Influence of fertility on women participation in labour market and their wages.
Alternative cost of having a child.

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Some widely known phenomena occurring in industrialized world

☞ changing function of woman in family – from housewife to breadwinner

☞ mother is tought to be a worse employee

☞ effects:

➤ delay in decision of setting up family and having children
➤ dramatic decrease in fertility

Our research issue

☞ How strong is influence of decision of having a child on participation in labour market?

☞ How large part of her income a woman loses as a result of maternity?

Econometric problems

☞ self-selection of working women

☞ endogeneity of fertility in participation equation

Scope of research

☞ two countries – Poland and Germany

☞ two patterns of data – cross-section and panel

☞ considered observations – married women in age brackets 18-55

Data sources

☞ Poland:

➢ panel data – CHER (Consortium of Household Panels for European Socio-
  economic Research) 1997-2000
  ✰ 980 women
➢ cross-sectional data – 1998 survey of Polish Central Statistical Office
 ✰ 13.316 women

☞ Germany:

➢ panel data – CHER 1990-2000
  ✰ 950 women
➢ cross-sectional data – CHER 1998 (one wave from above panel)
  ✰ 950 women

Variables

☞ labour market participation (y_{it})

☞ income from employment of woman and her husband as well as other income of household; all of them seasonally adjusted and deflated using CPI

☞ dummy for fertility (d_{it}):

   ➢ Poland – child at age up to 11 months (determined by month and year of birth) and (in case of panel data) number of children increased in comparison with previous year

   ➢ Germany – child at age of 0 or 1 (lack of data for month of birth) and number of children increased in comparison with previous year

☞ other maternity indicators – dummies for children at age 1-2, 3-6, 6-16

☞ socio-economic characteristic of woman – age, level of education, house ownership, residence (country, city, big city – only for Polish data)

Additional variable

☞ instrument for fertility (z_{it}) – whether the first two children is of the same gender (Angrist, Evans 1996)
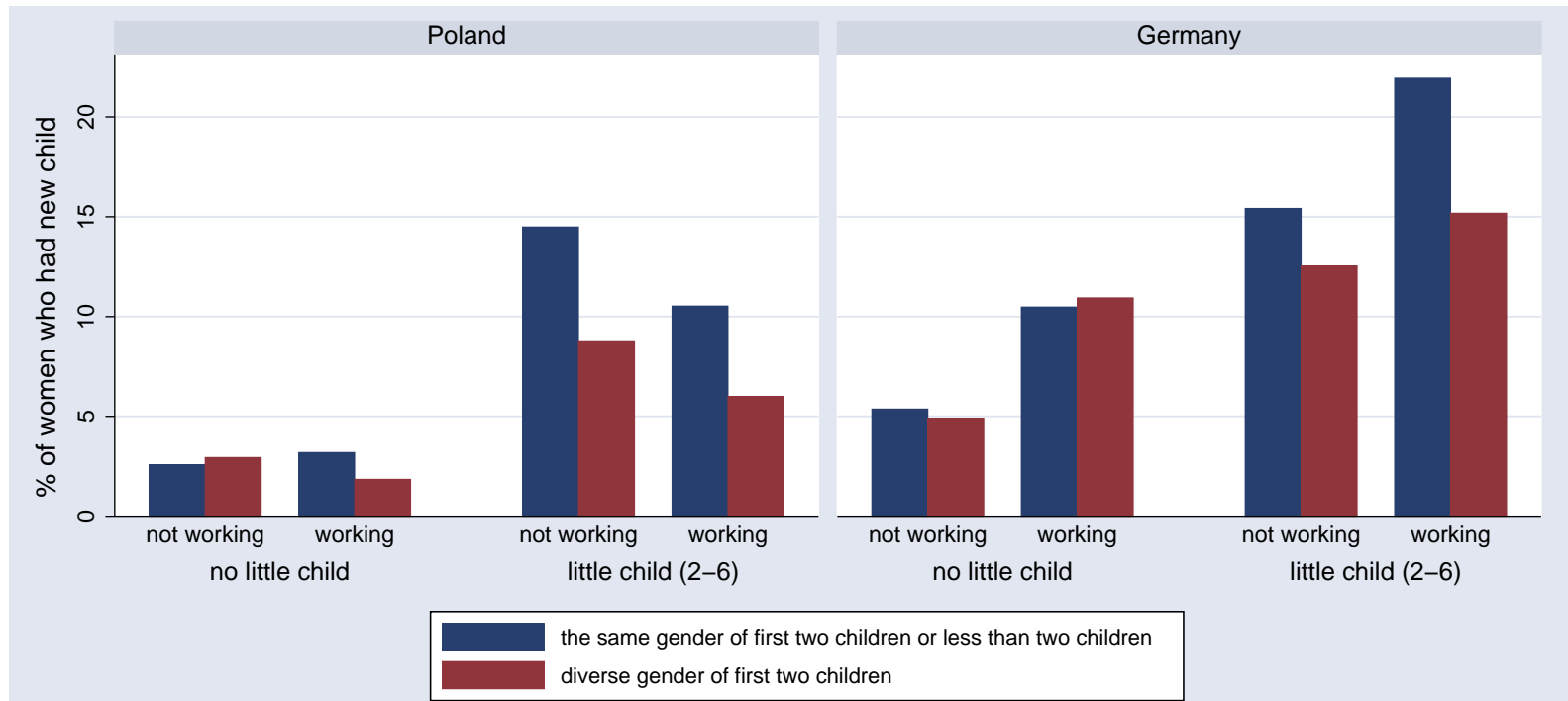
Estimated models for labour market participation

☞ cross-sectional

➢ with exogenous fertility

$$y_i = I\left(\alpha_0 + \alpha_1 d_i + \beta_0 x_i + \beta_1 x_i d_i + \nu_i \geq 0\right) \tag{1}$$

where $(\nu_i \mid x_i, d_i) \sim N(0, 1)$

➢ with endogenous fertility – (1) and additionally

$$d_i = I\left(\lambda_0 + \lambda_1 x_i + \lambda_2 z_i + \varepsilon_i \geq 0\right) \tag{2}$$

where $((\nu_i, \varepsilon_i) \mid x_i, z_i) \sim N(\mathbf{0}, \mathbf{I})$

Estimated models for labour market participation

☞ longitudinal

➢ with exogenous fertility

$$y_{it} = I\left(\alpha_0 + \alpha_1 d_{it} + \beta_0 x_{it} + \beta_1 x_{it} d_{it} + \eta_i + \nu_{it} \geq 0\right) \qquad (3)$$

➢ multinomial logit – trial to check for endogeneity
(4 categories for combinations of participation and fertility)

$$P\left(f\right) = \frac{\exp\left(V^f\right)}{\sum_{a=1}^{4} \exp\left(V^a\right)} \qquad (4)$$

where $\exp\left(V^1\right) = 1$, $V_{it}^a = \alpha^a + \beta^a x_{it} + \eta_i^a + \nu_{it}^a$

Results of estimation

(1) cross-sectional model for labour market participation with exogenous fertility

predictors	Poland	Germany
newborn child	-0.2631 (0.0733)	-
children at 1-2	-0.6916 (0.0530)	-
children at 3-6	-0.3803 (0.0307)	-0.8216 (0.1369)
children at 6-16	-	-0.5348 (0.1105)
newborn child together with children at 1-6	0.1920 (0.1160)	-
age	-	-0.0295 (0.0092)
does husband work	-	0.3397 (0.1353)
husband's income from employment (per hour)	-0.0206 (0.0020)	-0.0073 (0.0023)
other household income	-0.0022 (0.0001)	-0.0007 (0.0001)
secondary education	0.5322 (0.0261)	0.3814 (0.1070)
university education	1.3092 (0.0539)	0.9938 (0.1273)
number of children	0.0895 (0.0112)	-
lives in a big city (more than 0.5 mln)	0.2011 (0.0397)	/
lives in the country	0.0907 (0.0299)	/
house ownership	0.1587 (0.0262)	-
intercept	-0.2314 (0.0309)	1.4851 (0.4536)

Results of estimation

(2) cross-sectional model for labour market participation with endogenous fertility – participation equation

predictors	Poland	Germany
newborn child	-0.3370 (0.1210)	-1.5215 (0.4571)
children at 1-2	-0.7174 (0.0530)	-
children at 3-6	-0.3991 (0.0312)	-0.7495 (0.1325)
children at 6-16	-	-0.4775 (0.1062)
newborn child together with children at 1-6	0.2864 (0.1149)	-
age	-	-0.0305 (0.0089)
does husband work	0.2136 (0.0343)	0.3777 (0.1298)
husband's income from employment (per hour)	-0.0249 (0.0021)	-0.0051 (0.0023)
other household income	-0.0022 (0.0001)	-0.0006 (0.0001)
secondary education	0.5185 (0.0262)	-
university education	1.3015 (0.0540)	-
number of children	0.0805 (0.0114)	-
lives in a big city (more than 0.5 mln)	0.1979 (0.0397)	/
lives in the country	0.0825 (0.0301)	/
house ownership	0.1587 (0.0262)	-
intercept	0.1077 (0.0368)	1.8252 (0.4349)

Results of estimation

(2) cross-sectional model for labour market participation with endogenous fertility – fertility equation

predictors	Poland	Germany
the same gender of two first children	0.3058 (0.0504)	-
children at 1-2	-0.7074 (0.0939)	-
children at 3-6	-0.1890 (0.0495)	-0.7890 (0.3400)
children at 6-16	-	-1.1607 (0.3924)
age	-0.1054 (0.0042)	-0.1708 (0.0315)
husband's income from employment (per hour)	-	0.0161 (0.0048)
other household income	-0.0006 (0.0001)	-
university education	0.2635 (0.0713)	-
number of children	-	0.6875 (0.1643)
lives in the country	0.1594 (0.0492)	/
intercept	1.7026 (0.1373)	3.2231 (1.1338)

Results of estimation

(3) longitudinal model for labour market participation with exogenous fertility and random effects

predictors	Poland	Germany
newborn child	-0.7526 (0.2885)	0.5412 (0.1022)
children at 1-2	-1.2414 (0.1856)	-0.3306 (0.0827)
children at 3-6	-0.5325 (0.1180)	-0.5036 (0.0518)
children at 6-16	-	-0.1752 (0.0583)
newborn child together with children at 1-6	0.9637 (0.2582)	-
age	0.06576 (0.0123)	-
does husband work	0.4710 (0.1686)	0.2846 (0.0651)
other household income	-0.0103 (0.0008)	-0.0014 (0.0001)
years of education	0.3667 (0.0408)	0.1755 (0.0191)
number of children	-	-0.1616 (0.0378)
lives in the country	-0.5433 (0.1846)	/
intercept	-6.2890 (0.7504)	-1.1551 (0.2481)

Results of estimation

(4) multinomial logit for interaction of labour market participation and fertility

☞ Poland

> ➤ random individual effects are significant and very strongly correlated for all categories
> ➤ there is no reason to reject hypothesis of independence of both decisions
> ➤ neglect of endogeneity should not influence our results

☞ Germany

> ➤ random effects are insignificant
> ➤ prediction value of model is very poor (probabilities of choice of an alternative are almost equal for women who actualy chose it and for those who did not)

Estimated models for income from employment

☞ simple regression

☞ models with self-selection, where as selection equation are used various models for labour market participation

Final results – estimation of loss of monthly income caused by decision of having children

Poland	without self-selection		with self selection	
cross-section	loss in zł	% of childless woman income	loss in zł	% of childless woman income
woman with newborn child	232.16	25.50	232.45	25.54
woman with newborn child and child at 1-2	300.78	33.05	331.18	36.39
woman with newborn child and child at 3-6	247.01	27.14	255.39	28.06
woman with newborn child, child at 1-2 and child at 3-6	414.39	45.50	452.44	49.71

Average income of working childless woman (1998) – 910.20 zł.

Final results – estimation of loss of monthly income caused by decision of having children

Poland	without self-selection		with self selection	
panel	loss in zł	% of childless woman income	loss in zł	% of childless woman income
woman with newborn child	150.79	16.57	140.76	15.47
woman with newborn child and child at 1-2	279.91	30.75	215.41	23.67
woman with newborn child and child at 3-6	222.63	24.46	193.35	21.24
woman with newborn child, child at 1-2 and child at 3-6	351.76	38.65	268.01	29.45

Average income of working childless woman (1998) – 910.20 zł.

Final results – estimation of loss of monthly income caused by decision of having children

Germany	without self-selection		with self selection	
cross-section	loss in euro	% of childless woman income	loss in euro	% of childless woman income
woman with one child	371.31	11.38	282.59	6.13
woman with one child at 3-6	1293.59	39.64	1291.51	28.02
woman with two children	742.71	22.76	565.17	12.26
woman with two children, both at 3-6	2587.27	79.29	2583.01	56.05
woman with child at 3-6 and child at 6-16	2161.20	66.23	2197.87	47.69
woman with three children	1114.11	34.14	847.76	18.39

Average income of working childless woman (1998) – 2803.11 euro.

Final results − estimation of loss of monthly income caused by decision of having children

Germany	without self-selection		with self selection	
panel	loss in euro	% of childless woman income	loss in euro	% of childless woman income
woman with newborn child	387.16	16.78	586.45	36.32
woman with newborn child and child at 1-2	1370.72	59.42	1312.81	81.31
woman with newborn child and child at 3-6	1068.58	46.33	907.94	56.23
woman with newborn child, child at 1-2 and child at 3-6	1527.41	66.22	1206.52	74.72

Average income of working childless woman (1998) − 2803.11 euro.