gives up her professional activity entirely or limits it for the sake of caring for the child (Komorowska, 2017b; Komorowska et al., 2019). In the case of children with intellectual disability, many mothers leave the labour market for an extended period of time, sometimes permanently (Chou et al., 2018; Gomez Mandic et al., 2017; Komorowska & Kozłowski, 2021). Household chores, caring for a child with a disability and paid work become hard to reconcile (Einam & Cuskelly, 2002; Morris, 2014; Working Families and Unum, 2018).

In the case of mothers who bring up children with disabilities, there are also additional factors that affect their economic activity, such as: the child's age and his/her condition, the mother's mental and emotional condition, assistance or its lack in caring for and rehabilitating the child (including the availability of institutional care for the child), the mother's own perception of her role in the workplace, her education and the amount of allowances received from the state (Banaszkiewicz et al., 2019; Brown & Clark, 2017; Gogoi et al., 2016; Komorowska, 2017a; Komorowska & Kozłowski, 2021; Sapkota et al., 2017).

⁷In Poland, it is predominantly women who take up the majority of obligations related to childcare. Women usually have to reconcile various roles and tasks in the family. They become the 'managers of disability'.

The nursing benefit is one of the allowances that might discourage the economic activity of mothers bringing up children with disabilities. It is because in order to get it, the carer has to give up their economic activity completely for the sake of taking care of the child. In 2009, the income criterion related to the eligibility for this allowance was waived, and the amount of the allowance grew significantly later in the study period. In 2010, it was PLN 520, in 2014 PLN 1,000, and in 2020 PLN 1,830 (cf. Table 4). Since 2016, families have also been receiving a child benefit, PLN 500 per child, in the framework of the 'Family 500 Plus' programme which, in combination with the nursing benefit, generated the amount of fixed income which was relatively attractive compared to the potential wages, especially in the case of carers with lower professional qualifications or lower education level.⁸

Table 4. Amount of the nursing benefit and the minimum wage in Poland

Year	Minimum gross wage	Nursing benefit
	in PLN	
2009	1,126	420 ^a ; 520
2010	1,317	520 ^b
2011	1,386	520; 620 ^c
2012	1,500	620
2013	1,600	620 ^d ; 720 ^e ; 820 ^f
2014	1,680	820; 1,000 ^g
2015	1,750	1,200
2016	1,850	1,300 ^h
2017	2,000	1,406 ⁱ
2018	2,100	1,477
2019	2,250	1,583 ^j
2020	2,600	1,830

a The amount of allowance from 1st May 2004 to 31st Oct. 2009. b The waiver of the income criterion with respect to the eligibility for the nursing benefit. c As of 1st Nov. 2011, the nursing benefit in the amount of PLN 520.00 increased by an extra benefit of PLN 100.00. d Protests of parents in the Sejm aimed at urging the authorities to increase the amount of the nursing benefit. e Between 1st April 2013 and 30th June 2013, the nursing benefit consisted of the base benefit (PLN 520.00) plus an extra benefit (PLN 200.00). f Between 1st July 2013 and 30th April 2014, the nursing benefit consisted of the base benefit (PLN 620.00) plus an extra benefit (PLN 200.00). g Between 1st May 2014 and 31st Dec. 2014, the nursing benefit consisted of the base benefit (PLN 800.00) plus an extra benefit of PLN 200.00. h The 'Family 500 Plus' programme for the second and subsequent child without an income threshold, and for the first child with a higher income threshold when there is a child with a disability in the family. i The introduction of the mechanism of the annual valuation of the nursing benefit by the percentage of the increase in the minimum salary. j The 'Family 500 Plus' programme for the first child without an income threshold.

Source: authors' study based on Infor (2022).

⁸ In 2020, the minimum net salary in Poland was PLN 1,920. A carer of a disabled child who did not work in order to take full care of the child received the child benefit in the framework of the 'Family 500 Plus' programme per each child plus the nursing benefit in the amount of PLN 1,830, so in total PLN 2,330 net (in the variant of having just one child), which was higher than the minimum salary by PLN 410. In addition, carers of children with a disability were also often entitled to the 'attendance allowance' of PLN 215.84.

These benefits were not included as variables in the analyses. However, the increase in the amount of benefits together with a decrease in the employment rate of mothers bringing up children with disabilities (also mothers of children without disabilities with lower levels of education, which is often associated with lower earnings) indicates a correlation between the state policy in the field of social benefits and the economic activity of mothers. Further research is necessary to establish the causal relationship between the level of allowances and the employment rate.

In recent years, changes aimed at supporting parenthood in Poland have been introduced to the Polish labour law,⁹ e.g. the parental leave, by the amendment from 2013.¹⁰ Over the years 2022–2023, thanks to two European Union directives,¹¹ further changes to the labour law were introduced, the purpose of which was to foster work and family life balance (with a special focus on employees who are parents or guardians of children). These changes included parental leave extension by 9 weeks, to 41 weeks, when one child is born, and to 43 weeks in the case of a multiple pregnancy, as well as an increase to 65 weeks in the case of the birth of a child with a severe or irreversible disability or an incurable disease (67 weeks in the case of a multiple pregnancy), a care leave of 5 days a year, and the possibility of remote work. The provisions mentioned above and the proposals of changes are characterised by parents as helpful and are generally appreciated. They might also boost the economic activity of mothers of children with disabilities.

7. Conclusions

Between 2005 and 2020, an upward trend in the employment rate of mothers of children without disabilities prevailed. This was mainly the consequence of a rise in the proportion of mothers with tertiary education in the Polish society and the increasing trend of having children at a later age. In the same period, on the other hand, there was a downward trend in the employment rate of mothers of children with disabilities. The analysis demonstrates that the gap between the employment rates of these two groups of mothers, large and continuously widening, mainly results from the sole fact of the child's disability and its direct consequences (and above all, from the fact that more time and resources are needed to care for

⁹ Act of 26th June 1974 – the Labour Code (Pol. Ustawa z dnia 26 czerwca 1974 r. – Kodeks pracy).

¹⁰ Act of 28th May 2013 amending the Labour Code and some other laws (Pol. Ustawa z dnia 28 maja 2013 r. o zmianie ustawy – Kodeks pracy oraz niektórych innych ustaw).

¹¹ Directive (EU) 2019/1158 of the European Parliament and of the Council of 20th June 2019 on work-life balance for parents and carers and repealing Council Directive 2010/18/E and Directive (EU) 2019/1152 of the European Parliament and of the Council of 20th June 2019 on transparent and predictable working conditions in the European Union.

a child with a disability than for a child without such a condition). One of the potential contributors to the lack of increase in the scale of the economic activity of mothers of children with disabilities is the principle of granting the nursing benefit, which requires the mother taking care of a child with a disability to completely give up her economic activity.

Out of all explanatory variables considered in the analysis, education level had the strongest impact on the probability of a mother taking up paid employment, with tertiary education offering the highest probability of such an occurrence, and lower education levels yielding monotonically lower probabilities. The age of the youngest child turned out to be another variable with strong predictive power – the older the child, the more probable it was that the mother would be employed. The result which came as a slight surprise was the lack of any considerable impact of the variables connected with the number of children, class of locality, and the number of other adults in households.

It is necessary to mention that the HBS data do not make it possible to determine whether economically inactive mothers would take up paid employment if they came across such a possibility. These are not panel data, and hence there is no way of checking how the employment status of a specific woman changes over time. The HBS does not provide information about the type of the child's disability, which is informative in the context of the amount of time that has to be assigned to the care and rehabilitation of such a child.

In the situation where the employee market in Poland is shrinking, it seems worthwhile to seriously consider including the economically inactive mothers of children with disabilities in the labour market. Not only changes in legislation (e.g. in the provisions of granting the nursing benefit) are required, but also a more extensive support system for mothers of children with disabilities, in the form of e.g. increased availability of institutional care and psychological assistance. The latter need results from the fact that mothers of children with disabilities often see themselves as full-time carers for their children, and devote themselves fully to this role.

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