# Who wants a second child? Microeconometric analysis of individual children demand in Poland

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### Abstract

One of the most important economic problems in Poland is low fertility, much below the replacement rate. In the next 20-25 years the working to retired ratio will drop significantly. Therefore an important issue is to support female decisions of having second (and subsequent) child. We use sequential logit model to show that different individual characteristics are significant for the decision of first and second child. We show that well educated, white collar workers, who decided to give first birth later are more willing to have more children.

## Motivation

In recent years Poland has experienced a large drop in total fertility rate[1]- from 2.06[2] in 1990 to 1.31 in 2013[3]. The lowest TFR value was recorded in 2003- 1.22 children per woman. This numbers are significantly lower than the replacement rate which should be at the approximate level od 2.2. Current trend will cause serious issues in the future. In the horizon of 20 years in Poland is expected diminish in the number of people in working-age[4] and increase of aged dependancy ratio[5]. This implies serious issues with public finance, especially pension system and health care. There does not exist an implementable cure of given situation, only effects can be eased. Part of the solution is encouraging females to increase their fertility. On the other hand it is also beneficial to create incentives for people to participate the labor market. Therefore it is important to state the question if career and motherhood two exclusive life options? And why most of the women in Poland have only one child[6]? Finally, what can be done to support female procreation decisions without causing a decrease in their labour market participation?

The rest of this paper is organised as follows. First the current state of art described in the literature is discussed. Than methods and data used are specified. In the consecutive section the results are detailed. The paper ends up with short conclusion.

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[1]TFR definition by Eurostat: The mean number of children that would be born alive to a woman during her lifetime if she were to pass through her childbearing years conforming to the fertility rates by age of a given year. This rate is therefore the completed fertility of a hypothetical generation, computed by adding the fertility rates by age for women in a given year (the number of women at each age is assumed to be the same). The total fertility rate is also used to indicate the replacement level fertility; in more highly developed countries, a rate of 2.1 is considered to be the replacement level fertility rate.

[2]Eurostat http://epp.eurostat.ec.europa.eu/

[3]Estimate of the CIA World Factbook https://www.cia.gov/

[4]In Poland working-age is currently defined as 18-60 for women and 18-64 for men and will be extended to 18-66 within few years. Eurostat defines working-age as 15-64 for men and women. Given reasonong applies for all this definitions.

[5]Eurostat definition:

$$Aged\ demendancy\ ratio = \frac{number\ of\ people\ aged\ 65\ and\ over}{number\ of\ people\ aged\ 15\text{-}64} \times 100 \tag{1}$$

In 2011 it was equal to 19% (Source: http://wdi.worldbank.org/)

[6]In fact this is a common trend in whole Central and Eastern Europe.

# Current state of art

## State of art — early approach

The common sense, supported by early research in the field, so called New Home Economics, suggests that high fertility and high female labour market participation are exclusive options. It is based on the assumption that scarce time resources are a binding constraint causing decreasing fertility (Mincer and Polachek 1982, Ermisch 1988, Becker 1993). It claims efficiency of intrahousehold specialisation driven by wage[7] difference between spouses. For a long time it seemed economically beneficial for male spouses to focus on the career on the labour market and for female spouses to take care for children and household production (Becker 1985).

Therefore increase in the female labour market participation can be observed it was seen as a reason of decreasing fertility (Killingsworth and Heckman 1987, Fernandez et al. 2004, Blau and Kahn 2007, Thevenon 2009, Fogli and Veldkamp 2011). Several intuitions behind this phenomenon were given in the literature. Becker shown that people exchange quantity for quality- they decide to have less children and invest more time and money per child[8]. Some researchers claim that women trade-off children in favor of less time-demanding alternatives (Butz and Ward, 1979). They also claim that women postpone parental decisions- as increase in the age at first birth can be seen in the data (Happel et al. 1984, Cigno and Ermisch 1989, Chen and Morgan 1991, Gustafsson 2001, Frejka and Sardon, 2006). Women who enter the labour market have to face opportunity cost of children, that are foregone earnings (Calhoun and Espenshade, 1988), forgone career opportunities and forgone experience during maternal leave. Mothers suffer from depreciation of human capital during the leave. So called 'mommy track' is a term used to describe career path of females who became mothers and therefore are worse of in terms of job conditions, lower wages of mothers not entirely explained by experience. The wage gap that occurs is not entirely explained by differences in labour market experience (Waldfogel, 1997). Part of the difference can be explained by scheduling difficulties since mothers have more household chores than non-mothers and smaller experience labour market acquired by mothers(Phipps et al. 2011)

In female labour market participation the increasing trend can not and should not be inverted. Increasing number of divorces and marriage separations as well as increasing number of people living single imposes on women a need to "hedge" their future by improving their opportunities on the labour market.

## State of art- latest results

But within last 20 years an interesting phenomenon occurred: positive correlation of high female labour market participation and high fertility (Esping-Andersen, 2002; Billari and Kohler, 2004; Rindfuss et al. 2003). It was shown by (Adsera 2004) on the panel of 23 countries. In this paper it was also argued that countries with high unemployment and unstable contracts experience larger decreases in fertility[9]. On the contrary countries with large share of public employment and generous parental benefits are able to keep their TFR at levels slightly below $2$[10]. It implies that facilitating social policies that make female employment and childrearing more compatible might be most effective (Brewster and Rindfuss 2000; Esping-Andersen, 2002; Rindfuss et al 2003).

More detailed studies show a positive effect of female education on childbearing (e.g., Hoem and Hoem, 1989; Kravdal, 1992; B. Hoem, 1993; Oláh, 1996). Furthermore highly educated parents are in a better position to make use of private childcare because- higher wages and possibly flexible working hours (Hoem, Prskawetz, and Neyer, 2001; Kravdal, 2001). In Nordic countries, that is Norway and Sweden, generous maternity programs are pointed out as providing strong incentives for women to be employed full time before childbirth (Gustafsson et al. 1996; Ronsen and Sundstrom 1996; Rosen 1996).

Decisions of having more that one child (so called transition to second birth) has risen to an important problem investigated by several researchers. Many of them show the positive relationship between

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[7]Wage assumed to be exogenous, offered on the labour market.

[8]Given the same budget constraint.

[9]Effect is the largest among very young women.

[10]Main example are Scandinavian countries.

education and the transition to second births (Kreyenfeld 2002; Gerster et al. 2007; Kravdal 2001; 2007; Klesment and Puur 2010; Mureşan and Hoem 2010; Billingsley 2011). This effect is assigned both to time-squeeze hypothesis and self-selection.

- In France and western Germany second birth risks are higher for highly educated women than for women with lower education. In western Germany, the positive effect weakens after controlling for the education level of the partner.

- A high educational attainment has a positive effect on second birth rates for Danish one-child mothers during the period 1981-94 (Gerster et al. 2007)

- Kravdal (2001) and Kreyenfeld (2002) suggested a selection hypothesis as a possible explanation for the higher second birth rates for the highly educated.

# Methods

The difference between childlessness, having one or two and more children was considered. We decided to merge all females having at least 2 children since the point of interest are determinants of having more than 1 child. We analyse the number of children as an outcome of sequential consecutive decisions to stress the difference of choices: having children and number of children.
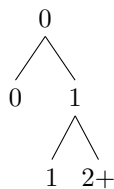
*Number of children - decision tree*

The dependant variable is defined as:

$$seqdzieci = \begin{cases} 0 & \textit{if female is childless} \\ 1 & \textit{if female has 1 child} \\ 2+ & \textit{if female has 2 or more children} \end{cases} \tag{2}$$

We believe that individuals may have expectations about desired quantity of children, but this number might be verified after first one is delivered. This might be the case when preferences change over time or if unexpected life events occur (like job loss or death of spouse). Therefore we use a sequential logit model (Cameron and Trivedi, 2006) which reflects the decision process described above:

$$Pr[y = 2] = Pr[y = 2|y \neq 1] \times Pr[y \neq 1] = \Phi(x_2'\beta_2)(1 - \Phi(x_1'\beta_1))$$

# Data

Our results are estimated with the data extracted from Eurobarometer 65.1 (2006)[11]. This is a survey run in European Union countries. We used data collected Poland (sample size n=1000).

We chose subsample of females aged 23-35, because they are the most probable group to make procreation decisions. The sample is trimmed from above to exclude females with completed fertility. Due to small number od observations we decided to choose significance level at $\alpha = 0.10$.

To describe the fertility decisions we chose following variables:

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[11]European Commission (2012): Eurobarometer 65.1 (2006). TNS OPINION & SOCIAL, Brussels. GESIS Data Archive, Cologne. ZA4505 Data file Version 1.0.1, doi:10.4232/1.10973

- works - [binary] 1- if woman works on the labour market, 0- otherwise,

- partner - [binary] 1- if woman has a partner (husband or other spouse) living in the same household,

- white-col - [binary] 1 if woman is employed as white collar worker (including managers),

- age - age of women measured in years (in 2006),

- years-edu - years of completed education,

- people-in-hh - number of people in the woman's household.

The descriptive statistics of used variables are shown in tables below:

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| works | 118 | .5932203 | .4933279 | 0 | 1 |
| partner | 118 | .7372881 | .441984 | 0 | 1 |
| white-col | 118 | .4237288 | .4962557 | 0 | 1 |

Table 1: Descriptive statistics of binary variables

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| age | 118 | 29.40678 | 3.576364 | 23 | 35 |
| yearsedu | 118 | 18.02542 | 18.70301 | 8 | 91 |
| people-in-hh | 118 | 3.245763 | 1.36461 | 1 | 8 |

Table 2: Descriptive statistics of quantitative variables

## Results

First part of the model -estimated transition from childlessness to having 1 child can be described with standard logit model[12]

$$log\left(\frac{at\ least\ one\ child}{childless}\right) = 0.73works + 1.49age + 6.79partner + 0.87years - edu \tag{3}$$

$$+ 3.35people - in - hh + 0.37white - col \tag{4}$$

Interpretation is therefore also analogical to standard logit interpretation[13]. The probability of having a child by woman ages 23-35 is higher if she has a proper partner[14]. Children decisions are realised by older. Family support also increases chances of having at least one child. Education and having a job have insignificant, although positive impact on probability of having a child.

Second part of the model describes transition from having at least one child to having two or more[15]. This is also a binary choice model:

$$log\left(\frac{more\ than\ one\ child}{one\ child}\right) = 0.12works + 0.79age + 0.54partner + 1.22years - edu \tag{5}$$

$$+ 0.93people - in - hh + 11.05white - col \tag{6}$$

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[12]No constant due to sd(1).

[13]We decided to include statistically insignificant variable estimates in order to keep consistency of both part of the model and to avoid omitting crucial variables.

[14]By 'proper' we understand a partner living in the same household- this implies some sort of decision and commitment made with respect to preferences.

[15]Having more than one child conditional to having at least one.

| children | Odds Ratio | Std. Err. | z | $P >$ $\|z\|$ | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| _1_2v0 | | | | | | |
| works | 0.7371364 | 0.7265457 | -0.31 | 0.757 | 0.1068011 | 5.087681 |
| age | 1.486166 | 0.160921 | 3.66* | 0.000 | 1.201987 | 1.837532 |
| partner | 6.784759 | 5.20323 | 2.50* | 0.013 | 1.509204 | 30.50147 |
| years-edu | 0.8745987 | 0.0900824 | -1.30 | 0.193 | 0.7147207 | 1.07024 |
| people-in-hh | 3.359836 | 1.144522 | 3.56* | 0.000 | 1.723288 | 6.550558 |
| white-col | 0.3757497 | 0.3431149 | -1.07 | 0.284 | 0.0627518 | 2.249942 |
| _2v1 | | | | | | |
| works | 0.1227555 | 0.1548292 | -1.66* | 0.096 | 0.0103618 | 1.454271 |
| age | 0.7927175 | 0.0874081 | -2.11* | 0.035 | 0.6386482 | 0.9839548 |
| partner | 0.5433659 | 0.5215401 | -0.64 | 0.525 | 0.0828098 | 3.565357 |
| years-edu | 1.221293 | 0.1341317 | 1.82* | 0.069 | 0.984769 | 1.514626 |
| people-in-hh | 0.9304593 | 0.265924 | -0.25 | 0.801 | 0.5314044 | 1.629182 |
| white-col | 11.05613 | 14.44237 | 1.84* | 0.066 | 0.8544721 | 143.0567 |

Number of observations = 118
LR chi2(12) = 92.98
Prob > chi2 = 0.0000
Log likelihood = -79.48594
$\alpha = 0,10$
n=118

Table 3: Sequential logit - Females aged 23-35

The probability of having more than one child is higher if woman works. Higher chances for more than one child have older, better educated women with white-collar type of job. In this part of the model partner and number of people in the household are insignificant factors.

It is important to notice that different variables are significant in each part of the model. This is consistent with hypothesis stated at the beginning of this paper. Age is significant variable in both parts of the model- chance of becoming a mother, both for the first or second time, increases for older women. This result confirms general observation that women postpone fertility decisions[16]. But for the rest of variables statistical significance occurs only in either part of the model. While at the first decision partner is a crucial factor, chances for larger family grow if woman is better educated and has a stable, not physically demanding employment[17].

The aim of following decomposition is to investigate the relationship between the effects on each transition and the effects on the final outcome. The decomposition shows marginal effects[18] of variables of interest on each transition. Transition specific effects are measured in terms of log odds ratios. The weight assigned to each transition is the product of: the proportion at risk, the variance, and the expected gain from passing the decision node. Default (mean) values are given in Table 4

## Conclusions

Low fertility is becoming important issue for policy makers and for both young and old cohorts, because if the fertility trends will not revert, young ones still on the labour market will have decreasing ability to produce enough goods for themselves and for rapidly growing group of retired. Therefore it is important to find out determinates of fertility decisions and recover how the process is made. The value added by

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[16]Although within given framework we are not able to decompose age effect into delayed fertility realisation, higher probability of more children for women who decided on late parenthood and time squeeze mentioned in the literature.

[17]All potential variables on female preferences on flexible labour contracts or longer parental leave and available external childcare services turned out to be insignificant in both part of the model and were excluded from estimation.

[18]Which is the derivative of the expected final outcome with respect to the explanatory variables.

| variable | value |
|---|---|
| works | .593 |
| age | 29.4 |
| partner | .737 |
| yearsedu | 18 |
| people-in-hh | 3.25 |
| white-col | .424 |

Table 4: Default level of variables taken into decomposition

| | _1_2v0 | | _2v1 | |
|---|---|---|---|---|
| | b | se | b | se |
| trans | | | | |
| works | -.305 | .986 | -2.1 | 1.26 |
| weight | | | | |
| weight | .359 | .0742 | .159 | .0368 |
| at risk | 1 | . | .661 | .131 |
| variance | .224 | .0421 | .24 | .0329 |
| gain (from passing) | 1.6 | .166 | 1 | . |
| pr(pass) | | | | |
| pr | .661 | .131 | .599 | .166 |
| tot | | | | |
| works | -.442 | .42 | | |

Table 5: Work effect decomposition

| | _1_2v0 | | _2v1 | |
|---|---|---|---|---|
| | b | se | b | se |
| trans | | | | |
| partner | 1.91 | .767 | -.61 | .96 |
| weight | | | | |
| weight | .359 | .0742 | .159 | .0368 |
| at risk | 1 | . | .661 | .131 |
| variance | .224 | .0421 | .24 | .0329 |
| gain | 1.6 | .166 | 1 | . |
| pr(pass) | | | | |
| pr | .661 | .131 | .599 | .166 |
| tot | | | | |
| partner | .59 | .376 | | |

Table 6: Partner effect decomposition

| | _1_2v0 | | _2v1 | |
|---|---|---|---|---|
| | b | se | b | se |
| trans | | | | |
| white-col | -.979 | .913 | 2.4 | 1.31 |
| weight | | | | |
| weight | .359 | .0742 | .159 | .0368 |
| at risk | 1 | . | .661 | .131 |
| variance | .224 | .0421 | .24 | .0329 |
| gain | 1.6 | .166 | 1 | . |
| pr(pass) | | | | |
| pr | .661 | .131 | .599 | .166 |
| tot | | | | |
| white-col | .0302 | .398 | | |

Table 7: White collar job effect decomposition

| | _1_2v0 | | _2v1 | |
|---|---|---|---|---|
| | b | se | b | se |
| trans | | | | |
| years-edu | -.134 | .103 | .2 | .11 |
| weight | | | | |
| weight | 359 | .0742 | .159 | .0368 |
| at risk | 1 | . | .661 | .131 |
| variance | .224 | .0421 | .24 | .0329 |
| gain | 1.6 | .166 | 1 | . |
| pr(pass) | | | | |
| pr | .661 | .131 | .599 | .166 |
| tot | | | | |
| years-edu | -.0163 | .0548 | | |

Table 8: Years of education effect decomposition

this paper is showing that to have first child women need a proper partner. But to have more children they also need proper, stable job. This result is important, because it shows that supporting female labour market participation is important issue not just to support current gross domestic product, but is also a way to improve polish demographic structure. Additionally, our results are contrary to common belief that women sacrifice their family life for better career opportunities. In fact it turns out to be opposite- women work to afford for children. Therefore policies supporting fertility should be oriented to protect women on labour market and support their participation.

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