

## The evolution of maternity attitudes in Polish society: A longitudinal perspective

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Individual attitudes toward motherhood depend on one's particular culture, values and beliefs. These, however, are usually transformed in the public's opinion into aspects related to maternity and the image of a child. The negative attitudes toward maternity, in turn, affects the current demographic crisis in many countries in Europe. The study evaluated the changing attitudes toward motherhood in Poland in recent years (2009-2015) on the basis of the Social Diagnosis longitudinal data. To show family-related behaviour and the changes over time, the author adopted latent mixed models to characterise the two groups of individuals (with a different number of states) at the beginning of the period of observation and to follow their evolution over time. The analysis of the changing propensity of childrearing in Poland seems to be pertinent especially because of the changes in Poland's new child benefit programme, i.e. extending to one-year the length of maternity and paternity leaves, Family 500+, the first of which entered into force in the analysed period. Hence, the study presents the initial and transition probabilities estimated for five recognized states in two groups of Poles (one with traditional, and the other with more modern attitudes to motherhood). Despite the extension of social benefits, the author observed the negative tendency to childrearing of Polish society in the analysed period of time.

**Keywords:** discrete latent variable, heterogenous data, maternity, mixed latent Markov model, Social Diagnosis

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### 1. Introduction

In general, during the last four decades family formation changes in Europe have been demonstrated through the decreasing propensity to marriage and delaying childbearing, and even an increase in the decision not to have children at all. Attitudes toward motherhood depend on one's particular culture, values and beliefs. These, however, are usually transformed in the public's opinion into aspects related to maternity and the image of a child. The negative attitudes toward maternity, in turn,

influence the current demographic crisis in many countries in Europe. It is striking that Poland, where family and children are highly valued, has one of the lowest fertility rates in Europe. Note that within the selected 15-year period Poland moved from the group of high-fertility countries to the group of low fertility. During that time Poland experienced an economic and social transformation, which has also had a big influence on the development of demographic processes (Kurkiewicz et al., 2004; Kotowska, 2009, 2014; Józwiak et al., 2010; Matysiak et al., 2013). The major changes that can be observed are related primarily to intensive migration, a decline in fertility, the growing employment of women, changes in marital behaviour, the development of the welfare state, and also an increase in life expectancy. Young people put off marital and childbearing decisions until achieving professional success and a fair standard of living (Kotowska et al., 2008). The decline in fertility and the rise in migration of young (well educated) people, especially after the EU accession, have accelerated the ageing of the Polish population (Gołata, 2016). Note, however, that Poland belongs to the group of countries with the lowest intended childlessness and with high intentions to have at least one child. This can be partly attributed to growing fertility intentions, also illustrated by the results of two sample surveys carried out in Poland in 2006 (Józwiak, 2006; Kotowska and Baranowska, 2006).

To evaluate population attitudes toward motherhood, the study referred to the most recent available Social Diagnosis survey data (<http://diagnoza.com/index-en.html>). These longitudinal data concerns a diagnosis of the conditions and quality of life of Poles as they report it. The author explored nine binary items concerning work-related issues, better use of maternity leave and possibilities for childcare for children of different ages. Family-related behaviour observed in Poland in this period seems to be of particular public interest, because since 2013 maternity and parental leaves were extended respectively to 20 and 32 weeks (a total of 52 weeks), with 80% of the wages paid during that year.

To describe the process of attitude changes of Poles toward motherhood the author adopted the mixed latent Markov (LM) model in which the parameters of the latent process are allowed to vary in different latent subpopulations defined by an additional discrete latent variable (Van de Pol and Langeheine, 1990; Bartolucci et al., 2007, 2013). Under this approach, useful from the perspective of clustering, the initial and transition probabilities of the latent Markov chain differ between sample units in a way that do not depend on the observable covariates. Family values, for instance, include feelings referring to children, cohabitation, marriage, and household roles. Autonomy values, such as attitudes toward education, career, personal freedom and self-development, are presented as competing alternatives (Barber, 2001), however some people might value children, while others express a need for personal freedom (Moors, 2008). The main research question in analysing the considered data concerns the evolution of maternity attitudes taking in particular into account how this evolution was affected by the latent personality type, i.e. people with modern, rather sceptical (career women, bad childhood memories) and optimistic, traditional

maternity attitudes. Hence, the study aimed to characterise the two (sceptical and optimistic) groups of Poles (with a different number of states) at the beginning of the period of observation, and to follow their evolution over time.

The paper is organised as follows: Section 1 reviews the relevant literature describing the most important studies showing the impact of childrearing on a mother's professional career. Next, the data and outline of the adopted modelling approach are described in Sections 2 and 3, respectively. The empirical analysis is presented in Section 4. Final remarks and discussion are given in Section 5.

## 2. Literature review

The most popular branch of literature concerning maternity is focused on the family wage gap. Waldfogel (1997) studied the question of the family wage gap to understand where the differences in wages between women with children and women without children come from. There are many studies (e.g. Gangl and Ziefe, 2009; Gash, 2009; Gupta and Smith, 2002) concerning the financial penalties for motherhood analysed in different countries measured through fixed effects, OLS or LS estimations. The family wage gap has been studied in most developed countries, cf. Meurs et al. (2010); Wilner (2016) for France, Ejrnaes and Kunze (2013) for Germany, Gupta and Smith (2002) for Denmark, Davies and Pierre (2005); Gash (2009) for a European comparison. The main reasons given to explain the family wage gap are the lower accumulation (or depreciation) of human capital, statistical discrimination, presence of unobserved heterogeneity and sample selection of mothers in lower-paying firms.

Literature concerning childrearing quite often is also focused on reforms of maternity (or parental) leave policies to study the labour supply behaviour of women after childbirth. Lalive and Zweimüller (2009) studied the impact of two maternity leave reforms in Austria on future fertility decisions and on the career of mothers, based on the Austrian Social Security Database (ASSD). Schönberg and Ludsteck (2014) showed that the successive expansion of maternity leave coverage in Germany reduced the employment rate of mothers in the short term. They estimated the regression models separately for each policy reform and separately by time since childbirth. A similar strategy, for instance, was used by Lalive and Zweimüller (2009) and Lalive et al. (2014) to evaluate the impact of the Austrian policy reform on mothers' fertility and labour market outcomes, as well as by Ekberg et al. (2005), to analyse the impact of Sweden's "daddy month reform" on the labour supply of fathers. The findings presented by Roosalu and Täht (2016), showed that the career breaks in Estonia related to parental leave generally keep women in the same place with regard to their labour market position. By estimating a competing risks model, the study by Arntz et al. (2017) shed light on the factors affecting the decision process of young German mothers after the first childbirth. Expansionary leave policies were found to be a key factor for the rising share of women who have their second child out of professional

inactivity. More recently, Rodrigues and Vergnat (2019), also used competing risks model to determine which variables may explain time out of work, as well as the transition back to work for young mothers in France. Other publications studied also the determinants of mothers' transitions from employment to non-employment. For example, Davia and Legazpe (2014) based on the Fertility, Family and Values Survey of 2006 (FFVS-2006), a Spanish retrospective study, analysed the impact of human capital on employment decisions (namely, entry and exit from employment) of first-time mothers in Spain. The empirical strategy consisted of discrete-time hazard models and indicated that a higher educational attainment contributes to an increase in the likelihood of accessing employment, and more experienced women were shown as those less likely to leave employment after their first maternity.

As far as the Eastern and Central European countries are concerned, Valentova and Zhelyazkova (2011) applied binary logistic regression model to present the effect of transition on perception of the consequences of career interruptions due to child care for seven countries (Czech Republic, Estonia, Hungary, Poland, Slovakia, Slovenia, Ukraine) based on the European Social Survey 2004 data. Their results suggest that women living in Poland and Ukraine face more obstacles to reconcile child care with their career aspirations. In contrast to Poland and Ukraine, mothers in Estonia and Slovakia report the least negative consequences of career breaks. In the case of Estonia, this can be attributed to the country's work-family policies supporting women, especially through extensive and high-quality child care in the analysed period of time.

Regarding to Polish society, Ilska and Przybyła-Basista (2014) examined the maternal attitudes shaped during the prenatal period of the child's development for a sample of pregnant women from the Silesian voivodeship. This research, based mainly on the stepwise multiple regression analysis, suggests that the multiple fears and concerns that women experience during pregnancy, as well as the level of education, contribute to an anxious attitude towards motherhood. Other results revealed that no differences were observed between the group of women with a normal course of pregnancy and those with a high-risk pregnancy in terms of prenatal attitudes toward motherhood and pregnancy. The main limitation of the study was the relatively small group of pregnant women ( $n=137$ ), further divided into two subgroups: women with a normal course of pregnancy and women with a high-risk pregnancy. Another study concerning Polish society was presented by Witkowska (2013), however it was more concentrated on a specific group of Polish girls affected with anorexia nervosa and the parental attitudes of their parents (much older than the those considered in the articles mentioned above).

Most of the presented studies are based on different modelling techniques, however share a common perspective, namely the search for regularities in the pattern of association between attitudes and demographic behaviour, with a primary focus on the content of the analysed items. A different approach was presented by Moors (2008), who concentrated mainly on the similarities between respondents

regarding their integrated view on a range of opinions. The main aim was to recognise distinct groups within society that differ in terms of their attitude profile. Moors (2008) demonstrated the usefulness of a latent class approach for the three-wave German panel study "Familienentwicklung in Nordrhein-Westfalen" conducted in 1982, 1984 and 1986. The analysis was based on a sample of women aged between 18 and 30 years old and their views on family issues regarding marriage, children, partnership and household roles. The author provided the empirical typology for the six latent groups of women (such as "traditional family oriented", "egalitarian type") being positively/negatively oriented towards a particular set of items. However, even if the data were given for three different years, the question concerning the change over time goes beyond the limits of this research.

The paper from which most inspired the author and whose analysed data is most similar, was Valle et al. (2008), which examined the questionnaire data based on the British Household Panel Survey (BHPS) together with the Families and Children Study (FACS) from 2007. To explore the factors that influenced mother's decision to stay at home after the birth, the authors analysed a very similar set of items concerning responses regarding attitudes toward parental care and difficulties with childcare, work-related issues and other statements. Applying the regular latent class model, their study indicated that despite the recent improvements in maternity rights and family-friendly employment policies, little has changed since 2002 in relation to the take-up of maternity rights and mothers' post-birth employment decisions and experiences. Note that the achieved results were compared with the data from the 2002 wave of BHPS. They identified five distinct clusters with different attitudes toward parental care and child care and facing different obstacles to work, and noted that the number of family-friendly arrangements has an impact on the duration of maternity leave, even after the employer's size and sector were controlled for. The results of logistic regression also showed a strong association between maternity leave decisions and financial considerations. Mothers taking the longest periods of maternity leave were those who received the most generous maternity pay package. In contrast to Valle et al. (2008), who based the results just on the one wave of the survey, this author described the evolution of the tendency toward motherhood over time (resulting from a suitable methodological application). Another difference is that the British survey included only mothers who had worked at some point in the year before the baby was born, hence the sample was not representative of all mothers with young children, as it excluded mothers who had never worked and under-represented mothers with limited work experience. This study is more general and concerns the opinions of people of reproductive age.

It could be observed that the assumption of many of the applied statistical methods is the homogeneity of the analysed data. In the vast majority of works concerning the subject of maternity attitudes it is presumed (without prior verification) that the analysed data set is homogeneous and the statistical techniques are applied. The problem of heterogeneity of the data is very important, especially when responses are observed

on each subject repeatedly over time. One of this study main contributions to the existing empirical literature is that the attitude toward maternity is perceived as a discrete latent (non-observable) feature additionally evolving with time, since the attitude cannot be directly observable and measurable. This psychological trait might depend on individual characteristics that are not directly observable, such as cultural background based on tradition, economic status, political views and religious beliefs. Note that the opinion concerning family formation may be reviewed over time due to, e.g. the change of socio-economic position, the change of partner, new policy concerning different types of support, such as maternity benefits, access to family-friendly arrangements and child care. More recently, it might have also been influenced by sudden, unexpected events such as the COVID-19 pandemic and Russia's invasion of neighbour and hence, an uncertain future. Therefore, the author considered the unobserved heterogeneity in the dynamic fashion at the same time. The respondents could change membership of the identified structures (referred to as states) over time. The main advantage of using LM models is that they allow to understand the evolution of family behaviour measured at different points in time (cf. Pennoni and Genge 2020; Genge 2023).

### 3. Data presentation

The attitudes towards motherhood were assessed using the long-term longitudinal Polish Social Diagnosis questionnaires<sup>1</sup>. The questions focused on examining the causes which, according to the respondents, allow to combine professional and family duties<sup>2</sup>. The author considered  $n = 2256$  responses for people of reproductive age (25-41). The following binary outcome variables<sup>3</sup> (causes, regarding work-related issues, maternity leave and childcare services) measured on four occasions (2009, 2011, 2013, 2015) along with the longitudinal sample weights were considered in the analysis:

- $X_1$  – part-time work;
- $X_2$  – opportunity to share parental leave with the child's father;
- $X_3$  – flexible work hours;
- $X_4$  – possibility of working partly at home;
- $X_5$  – more days off in a week;
- $X_6$  – longer paid childcare leave;
- $X_7$  – higher social benefits (e.g. childcare benefit, benefits for children, etc.);
- $X_8$  – better possibilities of childcare for children under 7;
- $X_9$  – better possibilities of childcare for children aged 7-12.

<sup>1</sup> <http://www.diagnoza.com>

<sup>2</sup> The original question was: Which solutions would in your opinion facilitate combining professional and family duties, including parental duties?

<sup>3</sup> Originally, the items  $X_1 - X_9$  in the years 2009 and 2011 had a 10-point Likert type scale, from 1 for "key solution" and 10 for "least important". In turn, the items measured in the last two waves (2013, 2015) originally had binary response variables.

Table 1

Weighted frequency distributions of each response variable (%) in 2009, 2011, 2013 and 2015 for complete data and people of reproductive age 25-41 (0-no, 1-yes)

Item	2009		2011		2013		2015	
	0	1	0	1	0	1	0	1
$X_1$	63.26	36.74	54.86	45.14	82.78	17.22	80.50	19.50
$X_2$	65.97	34.03	67.11	32.89	87.50	12.50	88.99	11.01
$X_3$	43.26	56.74	41.57	58.43	41.25	58.75	36.37	63.63
$X_4$	49.78	50.22	53.18	46.82	75.35	24.65	71.35	28.65
$X_5$	60.17	39.83	60.85	39.15	85.70	14.30	81.33	18.67
$X_6$	35.88	64.12	34.51	65.49	84.99	15.01	76.80	23.20
$X_7$	39.28	60.72	40.58	59.42	78.85	21.15	77.78	22.22
$X_8$	36.39	63.61	35.69	64.31	63.74	36.26	67.44	32.56
$X_9$	51.93	48.07	51.78	48.22	83.63	16.37	84.28	15.72

Source: own calculations in R.

The frequency distribution of the response variables is given in Table 1. It was observed that Poles have the most negative view of the opportunity to share parental leave with the child's father ( $X_2$ ), part-time work ( $X_1$ ) and more days off in a week ( $X_5$ ). One can note the substantial increase of those being unsatisfied with these kind of solutions reaching over than 80% (especially for  $X_2$ ) in 2013 and 2015. Additionally, in the last two waves the author observed the huge increase of people being negative to longer paid childcare leave ( $X_6$ ) and better possibilities of childcare for children aged 7-12 ( $X_9$ ). As far as the positive opinions were concerned, Poles considered the longer paid childcare leave ( $X_6$ ) and better possibilities of childcare for children under 7 ( $X_8$ ) in the first two waves as the best solutions helping people to combine professional and family duties. However, in 2013 a substantial decline was seen for the item concerning child care leave being positively considered. Regarding childcare for children under 7, the author observed the lower percentage of positive opinions in 2013 and 2015, although this issue seems to be one of the most important issues to be solved next. It was found that the positive opinions to the third solution concerning flexible work hours remained stable (at around 60%) over those years.

The significant drops between the third and fourth waves of the survey might be explained by the original scale changes (from the 10-point Likert type to binary scale) and Poland's new child benefits, namely extending to one-year the length of maternity and paternity leaves in 2013.

## 4. Adopted statistical approach

There is a broad range of statistical models to analyse longitudinal data. The choice of the most suitable model should rely on the structure of the data set, the nature of the responses and especially on the context of application. In this framework, latent Markov models which are a particular family of latent variable models and mixture models for longitudinal data, play a special role in the socio-economic data analyses.

The first important work of literature focused on LM models for longitudinal data was by Wiggins (1973). Since that time, the initial LM formulation has been developed in several directions, and especially in connection with psychology, sociology and medicine. One of the interesting developments presented in this paper concerns the formulation based on random parameters having discrete distribution as proposed by Bartolucci et al. (2011), related to the mixed LM model (Van de Pol and Langeheine, 1990) and to the LM models with random effects (Altman, 2007). In this formulation the parameters are allowed to vary in different latent subpopulations, such as groups of Poles with the different parenting attitudes.

### 4.1. Mixed latent Markov model

One of the most important extensions of LM models may be taking into account the additional source of (time-fixed) dependence in the data. The study considered the mixed LM model in which the parameters of the latent process were allowed to vary in different latent subpopulations, defined by an additional latent variable  $S_1$ , in respect to the latent variable included in the latent Markov model described in Bartolucci et al. (2013). Denote by  $X_j^{(t)}$  the  $j$ -th response variable at occasion  $t$ , where  $t=1, \dots, T$  ( $t=1, \dots, 4$  in this study),  $j=1, \dots, m \dots$  ( $j=1, \dots, 9$  in this study) characterised by  $l_j$  categories (2 in this case). The vector of responses for each variable  $\mathbf{X}^t$  observed at different points in time has  $mT$  elements and is denoted by  $\mathbf{X}$ . It assumed  $S_1$ , a discrete latent variable which is time invariant, with  $u_1$  support points (referred to latent classes)

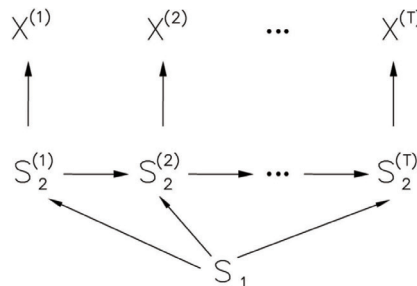


Fig.1. Path diagram of the mixed LM model

Source: cf. Bartolucci et al. 2013, p. 142.



and mass probabilities denoted by  $\omega_{s_1}, s_1 = 1, \dots, u_1$ . Consequently, the latent process was then denoted by  $\mathbf{S}_2 = (S_2^{(1)}, \dots, S_2^{(T)})$  described by  $u_2$  numbers of latent states. This formulation of the model (presented also in Figure 1) is reasonable when accounting for a further source of unobserved heterogeneity in respect to that represented by the latent Markov chain.

Then, the parameters of the mixed LM model are as follows:

- the conditional distribution of the response variable expressed as

$$\phi_{x|s_2} = p\left(X_j^{(t)} = x \mid S_2^{(t)} = s_2\right), \quad t = 1, \dots, T, \quad s_2 = 1, \dots, u_2, \quad (1)$$

$$j = 1, \dots, m, \quad x = 0, \dots, l_j - 1.$$

- the initial  $\pi_{s_2|s_1}$  and the transition  $\pi_{s_2|s_1\bar{s}_2}$  probabilities, given by the expressions below

$$\pi_{s_2|s_1} = p\left(S_2^{(1)} = s_2 \mid S_1 = s_1\right), \quad s_1 = 1, \dots, u_1, \quad s_2 = 1, \dots, u_2,$$

$$\pi_{s_2|s_1\bar{s}_2} = p\left(S_2^{(t)} = s_2 \mid S_1 = s_1, S_2^{(t-1)} = \bar{s}_2\right), \quad s_1 = 1, \dots, u_1, \quad \bar{s}_2, s_2 = 1, \dots, u_2.$$

The mixed LM model presented above assumes common conditional and transition probabilities. Under this assumption of homogeneity, the transition and conditional probabilities remain constant over time (time-homogenous). Accordingly, the conditional distribution of  $\mathbf{S}_2$  given  $S_1$  is equal to

$$p(\mathbf{S}_2 = \mathbf{s}_2 \mid S_1 = s_1) = \pi_{s_2^{(1)}|s_1} \prod_{t=2}^T \pi_{s_2^{(t)}|s_1\bar{s}_2^{(t-1)}}, \quad (2)$$

where  $\mathbf{s}_2 = (s_2^{(1)}, \dots, s_2^{(T)})$  describes a realisation of  $\mathbf{S}_2$ . Relying on the assumption of local independence, the conditional distribution of  $\mathbf{X}$  given  $S_1$  and  $\mathbf{S}_2$  may be reduced to

$$p(\mathbf{X} = \mathbf{x} \mid S_1 = s_1, \mathbf{S}_2 = \mathbf{s}_2) = p(\mathbf{X} = \mathbf{x} \mid \mathbf{S}_2 = \mathbf{s}_2) \prod_{t=1}^T \phi_{\mathbf{x}^{(t)}|s_2^{(t)}}, \quad (3)$$

while the conditional distribution of  $\mathbf{X}$  given  $S_1$  may be formulated as

$$p(\mathbf{X} = \mathbf{x} \mid S_1 = s_1) = \sum_{\mathbf{s}_2} \pi_{s_2^{(1)}|s_1} \pi_{s_2^{(2)}|s_1\bar{s}_2^{(1)}} \cdots \pi_{s_2^{(T)}|s_1\bar{s}_2^{(T-1)}} \phi_{\mathbf{x}^{(1)}|s_2^{(1)}} \cdots \phi_{\mathbf{x}^{(T)}|s_2^{(T)}}. \quad (4)$$

To sum up, the manifest probability distribution of the response variables may be computed as

$$p(\mathbf{X} = \mathbf{x}) = \sum_{s_1=1}^{u_1} p(\mathbf{X} = \mathbf{x} \mid S_1 = s_1) \omega_{s_1}, \quad (5)$$

which depends on the mass probabilities for the distribution of the latent variable  $S_1$ . The manifest distribution may be calculated through a forward recursion proposed by Baum et al. (1970).

Maximum likelihood estimation of the mixed LM model was carried out by an extended version of the EM algorithm described in Dempster et al. (1977), see also Bartolucci et al. (2013), p. 145 for more details. Next, the parameters of the model were estimated until convergence in the two following steps (E-step and M-step) of the algorithm, starting with different initial points. To choose the number of latent states, the study relied mainly on the Bayesian Information Criterion (BIC; Schwarz, 1978) and the Akaike Information Criterion (AIC; Akaike, 1973). In accordance this strategy, the author selected the number of latent states  $s_2$  for which  $BIC_{s_2}$  or/and  $AIC_{s_2}$  reaches a minimum. The appropriate functions to estimate the mixed LM models are available within the package `LMest` (Bartolucci et al., 2017) of R software.

## 5. Results

Following the rules presented above, one can report the results obtained by applying the mixed LM model to the data concerning maternity attitudes presented in Section 2. Based on the previous research on LM mixed models for binary responses (see e.g. Bartolucci et al., 2017), and other studies focused on the results for people positively/negatively oriented toward particular set of items concerning motherhood, two groups of Poles were assumed. Note also that this number of latent structures is in agreement with the parsimony principle, suggesting to consider the smallest number of components able to represent the main typologies of the latent phenomena under study and provides a reasonable interpretation of the resulting states according with the subject matter knowledge. Table 2 shows the results of fitting the initial model for two clusters (related to traditional and more modern types of Poles) and  $s_2$  from 1 to 8, where  $s_2$  is the number of latent states. It can be seen that the smallest value of  $BIC = 23593.49$ , was achieved for five latent states.

Table 2

The BIC information criteria, log-likelihood (LL) values, number of parameters (#par) for mixed LM,  $s_1 = 2$ , and varying  $s_2$

$s_2$	LL	#par	BIC	AIC
1	-12971.48	10	26006.31	25962.96
2	-12255.93	25	24670.23	24561.85
3	-12051.97	44	24382.69	24191.95
4	-11703.42	67	23831.28	23540.84
5	-11499.00	94	<b>23593.49</b>	23186.00
6	-11646.66	125	24085.19	23543.31
7	-11320.25	160	23654.11	22960.50
8	-11420.53	199	24101.73	23239.06

Source: own calculations in R.

The corresponding number of parameters was 94. It can also be seen that the lowest value of  $AIC = 22960.50$  was achieved for five latent states. However, if those criteria suggest to select a different number of states,  $BIC$  is usually preferred (cf. Bacci et al., 2014).

According to the conditional probabilities presented in Figure 2 and in Table 3, one can identify the first latent state  $S_2(1)$  as that of those with a generally negative tendency to accept the child, especially for better possibilities of childcare for children, but positive for longer paid childcare leave, and higher social benefits. The

Table 3  
Conditional probabilities for the “yes” category

$s_2 / j$	$j = 1$	$j = 2$	$j = 3$	$j = 4$	$j = 5$	$j = 6$	$j = 7$	$j = 8$	$j = 9$
1	0.323	0.212	0.591	0.535	0.464	0.956	0.640	0.117	0.000
2	0.211	0.124	0.662	0.288	0.180	0.171	0.196	0.356	0.180
3	0.599	0.567	0.782	0.673	0.420	0.127	0.225	0.534	0.421
4	0.121	0.090	0.171	0.112	0.181	0.876	0.881	0.980	0.700
5	0.803	0.707	0.934	0.919	0.834	1.000	1.000	1.000	1.000

Source: own calculations in R.

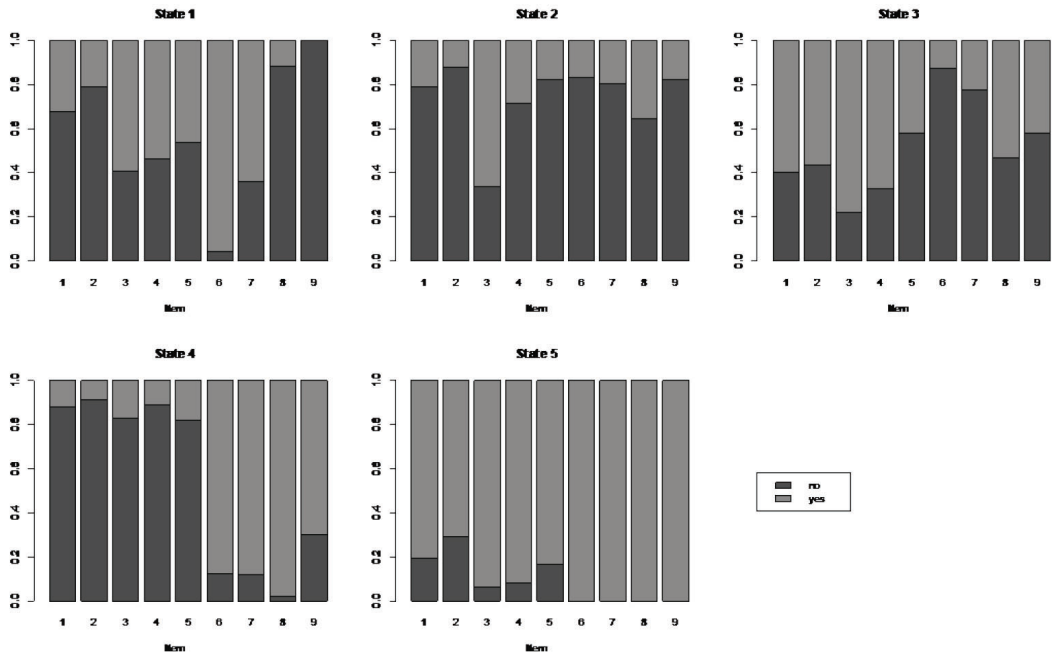


Fig. 2. Estimated conditional probabilities

Source: own calculations in R.

second latent state  $S_2(2)$  was identified as definitely negative (with the small exception of flexible working hours). The third latent state  $S_2(3)$  consisted in those rather neutral to all the solutions to facilitate combining professional and family duties (with the exception of higher social benefits and longer paid childcare leave, i.e. negative for those solutions), but more positive for flexible work hours and possibility of working partly at home. The fourth state  $S_2(4)$  regarded Poles positive towards motherhood but with better social care and benefits (also longer paid childcare leave), and especially positive for better possibilities of childcare for children under 7. In the fifth state  $S_2(5)$ , there were people positive for all the considered solutions.

The model formulation enabled to describe the two clusters of individuals at the beginning of the period of observation and show their opinion changes over time. Based on the estimated mass probabilities the first cluster, comprising around 22% of Poles (see Table 4), was characterised by the respondents having at the beginning of the period of observation, a probability equal to 0.5 of being in the first latent state (corresponding to those who generally do not believe that solutions concerning better possibilities of childcare can improve the situation of parents on the labour market) and close to 0.5 belonging to the neutral third state of Poles, however with negative assessment of higher social benefits and longer paid childcare leave (see Table 5).

Table 4  
Mass probabilities

$s_1$	
1	2
0.216	0.784

Source: own calculations in R.

Table 5  
Initial probabilities

$s_2$	$s_1$	
	1	2
1	0.507	0.152
2	0.000	0.000
3	0.493	0.328
4	0.000	0.427
5	0.000	0.093

Source: own calculations in R.

Over time, within the first cluster, one observes a very high level of persistence in the second latent state, and the very high transition probabilities to this negative state from  $S_2(4)$  and  $S_2(5)$ . However, notice also that close to 88% of people move to the more positive state  $S_2(4)$  and 12% to the most positive state  $S_2(5)$  from the rather negative  $S_2(1)$ . Moreover, the high percentage of those being neutral (82%) are also prone to switch to being positive with better social care and benefits, i.e.  $S_2(4)$ , and 15% tend to switch to the state with the highest maternity attitude, i.e.  $S_2(5)$ , revealing the more pronounced tendency to improve in their behaviour (see Table 6).

On the other hand, in the second, bigger (78%) cluster, 43% of people belong to the fourth state (those with positive opinion toward motherhood if better social care and benefits were available), 9% of Poles belong to the fifth, most positive state, and

Table 6  
Transition probabilities for  $s_1 = 1$

$\bar{s}_2$					
$s_2$	1	2	3	4	5
1	0.000	0.000	0.000	0.879	0.121
2	0.058	0.896	0.000	0.046	0.000
3	0.000	0.000	0.028	0.818	0.154
4	0.000	1.000	0.000	0.000	0.000
5	0.000	1.000	0.000	0.000	0.000

Source: own calculations in R.

Table 7  
Transition probabilities for  $s_1 = 2$

$\bar{s}_2$					
$s_2$	1	2	3	4	5
1	0.216	0.679	0.105	0.000	0.000
2	0.000	1.000	0.000	0.000	0.000
3	0.145	0.530	0.315	0.009	0.000
4	0.189	0.300	0.194	0.297	0.020
5	0.092	0.227	0.132	0.363	0.187

Source: own calculations in R.

33% to the neutral state at the very beginning of the survey (see Table 5). In terms of transitions and changing behaviour among this group (Table 7), the highest stability was observed for the second state, and the highest transition probability (from state 1) equal to 0.68 also to that state. There was also the slight improvement for those being negative in  $S_2(1)$ , who are prone to switch to the state of neutral Poles (over 10%). As far as the neutral part of Polish society is concerned, they moved mostly to the states with worse attitudes to maternity, i.e.  $S_2(1)$  and  $S_2(2)$ . Those considering social benefits as a good solution (belonging to  $S_2(4)$ ) tended to move in particular to states with negative feelings, i.e.  $S_2(2)$  and  $S_2(1)$ , or to being unconcerned. Those with the most positive attitudes unfortunately tended to change their opinion, switching to other states, especially to those supporting social benefits (36%), or to having negative feelings (over 22%).

Although in both of clusters one could note the highest transitions to move to the negative state  $S_2(2)$ , more positive changes were observed in the first cluster (showing higher transitions to  $S_2(5)$  and  $S_2(4)$ ). The transitions in a more positive direction in this cluster may be explained by the reform introduced in 2013. For this group the

solutions concerning higher social benefits and longer paid child care leave were especially important. The reform fulfilled the expectations of some persons, influencing their opinions in the next rounds of surveys. When those wishes were fulfilled through the government programme, they could move to the more satisfied states of Poles. However, the second, much bigger cluster represented Poles with a higher tendency to switch to the rather negative  $S_2(1)$  or to neutral  $S_2(3)$ . These results confirmed that regardless of extended social benefits, one could observe a negative tendency towards childbearing. The biggest group consisting of 88% of society, who started with more optimistic feelings tended to change their behaviour in a more negative direction. Poles are generally more prone to be unsatisfied with the proposed solutions as preferred ways of reconciling employment and parental duties. This also shows that other family support services could change Polish attitudes and persuade people to have more children – it seems that the key is maintaining respect for the value of the family. European society could help itself if it was possible to persuade people to have more children. The neighbouring Czechia can be an example for many European countries (in 2021 Czech women were having more children than anywhere else in Europe); 48% of Czechs believe that having and raising children is a duty to society, while only 22.3% of Poles share the same opinion. Living conditions are also of great importance for the increase in birth rates – when deciding to have children, a sense of stability and predictability (also in economic terms) is crucial. Only 15% of Czechs live in overcrowded accommodation, compared with 37% in Poland and 31% in Italy. The author also believes that the relatively generous family policies, supporting families in their care of children, allowing flexible and well-paid parental leave as well as offering an adequate number of nurseries and kindergartens which enable parents to care for their young children (during the first three or four years of each child's life), can bring the expected results in future.

## Discussion

To assess the attitudes toward motherhood measured at different points in time, the study adopted the model-based dynamic clustering approach, extended to include the longitudinal weights. Based on the previous research, two groups of Poles with traditional and more modern attitudes to motherhood were examined. However, contrary to most of such studies, especially those relying on the popular latent analysis techniques (see e.g. Moors, 2008; Valle et al., 2008), the author focused not only on cluster recognition but also on the changes in the responses, in order to capture heterogeneity varying with time. By applying the adopted mixed latent Markov model, the study obtained the initial and transition probabilities, estimated for the recognised states in groups of different types of Poles. The estimated initial probabilities presented the weights of each state at the beginning of the period and, in turn, the estimated averaged transition matrices enabled the specific interpretation of the transitions across states in the period from 2009 to 2015. Moreover, to the best

of the author's knowledge, this is the first analysis focused on changing family behaviour, and relying on the four last waves of the national panel study and longitudinal sample weights as well.

Providing causal evidence on how maternity attitude changes with time is of interest and importance also for the non-Polish research. In many countries, positive feelings toward motherhood and fertility levels have declined significantly, therefore the question whether parental leave policies can help to increase fertility is being hotly debated. This analysis also addressed the question of whether the more generous parental leave rules might bring a positive and more friendly motherhood attitudes – an issue of paramount importance. The results presented in the work by Lalive and Zweimüller (2009) showed that the parental leave extension in Austria did not increase the proportion of women who never returned to work and did not have a detrimental effect on employment and earnings over an extended time horizon. In reference to Poland, one can conclude that more generous parental leave policies do not necessarily result in a better maternity attitude and fertility increase, which rather continued to decrease in the last few years (when parental leave reforms were introduced).

It might be supposed that providing better possibilities of childcare for families with small children could give better results and help to improve the attitudes towards childbearing in Poland. One should note that European studies ranked Poland in one of the lowest positions among all the EU countries in terms of indifference to the percentage of children in formal care from the age of 3 and to compulsory education (76% in 2013). In countries such as Belgium, Denmark, Germany, Ireland, Spain, France, Italy, Luxembourg, the Netherlands and the United Kingdom, as well as Iceland and Norway, the participation rate of pupils from the age of 3 to the starting age of compulsory education at primary level was around 95%. Although this indicator for Poland has been increasing over time, it is still below the EU average and the headline target of 96% (Eurostat, 2021).

Another limitation of this study can be due to the data available for the years preceding the latest parental reforms in Poland, i.e. the largest government programme Family 500+, introduced in 2016 and offering PLN 500 for every child under 18 years old. In further research, the author would also like to examine in more detail the resulting variability among the recognised states of Poles, characterised by different time-constant and time-varying socio-economic features.

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