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Does motherhood explain lower wages for females in Macedonia? Evidence from repeated imputations and semi– and non–parametric decomposition
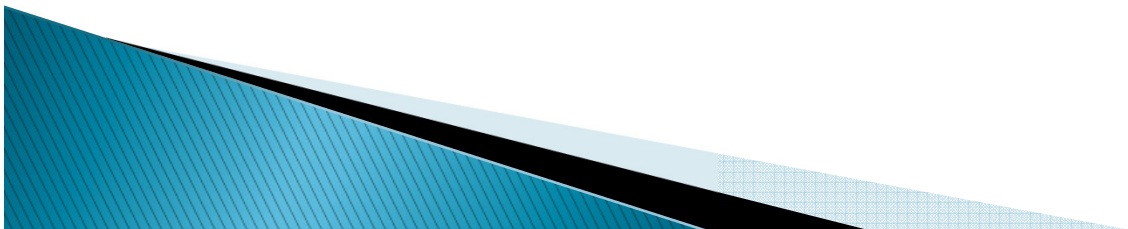
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FINANCE THINK
OUT OF THE BOX

Agenda

- Motivation
- Objectives
- Stylized facts
- Literature overview
- Model, methodology and data
- Results and discussion
- Conclusions

Motivation

- The gender wage gap in Macedonia – when workers' characteristics and selectivity bias into employment have been taken into account – is about 7.5%
- Female's role as mother is a possible explanation of the residual gap
- Potential reasons
  - different productivity of mothers versus childless women or men
  - different employer's expectations for mother's productivity than compared to other workers;
  - different perceptions of employers for the work of mothers; and others.

Objectives

▸ First, to calculate the differences in wages between mothers and childless women (motherhood wage gap);

▸ Second, to estimate its contribution for the gender wage gap in Macedonia; and,

▸ Third, to decompose the selection-adjusted gaps at deciles by referring to semi- and non-parametric approaches.
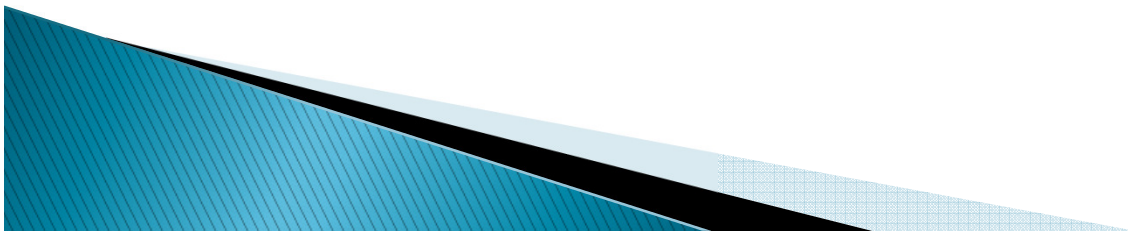
Stylized facts– labor market status

Labor market status	Men	Women	Childless women	Mothers
Employed	59.4	40.1	49.9	36.9
Unemployed	40.4	29.3	36.8	26.7
Inactive	0.3	30.6	13.4	36.4

Source: Author's calculation based on SILC
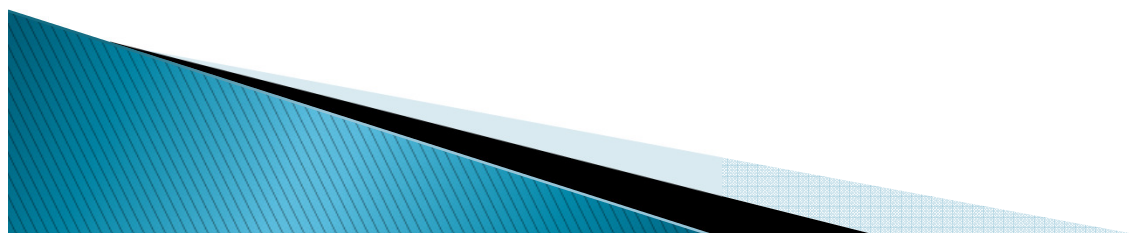
Stylized facts– gender wage gap

Unadjusted wage gap

	Gender / Motherhood pay gap
All women compared to all men	-12.5
Childbearing-age women compared to child-bearing-age men (gender wage gap)	-14.1
Mothers compared to childless women (motherhood wage gap)	-8.7
Mothers compared to fathers	-21.9
Mothers compared to all men	-16.8
Source: Author's calculation based on SILC	
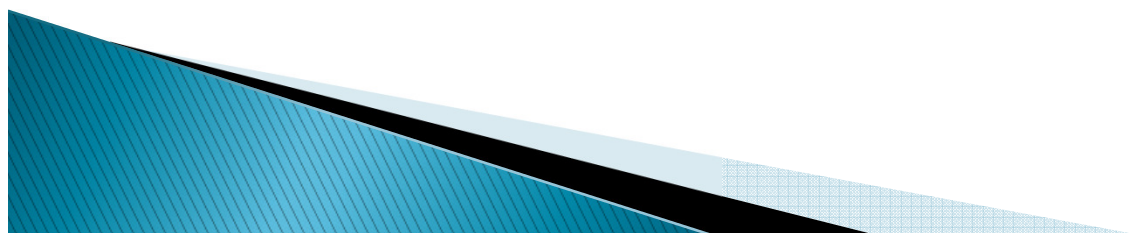
Stylized facts– gender wage gap

Gender wage gap against i) gender employment gap (left) and ii) gender participation gap (right), at different levels of education for childbearing-age individuals (24-45)
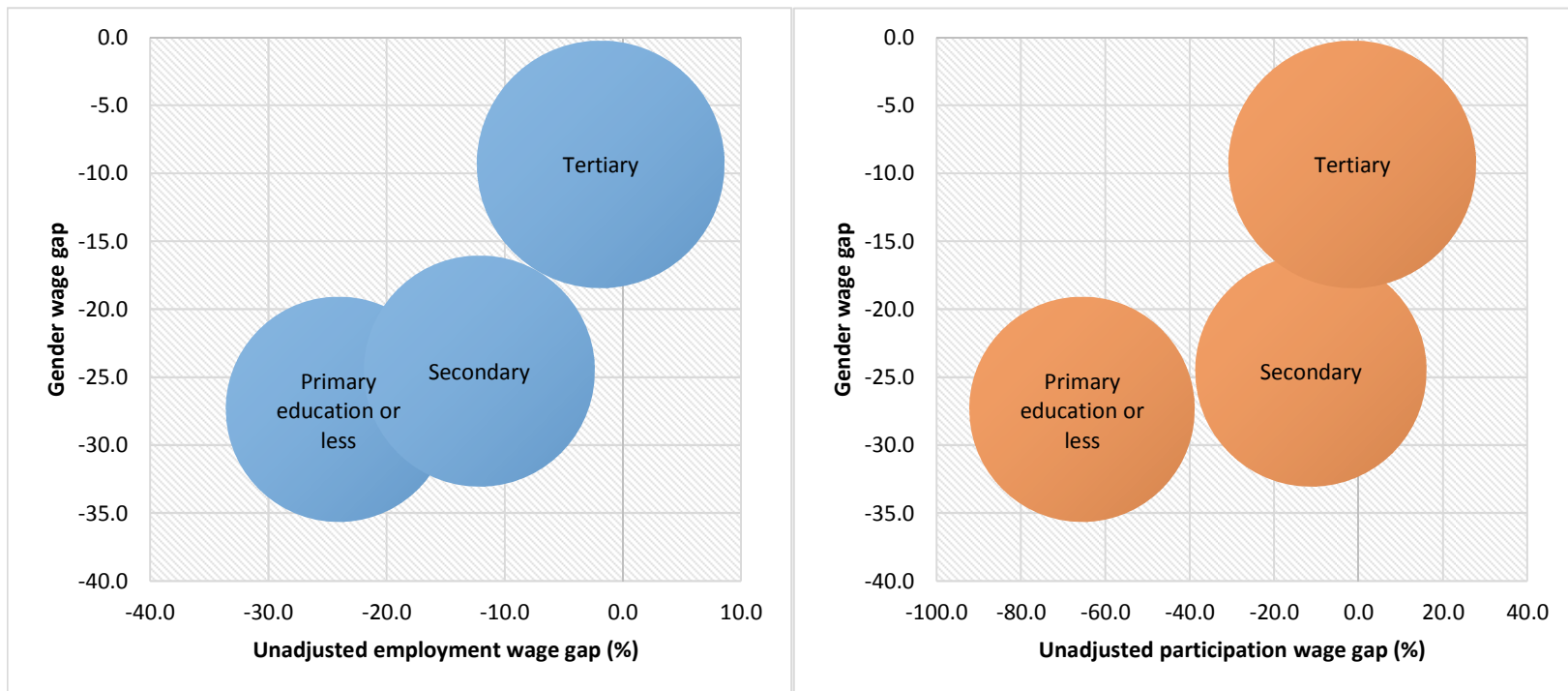
Source: Authors' calculations based on SILC 2010
Note: The size of the circles represents the size of the females' wage.

Stylized facts- motherhood wage gap

Motherhood wage gap against i) motherhood employment gap (left) and ii) motherhood participation gap (right), at different levels of education for childbearing-age women (24-45)
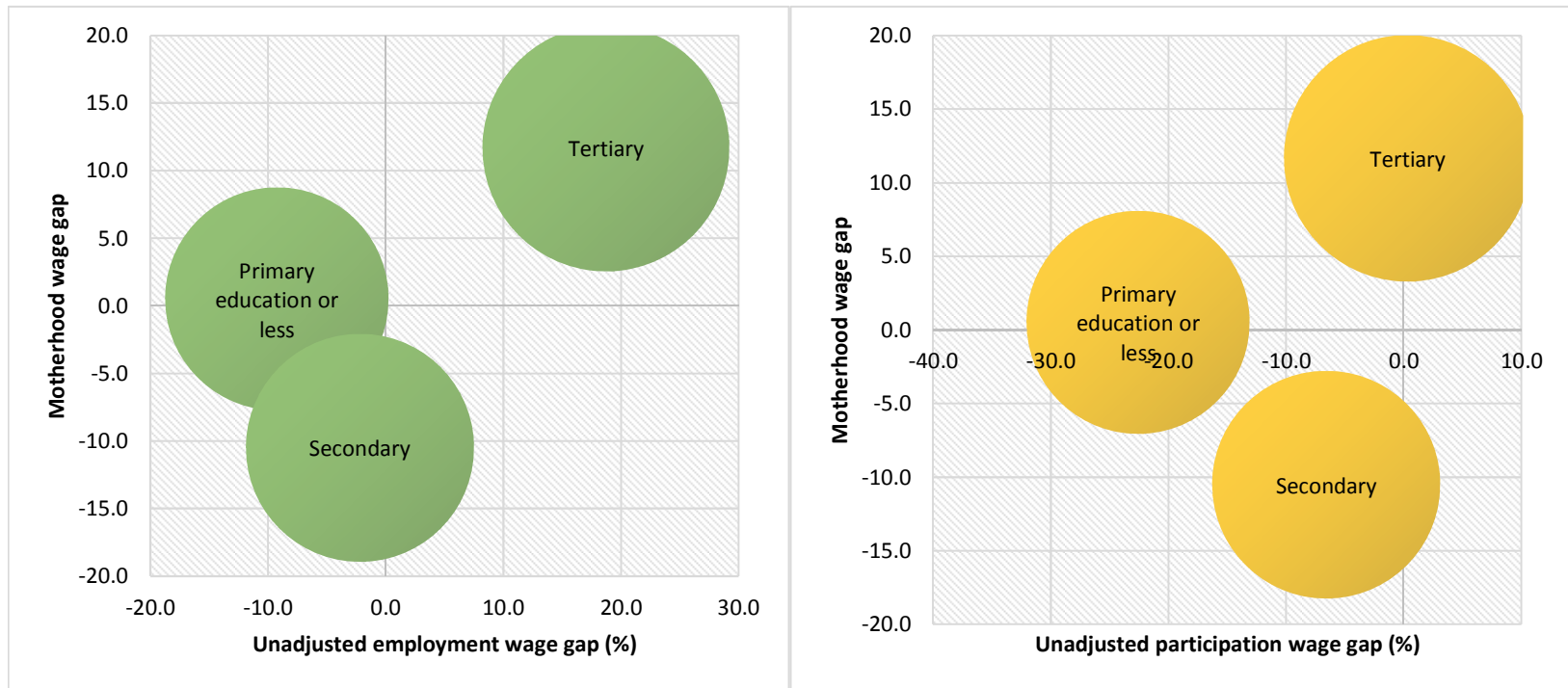

Source: Authors' calculations based on SILC 2010
Note: The size of the circles represents the size of the mothers' wage.

Stylized facts –gender and motherhood wage gaps

- The unadjusted motherhood wage gap is likely lower than the gender wage gap, but mainly driven by women in a secondary-education group;
- Childbearing-age women outside the labor market are likely not those with the worst labor-market characteristics (negative selection), reflecting the high reservation wages;
- Childbearing-age mothers outside the labor market are likely with worse labor-market characteristics (positive selection) but the result is likely driven by the secondary-education group and not the entire cohort;
- Hence, motherhood may actually explain a part of the gender wage gap, potentially correcting it downwards.

Literature overview

▸ Literature on gender wage gaps and their interferences with the gender employment and participation gaps (Gronau (1974); Beblo et al. (2003); Blau and Kahn (2003); Albrecht et al. (2004); Azmat et al. (2004); Neal (2004); Fotin (2005); Petrongolo and Olivetti (2008))

  ◦ the selection into employment or into the labor market;
  ◦ studies correcting for selection mainly rely on the Heckman (1979) method;

Literature overview

- Literature on motherhood wage gap (Ermisch and Wright, 1993; Joshi and Paci, 1998; Makepeace, 1987; Joshi and Newell, 1989; Hill, 1979; Korenman and Neumark, 1992; Waldfogel, 1997a,b; Joshi, 1991)
  - important component of the gender wage gap (Waldfogel, 1998a)
  - variety of wage differentials:
    - between full- and part-time workers
    - between married and single women
    - between mothers and childless women
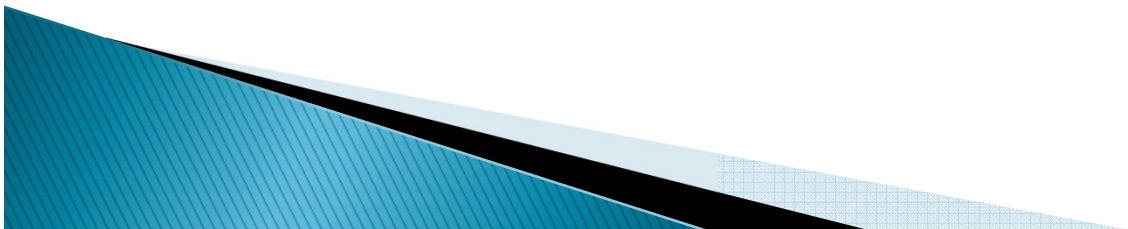
Literature overview

- Why mothers may have lower wages than childless women?
  - Becker's (1993) human capital theory, based on individual productivity;
  - Mothers may trade-off higher wages for "mother-friendly" jobs that are easier to combine with parenting;
  - Because needs of their children leave them exhausted or distracted at work, making them less productive, or simply limit options to travel, stay overtime and the like (Gangl and Ziefle, 2009);
  - Employers may discriminate against mothers;
 - Unobservable factors

Model

- Mincer's (1974) human capital earnings function

$$ln(y_t) = \alpha + \beta_1 gender_i + \beta_2 mother_i + \Sigma\gamma_j * X'_t + \epsilon_i$$

- Whereby $ln(y_t)$ is the log of the hourly wage;
- $gender_i$ is a dummy variable taking a value of 1 for females and zero for males; and $mother_i$ is a dummy variable taking a value of 1 for females with at least one child below the age of 18;
- β_1 measures the gender wage gap, while β_2 the motherhood wage gap;
- X'_t is s vector of labor-market characteristics, including: education, age and its square, experience, marriage and the like.
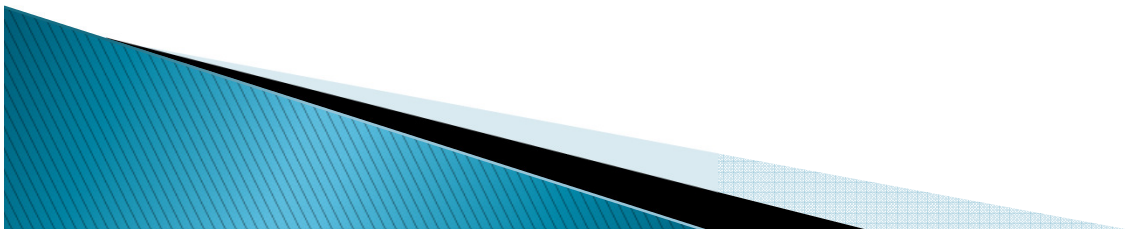
Methodology

- Repeated imputation technique – imputing missing wages for those who are not in employment and hence have an unobserved wage;
  - it is based on median regressions (Rubin, 1987)
  - does not require assumptions on the actual level of missing wages, as usually required in the matching approach;
  - nor it requires arbitrary exclusion restrictions and lack of robustness (Manski, 1989) raised in Heckman (1979) models.

Methodology

- Missing wages calculation
  - We estimate the probability of each individual belonging above or below their gender-specific/motherhood-specific median;
  - Assumption relates to individual's observable characteristics;

$$Pr(m_t) = \alpha + \Sigma\gamma_j * Z'_t + u_i$$

Whereby the Z_t vector includes: education, experience, age, its square, marital status, number of children below the age of 3, and between the ages of 3 and 6, and spouse's income (but not gender and motherhood)
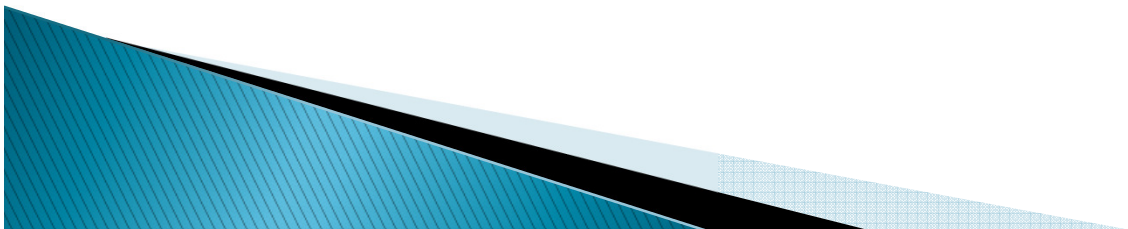
Methodology

- Decomposition of the gaps at deciles:
  - by utilizing weights that equalize the empirical distributions of the explanatory variable (Barsky et al. 2002);
  - by replacing the log wages with the recentered influence function (Firpo et al. 2007);
  - as well by utilizing their combination.
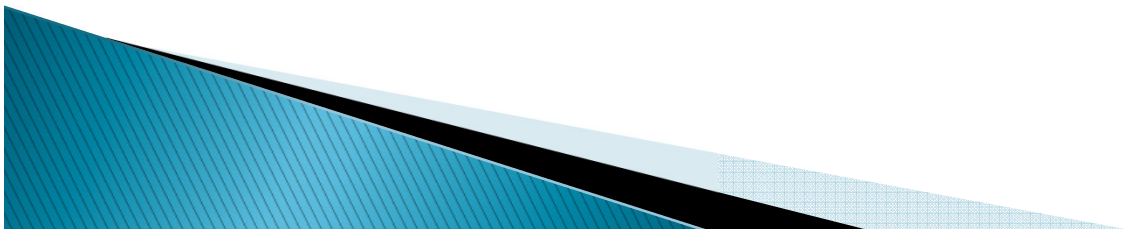
Data

- Survey of Income and Labour Conditions (SILC)
- Representative sample of Macedonian individuals and their households.
- Representative sample of about 13,800 individuals, out of which about 3.000 belong to the childbearing-age cohort of between 24 and 45 years of age.

Results–Gender and motherhood wage gaps in an OLS regression

	Entire sample				Females' sample	
	Raw gaps		Adjusted gaps		Raw gap	Adjusted gap
	(1)	(2)	(3)	(4)	(5)	(6)
Gender	-0.141***	-0.0811*	-0.204***	-0.145***		
	(0.030)	(0.044)	(0.026)	(0.042)		
Mother		-0.0870*		-0.0862*	-0.0870*	-0.00089
		(0.050)		(0.048)	(0.050)	(0.059)
Secondary education			0.185***	0.186***		0.203***
			(0.035)	(0.035)		(0.056)
Tertiary education			0.728***	0.727***		0.790***
			(0.041)	(0.041)		(0.061)
Age			0.00513	0.0122		0.031
			(0.029)	(0.029)		(0.048)
Age squared			-0.00022	-0.00033		-0.00056
			(0.000)	(0.000)		(0.001)
Experience			0.0185***	0.0184***		0.0187***
			(0.003)	(0.003)		(0.005)
Marital status (1=married)			0.0475	0.0671*		-0.124*
			(0.033)	(0.036)		(0.067)
Contract (1=fulltime)			0.219***	0.220***		0.257***
			(0.038)	(0.037)		(0.057)
Constant	4.220***	4.220***	3.662***	3.535***	4.139***	3.046***
	(0.018)	(0.018)	(0.494)	(0.501)	(0.040)	(0.816)
Observations	1,488	1,488	1,445	1,445	634	627
R-squared	0.015	0.017	0.257	0.259	0.004	0.305

*Source: Authors' calculations. *, ** and *** denote statistical significance at the 10, 5 and 1% level, respectively. Estimates are robust to heteroskedasticity. Standard errors given in parentheses.*

Results–Gender and motherhood wage gaps in OLS regression – by education

Dependent variable: Log of the net hourly wage

	Entire childbearing-age cohort		Only childbearing-age women
	(1)	(2)	(3)
Primary			
Female	-0.317***	-0.267***	
	(0.065)	(0.097)	
Mother		-0.0654	-0.0718
		(0.107)	(0.133)
Secondary			
Female	-0.235***	-0.153***	
	(0.034)	(0.053)	
Mother		-0.119*	-0.0106
		(0.063)	(0.074)
Tertiary			
Female	-0.0753	-0.0278	
	(0.052)	(0.084)	
Mother		-0.0759	0.0109
		(0.099)	(0.129)

*Source: Authors' calculations. *, ** and *** denote statistical significance at the 10, 5 and 1% level, respectively. Estimates are robust to heteroskedasticity. Standard errors given in parentheses. Labor-market characteristics not shown due to space.*

Results–Probit regression for assigning an individual without observed wage below or above the median

	Dependent: Dummy 1=if wage above median	
	Entire childbearing-age cohort	**Only childbearing-age women**
Age	0.0105	-0.324
	(0.071)	(0.226)
Age squared	-0.00062	0.00453
	(0.001)	(0.003)
Secondary education	0.558***	0.797**
	(0.117)	(0.401)
Tertiary education	1.793***	1.968***
	(0.137)	(0.442)
Experience	0.0582***	0.0595***
	(0.008)	(0.020)
Marital status (1=married)	0.068	
	(0.101)	
Spouse's income	0.00199***	0.00868***
	(0.001)	(0.003)
Number of children below the age of 3	0.146	0.282
	(0.091)	(0.233)
Number of children between the ages of 3 and 6	-0.0128	0.0248
	(0.069)	(0.191)
Constant	-1.047	3.38
	(1.207)	(3.870)
Observations	1,488	242
*Source: Authors' calculations. *, ** and *** denote statistical significance at the 10, 5 and 1% level, respectively. Marginal effects reported. Standard errors given in parentheses.*		

# Results–Gender and motherhood wage gap with repeated imputations (100)

Dependent variable: Log of the net hourly wage

	Entire childbearing-age cohort			Only childbearing-age women					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Female	-0.0820***	-0.0823***	-0.0761**						
	(0.025)	(0.025)	(0.038)						
Mother			-0.00906	-0.069*	0.0332	0.0418	0.00456	0.0008	0.00232
			(0.042)	(0.041)	(0.050)	(0.051)	(0.068)	(0.068)	(0.067)
Secondary education		0.0158	0.0153		-0.0479	-0.0282	-0.0209	-0.0203	-0.0216
		(0.030)	(0.030)		(0.048)	(0.047)	(0.047)	(0.047)	(0.047)
Tertiary education		0.501***	0.500***		0.404***	0.425***	0.434***	0.434***	0.433***
		(0.039)	(0.040)		(0.061)	(0.058)	(0.058)	(0.058)	(0.058)
Age		0.0179	0.0187		0.0117	0.0265	0.0203	0.0235	0.0195
		(0.024)	(0.024)		(0.039)	(0.040)	(0.040)	(0.041)	(0.041)
Age^2		-0.0003	-0.0003		-0.0001	-0.00037	-0.00028	-0.00031	-0.00027
		(0.000)	(0.000)		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Experience		0.009***	0.009***		0.00431	0.00439	0.00479	0.00477	0.00489
		(0.002)	(0.002)		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Marital status (1=married)		0.0491	0.0511		-0.0688	-0.0401	-0.0446	-0.0472	-0.0425
		(0.031)	(0.032)		(0.061)	(0.061)	(0.061)	(0.062)	(0.061)
Log of spouse's income						-0.0191	-0.0185	-0.0186	-0.0184
						(0.013)	(0.013)	(0.013)	(0.013)
Number of children							0.0219	0.02	0.0263
							(0.025)	(0.026)	(0.027)
Children below the age of 3								0.026	0.026
								(0.051)	(0.051)
Children between the ages of 3 and 6									-0.0161
									(0.037)
Constant	4.143***	3.705***	3.693***	4.102***	3.783***	3.531***	3.626***	3.562***	3.647***
	(0.019)	(0.406)	(0.409)	(0.040)	(0.663)	(0.673)	(0.679)	(0.699)	(0.682)
Observations	3,018	3,018	3,018	1,579	1,579	1,579	1,579	1,579	1,579

*Source: Authors' calculations. *, ** and *** denote statistical significance at the 10, 5 and 1% level, respectively. Estimates are robust to heteroskedasticity. Standard errors given in parentheses.*

Results–main conclusions after repeated imputations

- Results suggest that selection could explain about 12 percentage points of the gender wage gap in Macedonia;
- Characteristics do not explain portion of the gender wage gap further to that explained by selection, including motherhood;
- Selection does not play any role for the difference in wages between mothers and childless women;
- The motherhood wage gap is found insignificant.
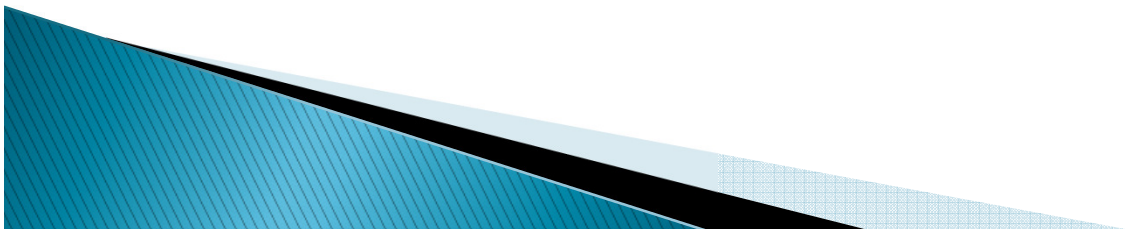
Results– Densities of wages by gender/motherhood (left) and gender/motherhood differential by decile (right)
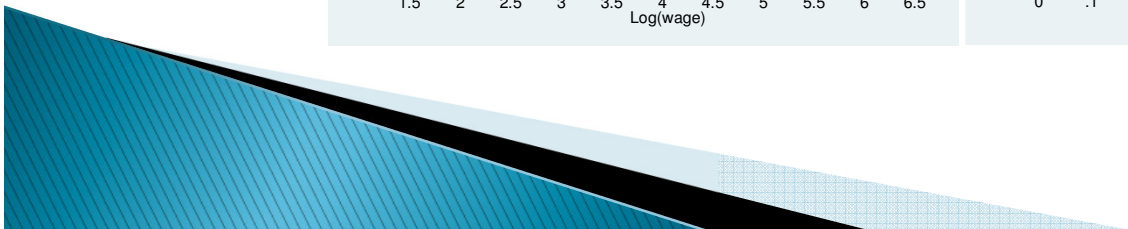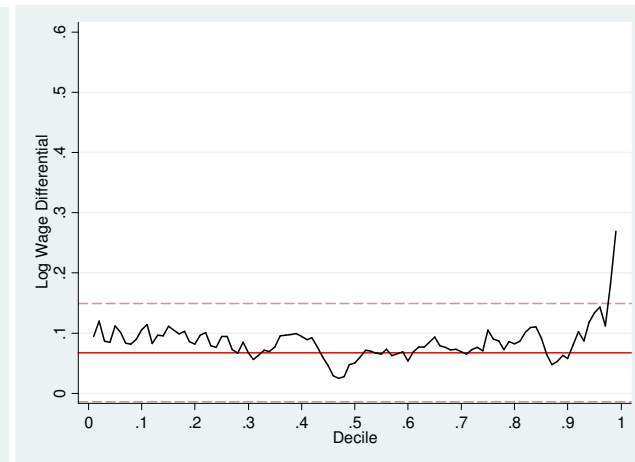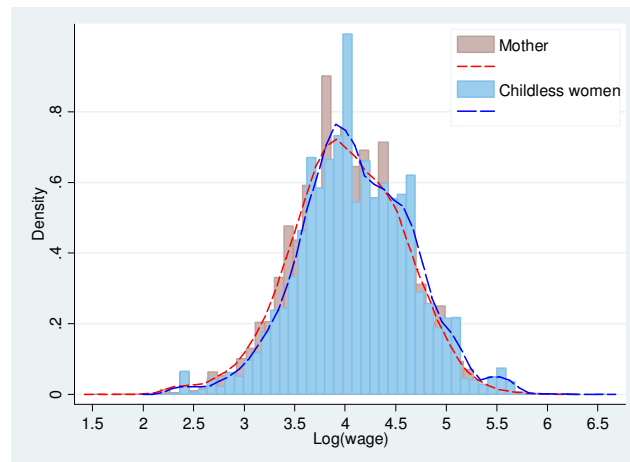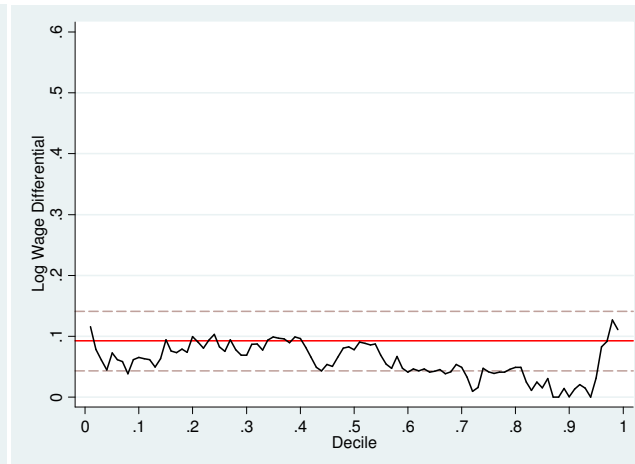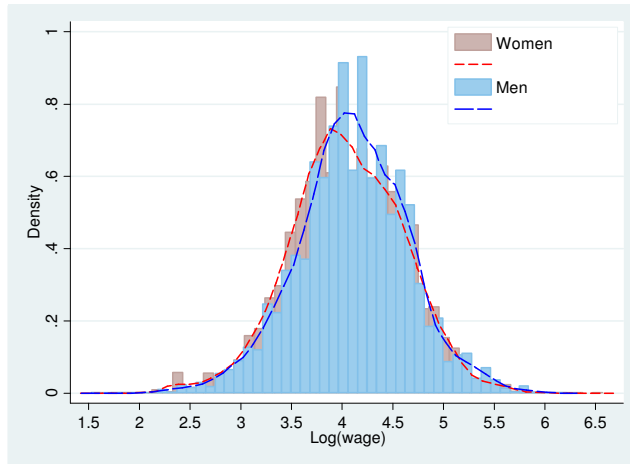
Results – Densities of wages by gender/motherhood (left) and gender/motherhood differential by decile (right), after reweighting
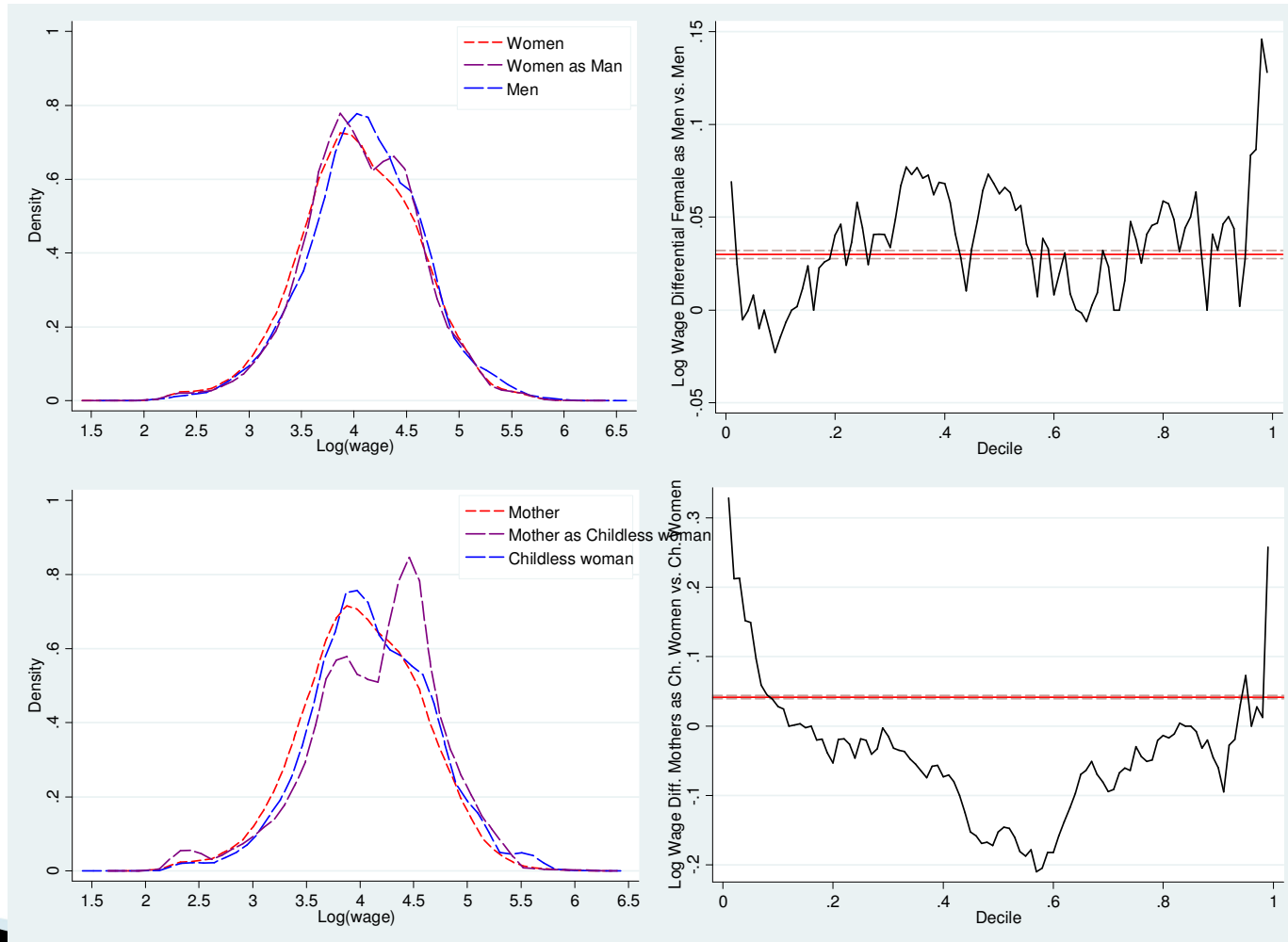
Results– Gender and motherhood wage gaps, decomposed on explained and unexplained part

- The gender wage gap, after workers' characteristics and selectivity have been considered, exists along the entire wage distribution, with potentially declining size in the right half of it and vanishing for the highest-paid jobs;
- At each decile, generally small portion of the gender wag gap could be attributed to the education, age, experience and marriage;
- The existent difference in the wages between mothers and childless women could be entirely, if not overly, explained by characteristics, at any point of the wage distribution.

Conclusions

- Adjusted gender wage gap for individual characteristics in Macedonia is 7-8%;
- Selection has been found to explain about 60% of the existing gender wage gap;
- Motherhood wage gap does not exist and, hence, does not contribute to explaining the gender wage gap;
- The apparent difference in wages between mothers and childless women could be entirely, if not overly, explained by characteristics, at any point of the wage distribution.