Does a Child Penalty Exist in the Post-apartheid South African Labour Market?

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By

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Does a Child Penalty Exist in the Post-apartheid South African Labour Market?

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Abstract

This study examines whether there exists a motherhood (or child) penalty for female employees in post-apartheid South Africa using three cross sections of data between 2001 and 2007. The Mincerian regression results indicate that a motherhood penalty exists, ceteris paribus. Using unconditional quantile regressions (RIF-OLS) to analyse the wage returns along the wage distribution, the study finds that there exists a motherhood wage penalty at lower wage levels, but this effect wanes in prominence at higher wage quantiles. At higher wage levels, mothers earn higher wages than their child-free counterparts, especially if they are married. Furthermore, the study applies Oaxaca-Blinder type decompositions within the RIF framework to decompose changes in the motherhood wage gap along the distribution into explained and unexplained contributions related to a range of factors. The decomposition results indicate that at lower quantiles, the wages of mothers minus wages of non-mothers is negative, but the relationship alternates at higher quantiles. Moreover, majority of the wage differential between mothers and non-mothers is due to unexplained characteristics. This implies that there are additional relevant factors such as societal norms, selection effects into employment and behavioural characteristics to be considered when analysing women's wage returns.

Keywords: Motherhood wage gap; child penalty; wage differential; Mincerian regression; recentered influence function (RIF); decomposition; South Africa

1. Introduction

Currently, women in South Africa represent 45.1% of the employed[11] population (QLFS, 2017). While women have come a long way in terms of gains in the labour market, they are still less likely to have successful careers than men (Bhorat & Goga, 2013), more so if they have children. Globally, women who participate in the labour market are susceptible to social norms and prejudices both inside and outside the workplace. As more women enter the labour force, topics such as childbearing and how the workplace adjusts to childbearing and child-caring matter.

Although many studies have investigated the gender wage gap in South Africa (Bhorat & Gogga, 2013; Bosch, 2015), none have analysed the motherhood wage gap, or penalty. There seems to exist a gap between the earnings of women with children versus the earnings of women without children. It is postulated that women with children tend to earn less than women without children. The motherhood pay gap is also known as the family or child wage gap, reflecting the fact that sometimes it measures the pay gap between mothers and non-mothers but, in most econometric studies, measures women without dependent children (Grimshaw & Rubery, 2015). The incidence of mothers earning less than non-mothers pulls the average earnings of women relative to men down, meaning that as long as working women bear children, one cannot expect the gender gap to narrow. Consequently, there is a growing tendency globally for career-minded and highly skilled women to postpone or even forgo child-bearing for the sake of career progression.

The presence of children can affect the household dynamic for all members, but women tend to change their labour-market behaviour more drastically in response to a change in family/children size than men (Angrist & Evans, 1998). The case of South Africa is unique due to the high labour migration rates across provinces. Migrant worker females may respond to childbirth in a range of ways; for example, they might leave children in the care of relatives. Hence, outcomes of motherhood for Black South African women in particular tend to be more nuanced.

Using the 2001, 2005 and 2007 Labour Force Survey (LFS) data, this study combines detailed wage decompositions with quantile regressions to analyse differences in wage outcomes for employed mothers/caregivers and non-mothers. Given the stark wage disparities in the South African labour market, this study provides a more nuanced understanding of wage

[1] Narrow or strict definition of employment is used.

inequality determinants amongst women who tend to be more marginalized than their male counterparts. This study is henceforth structured in the following manner: Section 2 provides a review of pertinent international and South African literature on women's labour market outcomes. Section 3 discusses the data and presents the methodology. Section 4 presents trends in women's labour market characteristics with graphical illustrations of key variables of interest. Section 5 provides the model estimation results: firstly, the Mincerian (Mincer, 1974) regression is applied to understand the average magnitude of the motherhood wage penalty. Secondly, the linear Recentered Influence Function (RIF)-OLS regressions model wage returns for mothers and childless women along the wage distribution. Thirdly, using the Blinder-Oaxaca method on the RIF regressions, the section decomposes the wage gap between mothers and non-mothers into explained and unexplained parts along the distribution. Section 6 concludes by summarizing key findings of the study and flagging some important limitations.

2. Literature Review

According to the United Nations report on gender and work (2015), on average, women spend three hours more per day than men on unpaid work such as childcare in developing countries and two hours more per day than men in developed countries. It is widely documented internationally that female employees without children earn higher wages than female employees with children, even after controlling for measurable characteristics related to their productivity. There are various possible explanations for why mothers are more likely to earn lower wages than other women. According to the rationalist economics (human capital) approach, time spent at home for childcare interrupts work experience; and mother-friendly jobs offer lower wages (Budig & England, 2001). Under the sociological approach, employers may hold stereotypes that mothers are distracted or less productive at work due to exhaustion from childcare during leisure hours; so employers may just blatantly discriminate against mothers (ibid.). The third framework is a comparative institutionalist approach which aims to identify the societal specific causes of inter-country patterns in motherhood pay gaps, paying attention to gender relations and intersections with welfare, education and employment institutions (Grimshaw & Rubery, 2015). Most studies regarding the motherhood penalty focus on a combination of the rationalist economist and sociological approaches.

The motherhood pay gap may be related to a productivity differential, or statistical discrimination. In the context of the former case, Becker's worker effort hypothesis claims that firms aim to maximize worker effort per hour given earnings subject to their production functions (Becker, 1977). On the other hand, workers maximize utility by allocating time and effort to different activities, subject to their household production functions. Women with children will either choose to pay for childcare or take care of children themselves during leisure hours at home. The preference or choice may be contingent on the wage levels they earn. Due to this energy split between parenting and work, motherhood might be expected to reduce women's productivity on the job, thus affecting pay. In the latter case of discrimination, employers might deem mothers less productive assuming the generic parenting arrangement where women bear childcare over men. Women with children may therefore incur a penalty in terms of employment and/or wages. The motherhood pay gap may be due to various other reasons. Many mothers respond to competing demands of employment and childrearing by relaxing their attachment to paid work (Gornick, et al., 1998). For example, they may engage in part-time employment, or reduce working hours or

change occupations completely.

The estimates in most studies refer to an adjusted wage gap, i.e. the size of the motherhood wage gap controlling for differences in characteristics important for productivity (such as age, education, industry, occupation, firm characteristics, etc.) (Staff & Mortimer, 2012). Staff and Mortimer (2012) shed some light on the motherhood wage penalty early in women's occupational careers using fixed effects analysis on longitudinal data for 486 women followed from ages 19 to 31 in the Minnesota Youth Development Study. They observe that accumulated months out of the labour force and also not enrolled in school explain to some extent the residual pay gap of approximately 5% between mothers and non-mothers (ibid.). Nicodemo (2009) estimates family gaps along the wage distribution in the case of European households. The author finds that the reason for the family gap is that, when married, wives and husbands have the same characteristics but wives suffer from two types of discrimination with respect to husbands: a lower wage for the same work and also primary responsibility for children. Likewise, Budig and England (2001) use longitudinal data with a fixed effects model over the 1982 to 1993 period in the United States to find a motherhood wage penalty of 7% per child. The authors also discover in their analysis that penalties are larger for married women than for unmarried women.

The fact that a woman has a child implies that she may have taken some time off work, meaning that she may be negatively affected in the long run due to work experience foregone to take care of children. Using random effects and fixed effects regressions, Jia and Dong (2013) investigate how the economic transition has affected the wage gap between mothers and childless women in urban China using panel data for the period 1990–2005. The results reveal that on average, mothers earned considerably less than childless women during that period. significant at the 5% level) over the Chinese market-oriented economic reform period. More precisely, motherhood decreased women's hourly wages by 45.1% (statistically significant at the 5% level) over the Chinese market-oriented economic reform period.

Vinkenburg et al. (2012) study the motherhood bias which is the phenomenon where those making hiring and promotion decisions in organisational settings hold lower expectations regarding the professional commitment and competence of mothers. The authors conduct an experiment and discover that although women face a penalty for having children, their results uncover a wage premium for fathers (Grimshaw & Rubery, 2015) as they tend to be expected to work even harder than before in order to provide for their growing families. Moreover, applying the quantile regression and decomposition approach along the wage distribution on

the National Longitudinal Survey of Youth (NLSY), Waldfogel (1998) finds that in the United States between 1980 and 1991, having children had positive or no effects for men, but very strong negative effects for women. The author alludes to the idea that the family penalty disadvantages women more than men. To some extent, this explains why women with children tend to earn less than women without children.

Motherhood has a varying impact on women's career along their lifecycle (Kahn, et al., 2014). Analysing longitudinal survey data, Kahn et al. (2014) find that motherhood has the strongest negative labour market outcomes for women when they are younger and then attenuates when they are older (around age 50). However, for women with 3 or more children, the negative impacts persist across their life course. However, it should be kept in mind when considering these results that women who are married and have access to a husband's sizable income may face different incentives for labour force participation and career advancement than do women who are unmarried or have low-earning husbands (ibid.).

The penalty is usually heavier the younger the child. Using country fixed effects on women from 21 developing countries, Aguero et al. (2012) discover that the motherhood penalty diminishes as children age for low-skilled mothers. Authors stress the fact that amongst these lower educated mothers, effort and selection into different types of jobs, occupations and work intensity fully explain the family gap.

Applying the Oaxaca-Blinder wage decomposition into explained and unexplained components on two British cohort studies, Joshi et al. (1999) discover that amongst full-time employees, women who put their employment on hold due to childbirth are subsequently paid less than childless women. In contrast, mothers who maintained employment continuity are as well paid as childless women, but neither are as well remunerated as men. Likewise, Gamboa and Zuluaga (2013) use the Nopo approach (an alternative to Oaxaca-Blinder) to decompose wage gap between mothers and non-mothers in Colombia into four components – three observables and one unexplained part of the gap. Results by the authors show that once schooling is included as a matching variable, the unexplained components of the gap narrow and become insignificant. This effect could speak to childbearing lowering further educational attainment for women and thus leading to lower wages.

The motherhood bias may have a negative impact on women at various wage and skills levels. In other words, the size of the penalty may vary depending on the competency and commitment of the particular mother. A penalty may exist even towards high skilled (high wage) and career-oriented mothers. Using unconditional quantile regression models with person-fixed effects,

England et al. (2016) find that women with high skills and wages experience the highest total penalties for motherhood. The authors suggest that wage penalties can prevail just as much at low skill, low wage levels as at high wage levels.

The sociological approach to understanding the motherhood pay gap argues that some employers may build into their hiring and promotion decisions traditional stereotypical expectations of the burdens imposed by families on mothers' time and energy. This consequent undervaluation of women's work means that skill and experience in female-dominated occupations and workplaces tend to be rewarded unfairly (Grimshaw & Rubery, 2015). To demystify the question regarding whether motherhood actually affects workplace productivity and performance, Kalist (2008) investigates the motherhood penalty using panel data for a natural experiment on professional female golfers. He finds that productivity levels of women who eventually become mothers tend to increase in the years before giving birth and then declines thereafter. These results support the human-capital explanation and Becker's effort hypothesis of the family gap.

In spite of the productivity motivation for paying mothers less, a portion of the motherhood penalty still remains unexplained. Various authors have conducted behavioural studies to try explain workplace discrimination against mothers. Normative discrimination in particular is a form of bias which occurs when employers discriminate against mothers because they believe unconsciously, paid labour market success signals stereotypically masculine qualities such as assertiveness or dominance (Benard & Correll, 2010). This status-based discrimination occurs when individuals violate gendered expectations that mothers should prioritise family over paid work. Bernard and Correll (2010) determine whether mothers face normative discrimination by conducting a laboratory study where job applications for a high-status, highly paid professional position are evaluated by participants. Their findings show that given identical résumés, mothers were significantly less likely to be recommended for hire or promotion, offered marginally significantly lower starting salaries, and held to higher performance and punctuality standards (ibid.). Such biases influence the econometric analyses of women's wage outcomes.

Using population surveys from affluent countries and also conducting a survey experiment similar to that conducted by Benard and Correll (2010), Oesch et al. (2017) also find an unexplained wage penalty of 4% to 8% per child. This penalty is worse for younger mothers below the age of 40 and disappears for older mothers with older children or mothers in low income or low status jobs. This experiment corroborates the findings of Benard and Correll

(2010). Likewise, using data from the 1968-88 National Longitudinal Survey of Young Women, Anderson et al. (2003) observe that human capital inputs and unobserved heterogeneity explain 55-57% of the gap between mothers and women without children.

Statistical discrimination starts from the idea that employers think membership in a given group sends a signal about the individual's productivity (Cahuc, et al., 2014, p. 488). Statistical discrimination takes the form of stereotyping based on group membership that results from imperfect information (ibid.). For example due to this type of discrimination, women who intend to have children may start to believe that their return to education is lower than for the other group. This belief can incentivise these workers not to acquire education or a certain skills level. This affects the type of occupations and industries women enter. Thus a self-fulfilling prophecy may arise since employers anticipating women with children to be less skilled discourages women's effort to be more efficient workers (Cahuc, et al., 2014, p. 493).

Existing literature on the motherhood penalty in Sub-Saharan Africa (SSA) is still scarce. In an overview of the South African labour market since 2008, amongst the youth aged 15 to 34 years, unemployment continues to have a strong gender dimension. As a result, unemployment rates amongst Africans and women remain above the national mean (Development Policy Research Unit, 2012). The statistics are even worse for mothers in this age group, majority of whom are entitled to paid maternity leave (ibid.).

Ntuli and Wittenberg (2013) use survey data to analyse African women's participation in the labour force over the period of 1995 to 2004. The authors mention married women might have less economic need compared to single women. Furthermore, fertility increases wife's value of time at home, negatively affecting prospects of labour market participation. Their results indicate non-labour income, marriage, fertility and geographical variation in economic development persistently stifled participation over the ten-year period. The probit regression results prove Black women aged between 35 and 44 years are the most likely to participate in the labour force. These could be women whose children are older and more independent. Even and Macpherson's (1993) decomposition results for non-linear models reveal that marriage significantly reduces probability of a woman to participate in the South African labour market over the period, whilst divorce raises chances of participation.

According to Baker's (2010) qualitative study, domestic arrangements, perceptions of support, occupational requirements and ideas about "good mothering" affect women's wage outcomes and vary according to context. For instance, due to high migrant labour rates in South Africa, one cannot immediately assume that mothers live with their children. Women with fewer or

older children are likely to migrate to more economically thriving regions, which has implications for wage outcomes. Posel and van der Stoep (2008) use a probit model and discover that females who are not co-resident mothers are significantly more likely to be labour force participants. Moreover, Posel and van der Stoep (2008) find that more than 45% of mothers, and almost 70% of non-mothers, are residents in households with children who are not their own. Even amongst these non-mothers, living with children lowers positive labour market outcomes.

This fine distinction between mothers and co-residents of children makes for interesting analysis of motherhood penalty in the South African the labour market. This particular study on the child penalty is the first study in South Africa focusing specifically on wage differentials amongst women by parenthood status. Moreover, the use of the Labour Force Survey(LFS), a nationally representative household survey with earnings data, provides a more detailed explanation of women's wage outcomes. The conceptual framework used for analysis in this particular study is based on methodology applied by studies reviewed in this section.

3. Data and Methodology

3.1 Data and Variables

The data for this study comes from the nationally representative Labour Force Survey (LFS)[2] carried out by Statistics South Africa, which is publicly available. In the 2001 LFS, about 26, 558 households and 106,000 individuals were interviewed, while in the 2005 and 2007 LFSs around 28,000 households (109,000 and 106,000 individuals respectively) were interviewed. The 2007 LFS is the latest nationally representative household survey with earnings data. This study focuses particularly on Black employed women aged between 20 and 50 years.

According to Budlender et al. (2001), the 20–39 age group has the highest proportion of both men and women with children under the age of seven years. Nonetheless, very few labour market surveys have birth history information, let alone link mothers to their children. Dorrit Posel (2011) corroborates these details from her observation that studies on female labour force participation in South Africa have not been able to match women to their children. Even the datasets deemed most nationally representative household surveys in South Africa do not contain detailed birth history information.

In a sample of Black women aged 20-49 from the 2002 General Household Survey (GHS) of South Africa with approximately 30, 000 households, about 15% of Black[3] mothers are not co- resident with their own children, mostly due to labour migration (Posel & van der Stoep, 2008). This implies that the effects of motherhood in the South African context are not carried by biological mothers alone. Consequently, the mother variable in this study is generated based on Baker's (2010) findings that work/family integration is more complex for mothers: mothers do not always live with their children and childless women are not necessarily child-free. Therefore, in the analysis of this study, the mother or caregiver is a woman who co-resides with at least one child under the age of 15 in the same household. The study considers two sets of women: (1) mothers/caregivers (women with children in their households) and (2) non- mothers/non-caregivers or child-free[4] women.

In our sample of Black women aged 20-49, there are 13, 888 mothers and 3. 983 non-mothers in 2001, 14, 715 mothers and 4, 307 non-mothers in 2005, and 14, 829 mothers and 4, 490 non-mothers in 2007.

[2] Wage data are not collected in the more recent Quarterly Labour Force Surveys (QLFS), so the LFS is used instead as it contains the most recent real earnings observations.

[3] Black and African used synonymously in the paper.

[4] Feminist labour economists have lately put forward that childless women be more appropriately referred to as child-free instead.

3.2 Model specification

A number of studies in this area used fixed effects regressions. In the labour force survey, however, no attempt has been made to link individuals or households across waves, so there exists no a panel element for fixed regression analysis. Consequently, ordinary least squares models are applied for the three years. All three ordinary least squares (OLS) models in this study follow first from Mincer's (1974) human capital wage equation in which individuals' log hourly wages are a function of their demographic characteristics, work experience, household characteristics, and educational attainment. To determine whether there exists a wage penalty for having additional children in the two sectors, a dummy variable for motherhood is included in these Mincerian equations, similar to the methodology employed in Casal and Barham (2013). The specifications are semi- logarithmic linear and additive models inspired by Budig and England (2001) and Wadfogel (1998). The dependent variable, lnw_i, is the natural logarithm of the real hourly wages of women. Motherhood is the main independent variable. The indicator variable married and an interaction term (Mother*married) are incorporated to model the potential wage gains or losses of marriage. The work experience variable is age minus years of education minus early childhood (6 years). The work experience variable may overestimate actual work experience if women take any time off work to bear and raise children (Anderson, et al., 2003).

$$lnw_i = \alpha + \beta mother_i + \gamma_1 edu_{i1} + \gamma_2 married_i + \gamma_3 experience_i + \gamma_4 experience_i^2 + \gamma_5 occupation_i + \gamma_6 married_i * mother_i + \gamma_7 province_i + \varepsilon_i \quad (1)$$

The 2nd specification is inspired by Piras and Ripani (2005) who study of the effects of motherhood on wages in the developing countries of Bolivia, Brazil, Ecuador and Peru, taking into account children's age. Here children are grouped into two categories – children aged under 7 and those aged 7 to 15 years:

$$lnw_i = \alpha + \gamma_1 edu_{i1} + \gamma_2 married_i + \gamma_3 experience_i + \gamma_4 experience_i^2 + \gamma_5 occupation_i + \gamma_6 ChildrenUnder7yrs_i + \gamma_7 ChildrenUnder15yrs_i + \gamma_8 province_i + \varepsilon_i \quad (2)$$

The 3rd specification is motivated by analysis done by Aguero et al. (2012) where they posit that the penalty on wages increases as the number of children grows:

$$lnw_i = \alpha + \gamma_1 edu_{i1} + \gamma_2 married_i + \gamma_3 experience_i + \gamma_4 experience_i^2 + \gamma_5 occupation_i + \gamma_6 onechild_i + \gamma_7 twoormorechildren_i + \gamma_8 province_i + \varepsilon_i \quad (3)$$

All three model results for the years 2001, 2005 and 2007 will be presented in the empirical results section.

3.3 Going beyond the mean – RIF and reweighting

The relationship between wages and motherhood status may vary by income level. Consequently, the study runs unconditional quantile (RIF-OLS) regressions to understand the effect of motherhood along the wage distribution. The recentered influence function (RIF) estimates the impact of changing the distribution of explanatory variables, on the marginal quantiles of the outcome variable, log of hourly wages, $\ln W_i$ (Firpo, Fortin, & Lemieux, 2007). The influence function (IF) for the τ^{th} unconditional quantile of the distribution of W, W (q_τ), is expressed as:

$$\boldsymbol{IF(W; q_\tau)} = \frac{\boldsymbol{\tau - I(W \leq q_\tau)}}{\boldsymbol{f_w(q_\tau)}} \quad (4)$$

where f_W and I(.) represent the marginal marginal density function of the wage distribution and an indicator function, respectively. The RIF and τth quantile is

$$RIF(W; q\tau) = q_\tau + IF(W; q_\tau) \quad (5)$$

The τth quantile RIF regression aggregates to unconditional quantile of interest and allows one to decompose the gap into endowment and unexplained effects related to the explanatory variables (Firpo, Fortin, & Lemieux, 2007). The procedure provides a clear presentation of exactly where along the distribution the motherhood penalty has its greatest impact.

3.3 Oaxaca Blinder decomposition

Furthermore, this study uses a relatively more rigorous approach to the Oaxaca-Blinder decomposition by combining it with the Recentered Influence Function (RIF) regression in order to decompose the log wages of working mothers and non-mothers by earning quantiles, rather than merely at the mean. Within the labour economics literature, discrimination is usually defined as the presence of different wage rates for workers with the same productivity or ability but with different personal characteristics (motherhood status in this case). The Oaxaca-Blinder procedure provides a way of 1) decomposing changes or differences in wages into a wage structure (unexplained) effect and a composition (explained) effect, and 2) further dividing these two components into the contribution of each covariate (Kwenda & Ntuli, 2015):

$$ln\bar{W}_{nm} - ln\bar{W}_m = (\bar{X}_{nm} - \bar{X}_m)\hat{\beta}_{nm} + (\hat{\beta}_{nm} - \hat{\beta}_m)\bar{X}_m \quad (6)$$

The procedure divides the wage differential between mothers and non-mothers into one part that is explained, and a residual part that is usually seen as a measure of discrimination, but also includes effects of group differences in unobserved predictors (Jann, 2008). The study applies the technique based on Firpo et al.'s (2009) recentered influence function (RIF) regressions. This methodology divides the motherhood wage differential at each unconditional quantile into a 'composition effect' (attributable to differences in observable characteristics) and a 'price effect' (attributable to unobservable differences). The method determines the partial contribution of each covariate to these components as well. Moreover, the decomposition using RIF-regressions helps in understanding which variables are most important in understanding the wages of women and how much the wage differential between mothers and non-mothers remains unexplained at various points of the wage distribution.

4. Descriptive Statistics

The South African labour market experienced a 3.1 million increase in number of employed women from 1995 to 2007, albeit rising unemployment rates (van Klaveren, et al., 2009). Between 2000 and 2007, female employment grew by 7.6% (ibid.). In addition, some legal progress has been made in the South African labour market to protect the rights of pregnant women (ibid.). In the case of women who are employed, 54.56%, 54.15% and 55.19% in 2001, 2005, and 2007 respectively, are mothers of at least one child aged under 7. More precisely, 30.8% of mothers in 2001 (32.65% in 2005 and 34.13% in 2007) have one child, 16.11% in 2001 have two children (15.92% in 2005 and 15.66% in 2007) and 7.64% had three or more children under age 7 in 2001 (5.58% in 2005 and 5.38% in 2007) (PALMS, 2017). In terms of older children, approximately 50.82%, 50.36% and 50.32% in 2001, 2005, and 2007 respectively, are mothers of at least one child aged under 15. Out of these mothers 27.13% had one child in 2001 (28.43% in 2005 and 30.99% in 2007), 15.79% had two children in 2001 (14.63% in 2005 and 13.21% in 2007), and 7.91% had three or more children in 2001 (7.28% in 2005 and 6.12% in 2007) (ibid.). Clearly, the majority of employed women in South Africa reside with children.

With these background statistics in mind, this section presents a descriptive profiling of participation, employment and wages of mothers versus non-mothers over the 2001-2007 time period. In order to understand key and relevant trends, the descriptive statistics focus primarily on the key explanatory variables used in the regression estimates. Table 1 below outlines the trend in the labour market outcomes of women.

Table 1: Labour Market Status of Women in South Africa – 1994 to 2007

Employment status of mothers versus non-mothers - 1994 to 2007								
	Mothers/Caregivers				Non-mothers/Non-Caregivers			
Year	**NEA**	**Employed**	**Unemployed**	**Total**	**NEA**	**Employed**	**Unemployed**	**Total**
1994	6,596.08	3,590.52	1,820.85	12,007.45	1,007.05	708.33	275.22	1,990.59
Percent	54.93	29.9	15.16		50.59	35.58	13.83	
1995	7,138.91	3,820.02	1,597.34	12,556.27	992.85	773.73	233.87	2,000.46
Percent	56.86	30.42	12.72		49.97	38.51	11.53	
1996	7,715.88	3,215.05	1,745.46	12,676.39	1,465.4	946.65	347.04	2,759.09
Percent	60.87	25.36	13.77		53.11	34.31	12.58	
1997	7,796.62	3,350.95	1,949.99	13,097.55	1,440.08	1,029.05	417.08	2,886.21
Percent	59.53	25.58	14.89		49.9	35.65	14.45	
1998	7,189.93	3,559.08	2,488.79	13,237.8	1,397.261	1,291.83	571.37	3,260.45
Percent	54.31	26.89	18.8		42.85	39.62	17.52	
1999	6,760.78	4,042.35	2,537.54	13,340.67	1,261.71	1,646.44	656.28	3,564.43
Percent	50.68	30.3	19.02		35.4	46.19	18.41	
2000	5,362.72	5,108.68	3,169.09	13,640.49	1,040.42	1,949.46	842.57	3,832.45
Percent	39.31	37.45	23.23		27.15	50.87	21.99	
2001	6,011.01	4,343.46	3,533.27	13,887.74	1,118.49	1,969.59	895.21	3,983.28
Percent	43.28	31.28	25.44		28.08	49.45	22.47	
2002	6,034.34	4,300.579	3,861.54	14,196.45	1,128.05	2,076.21	935.19	4,139.46
Percent	42.51	30.29	27.2		27.25	50.16	22.59	
2003	6,647.83	4,284.12	3,354.44	14,286.38	1,237.44	2,203.89	924.06	4,365.39
Percent	46.53	29.99	23.48		28.35	50.49	21.17	
2004	7,059.24	4,463.29	3,078.68	14,601.22	1,389.04	2,114.9	747.14	4,251.08
Percent	48.35	30.57	21.09		32.68	49.75	17.58	
2005	6,320.79	4,849.88	3,544.16	14,714.84	1,193.45	2,227.79	885.68	4,306.93
Percent	42.96	32.96	24.09		27.71	51.73	20.56	
2006	6,181.59	4,980.74	3,664.71	14,827.05	1,208.95	2,338.79	826.15	4,373.9
Percent	41.69	33.59	24.72		27.64	53.47	18.89	
2007	6,429.49	5,463.63	2,936.17	14,829.29	1,323.21	2,334.33	832.23	4,489.77
Percent	43.36	36.84	19.8		29.47	51.99	18.54	

Source: 1994-1999 observations are from the October Household Survey (OHS); 2000-2007 numbers are from the September round of the Labour Force Survey (LFS)
Notes: Results are for Black women between the ages of 20 and 50. The Data is weighted using 2001 Cross entropy weights.

As the tabulated numbers indicate, most females in the labour market between the ages of 20 and 50 are mothers, or at least co-residents with children. In terms of labour market status, mothers dominate the Not Economically Active (NEA) category. More mothers or caretakers than child-free women are unemployed. It is understood that employed women dominate the informal sector[5] trade which offers flexibility in working hours (Department of Labour, 2007). From the tabulated results, non-mothers also have higher employment rates than

[5] It is difficult to compare survey estimates of the size of informal sector employment over time due to the evolution of the questions that attempt to capture informal sector employment.

mothers. The fact that most mothers are unemployed or not economically active is an important issue which requires attention. Nevertheless, for the sake of assessing the motherhood wage penalty, the rest of the study focuses on employed females in particular.

Table 2 below investigates educational of outcomes of employed mothers and non-mothers.

Table 2: Educational attainment of Black South African Women: 1994-2007

Education Status of employed mothers and non-mothers.												
	Mothers/Caregivers						Non-mothers					
Year	Grade 0-8	Grade 9-11	Matric	Diploma	Degree	Total	Grade 0-8	Grade 9-11	Matric	Diploma	Degree	Total
1994	6,394.79	3,512.95	1,548.88	418.01	80.95	11,955.59	947.56	611.48	313.33	80.55	30.11	1,983.04
Percent	53.49	29.38	12.96	3.5	0.68		47.78	30.84	15.8	4.06	1.52	
1995	6,303.43	3,521.68	1,872.17	593.56	132.46	12,423.3	955.11	582.78	338.56	119.59	35.43	2,031.47
Percent	50.74	28.35	15.07	4.78	1.07		47.02	28.69	16.67	5.89	1.74	
1996	6,453.07	3,517.19	2,029.77	407.97	115	12,523.01	1,336.58	757.97	472.74	113.27	39.42	2,719.97
Percent	51.53	28.09	16.21	3.26	0.92		49.14	27.87	17.38	4.16	1.45	
1997	6,384.03	4,076.10	2,072.08	447.21	100.51	13,079.94	1,304.95	846.85	577.76	115.61	35.02	2,880.18
Percent	48.81	31.16	15.84	3.42	0.77		45.31	29.4	20.06	4.01	1.22	
1998	6,556.85	3,918.73	2,077.97	528.89	127.35	13,209.79	1,545.66	981.06	543.18	144.19	41.39	3,255.48
Percent	49.64	29.67	15.73	4	0.96		47.48	30.14	16.68	4.43	1.27	
1999	6,311.08	3,904.71	2,262.61	506.89	208.23	13,193.53	1,627.12	956.71	707.23	164.36	68.61	3,524.04
Percent	47.83	29.6	17.15	3.84	1.58		46.17	27.15	20.07	4.66	1.95	
2000	6,206.36	4,156.38	2,406.89	612.01	201.47	13,583.11	1,674.403	1,062.853	770.25	194.95	109.94	3,812.39
Percent	45.69	30.6	17.72	4.51	1.48		43.92	27.88	20.2	5.11	2.88	
2001	6,045.64	4,292.71	2,551.01	634.68	284.26	13,808.3	1,733.59	1,115.794	810.85	215.19	85.51	3,960.95
Percent	43.78	31.09	18.47	4.6	2.06		43.77	28.17	20.47	5.43	2.16	
2002	5,986.56	4,475.78	2,760.59	628.73	283.02	14,134.68	1,740.81	1,144.05	848.64	294.19	90.53	4,118.22
Percent	42.35	31.67	19.53	4.45	2		42.27	27.78	20.61	7.14	2.2	
2003	5,598.39	4,634.17	3,054.82	687.89	250.26	14,225.53	1,668.01	1,243.76	1,089.26	260.94	92.92	4,354.89
Percent	39.35	32.58	21.47	4.84	1.76		38.3	28.56	25.01	5.99	2.13	
2004	5,498.87	5,044.81	3,133.77	639.652	227.07	14,544.18	1,490.24	1,335.13	1,047.19	238.55	113.64	4,224.77
Percent	37.81	34.69	21.55	4.4	1.56		35.27	31.6	24.79	5.65	2.69	
2005	5,215.15	5,106.94	3,372.0352	708.81	273.64	14,676.57	1,457.228	1,414.614	1,085.65	240.47	97.61	4,295.57
Percent	35.53	34.8	22.98	4.83	1.86		33.92	32.93	25.27	5.6	2.27	
2006	4,877.56	5,390.78	3,538.23	731.49	239.51	14,777.56	1,379.175	1,454.73	1,143.06	293.37	84.39	4,354.72
Percent	33.01	36.48	23.94	4.95	1.62		31.67	33.41	26.25	6.74	1.94	
2007	4,769.68	5,353.02	3,537.54	820.75	304.41	14,785.4	1,302.89	1,419.19	1,255.82	380.64	115.49	4,474.03
Percent	32.26	36.2	23.93	5.55	2.06		29.12	31.72	28.07	8.51	2.58	

Source: 1994-1999 values observations from October Household Survey (OHS); 2000-2007 is September round of the Labour Force Survey (LFS)
Notes: Results are for Black women between the ages of 20 and 50. Cross entropy Weights have been applied.

Education is measured as highest level of education completed. These years of education are recoded into categories in the table above. Over the years, a greater proportion of non-mothers have a matric or higher educational qualification. With that being said, mothers have been gaining more ground over the years in acquiring higher educational attainment levels.

Focusing on the most recent year (2007), 39.6% of child-free women have matric or higher qualification, versus 31.5% of mothers/caregivers.

It is useful to look at more labour market trends of women and observe whether there are any significant differences in the observable traits. Table 3 below shows the means, standard deviations and t-test differences between the estimated means of the labour market variables of employed mothers and non-mothers.

Table 3: Labour Market Characteristics of Employed Women – 2001, 2005, and 2007

Descriptive statistics of by Parenthood Status												
	2001				**2005**				**2007**			
	Mother		**Non-mother**		**Mother**		**Non-mother**		**Mother**		**Non-mother**	
	mean	***st. error***	**mean**	***st. error***	**mean**	***st. error***	**mean**	***st. error***	**mean**	***st. error***	**mean**	***st. error***
Age	32.19*	0.071	33.29*	0.137	32.32*	0.071	32.93*	0.143	32.55	0.072	32.32	0.143
Years of education	8.35	0.032	8.49	0.059	8.94*	0.029	9.14*	0.057	9.225*	0.029	9.513*	0.057
Weekly hours	43.08*	0.283	46.73*	0.386	44.86*	0.293	47.12*	0.383	41.61*	0.237	43.278*	0.316
Experience	17.8*	0.088	18.76*	0.169	17.371	0.086	17.78	0.173	17.31	0.086	16.83	0.173
Hourly wages	25.38*	0.73	19.57*	0.736	44.05	14.803	21.88	0.745	31.77	0.809	27.82	1.296
Married	0.43*	0.004	0.402*	0.008	0.407	0.004	0.41	0.008	0.409*	0.004	0.363*	0.008

Source: 2001, 2005, and 2007 September rounds of the Labour Force Survey (LFS).
Notes: Cross entropy Weights have been applied. The Hours variable includes part-time and full-time workers. The asterisk (*) denotes a significant difference between mean estimates for mothers and non-mothers at the 5% level. Data is weighted. Earnings data have been deflated to September 2016 for comparability.

The results in Table 3 above suggest that, on average, more mothers compared to non-mothers are married. Although child-free women have higher educational attainment levels than mothers, mothers seem to have higher mean wages than non-mothers. The tabulated results above imply that mothers work fewer hours per week than non-mothers. In terms of work experience, some mothers/caregivers may have taken breaks in between their career for maternity leave which may affect their total years of experience. This may potentially bias the mean results.

According to the Time Use Survey, on average women did eight times as much care work as men (32 minutes and 4 minutes, respectively) per day. On average, employed women also spent more than five times as much time as men in care work (44 minutes per day compared to 5) at home (Budlender, et al., 2001). Thus employed women spend far more time than men working (paid plus unpaid labour), but less of their time doing paid work. Correspondingly, working women in the South African labour market are over-represented in part-time employment, which has been an important feature of the feminisation of the labour force (Posel & Muller, 2007). The statistics above are important when thinking about the hours mothers and non-mothers spend at the workplace.

Overall, most women work in the private sector. Women with children may have anticipated that they want to have kids and therefore self-selected into more flexible occupations in the past. Many studies mention how women dominate in occupations such as clerks and domestic workers (Bhorat & Goga, 2013) in South Africa. Table 4 below paints a clearer picture of the occupations that women tend to opt into, by motherhood status. The table also provides information on the provinces in which women reside. According to the sample, mothers dominate elementary workers, professional workers and service and sales over the three years. Non-mothers dominate domestic work and clerks more than the mothers. Interestingly, more mothers than non-mothers are self-employed. This could be due to the fact that self- employment offers more flexibility in terms of work hours and other workplace conditions. When analysing the mean wages of the self-employed versus wage-employed women in the sample, it is self-employed women who have higher average earnings (PALMS, 2017). This detail in the data could provide interesting outcomes.

Most employed Black women are based in Gauteng, a city full of migrant workers, of whom non-mothers dominate over mothers. The Eastern Cape, Free State and KwaZulu-Natal, North-West, Mpumalanga and Limpopo contain more working mothers than non-mothers compared to the remaining provinces (Western Cape and the Northern Cape).

The distribution of women in various provinces speaks to the occupational types which prevail in each province. Some women are willing to migrate to certain regions in order to participate in these industries. Table 5 below examines further the skills levels of women in each province for the year 2007. Most mothers in skilled occupations such as doctors and engineers are based in Gauteng. Most mothers in medium-skilled occupations such as clerks, teachers and nurses are based in KwaZulu-Natal. Most women with children in low-skilled occupations such as domestic work and agriculture are based in the Northern Cape. Most high-skilled non-mothers are based in Limpopo; most medium-skilled women are based in the Free State. Most low-skilled women are based in Mpumalanga.

Table 4: Occupational & Geographical Status of Mothers & Non-mothers: 2001, 2005 & 2007

	2001				2005				2007			
	Mother		Non-mother		Mother		Non-mother		Mother		Non-mother	
	No.	*Percent*	No.	*Percent*	No.	*Percent*	No.	*Percent*	No.	*Percent*	No.	*Percent*
Private	3,723.37	79.92	1,785.84	85.86	3,826.89	81.84	1,738.94	86.3	3,777.5	81.1	1,614.18	81.24
Public	935.63	20.08	294.16	14.14	849.1	18.16	276.06	13.7	880.49	18.9	372.82	18.76
Self-employed	1,173.59	25.72	242.52	11.76	1,364.85	29.59	262.09	13.1	1,044.03	22.55	206.96	10.42
Wage-employed	3,389.41	74.28	1,820.48	88.24	3,248.15	70.41	1,738.91	86.9	3,584.97	77.45	1,780.04	89.58
High-skilled												
Managers	54.69	1.18	22.12	1.07	122.96	2.63	44.27	2.19	166.51	3.55	69.82	3.5
Professional	727.97	15.75	221.52	10.68	686.6	14.67	209.58	10.39	881.4	18.8	313.11	15.69
Medium-Skilled												
Clerks	420.62	9.1	157.66	7.61	424.31	9.07	202.67	10.05	509.31	10.86	243.83	12.22
Service and Sales	726.09	15.71	264.58	12.76	707.95	15.13	272.01	13.49	672.83	14.35	265.38	13.3
Skilled Agriculture & Fisheries	132.32	2.86	22.39	1.08	165.72	3.54	14.99	0.74	124.28	2.65	28.76	1.44
Craft & trade workers	306.99	6.64	86.49	4.17	327.29	6.99	89.51	4.44	277.85	5.93	93.68	4.69
Operators & assemblers	164.42	3.56	65.27	3.15	116.05	2.48	57.33	2.84	119.68	2.55	78.78	3.95
Low-skilled												
Elementary workers	1,217.34	26.34	463.77	22.37	1,373.44	29.35	454.34	22.53	1,124.08	23.98	409.96	20.54
Domestic workers	866.93	18.76	769.19	37.11	751.13	16.05	672.3	33.33	801.78	17.1	484.73	24.28
Province												
Western Cape	465.89	3.22	222.19	5.25	600.62	4.08	179.35	4.45	440.68	3.08	225.32	5.73
Eastern Cape	2,130.97	14.72	433.37	10.25	2,102.71	14.28	426.62	10.59	1,993.46	13.91	459.32	11.68
Northern Cape	146.35	1.01	36.64	0.87	143.37	0.97	33.61	0.83	131.94	0.92	38.79	0.99
Free State	919.81	6.35	314.23	7.43	965.76	6.56	243.18	6.04	965.92	6.74	256.11	6.51
KwaZulu-Natal	3,282.77	22.67	908.22	21.48	3,181.06	21.6	879.24	21.83	3,110.21	21.7	782.76	19.9
North West	1,349.69	9.32	373.53	8.83	1,383.04	9.39	325.73	8.09	1,366.65	9.54	324.19	8.24
Gauteng	2,796.26	19.31	1,378.26	32.59	2,846.97	19.33	1,341.63	33.32	2,926.39	20.42	1,204.9	30.63
Mpumalanga	1,212.25	8.37	241.19	5.7	1,276.52	8.67	265.11	6.58	1,198.53	8.36	267.84	6.81
Limpopo	2,173.99	15.02	321.35	7.6	2,227.95	15.13	332.52	8.26	2,197.21	15.33	374.77	9.53

Notes: Own calculations: LFS (2001, 2005 and 2007)

Notes: Cross entropy Weights have been applied

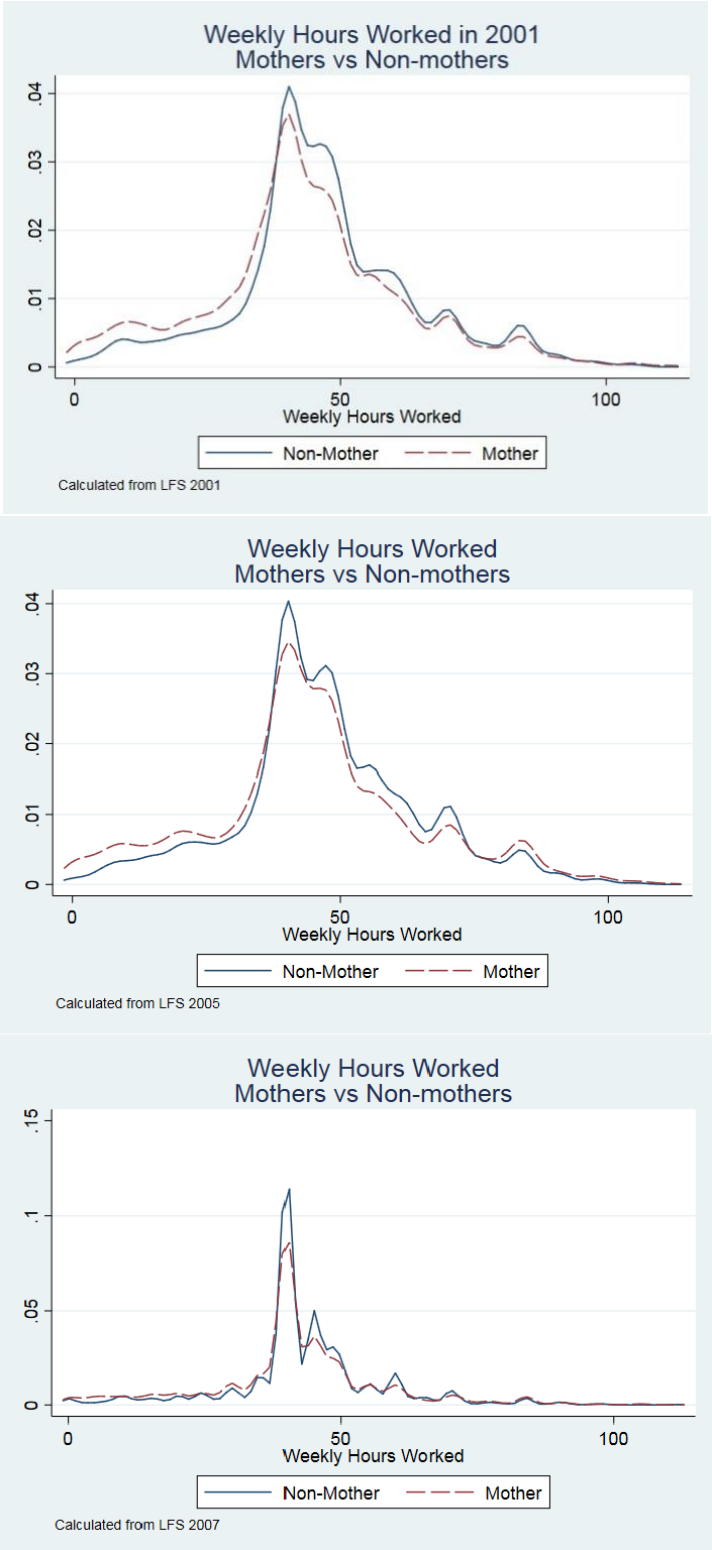
Table 5: Occupational Distribution of Skills levels for Women by Province – year 2007

Mothers	Western Cape	Eastern Cape	Northern Cape	Free State	Kwa-Zulu Natal	North West	Gauteng	Mpumalanga	Limpopo
High skilled Occup.	10.7	22.71	8.8	19.96	20.95	20.31	28.98	14.63	22.17
Medium-skilled	33.75	39.4	34.42	37.44	38.89	38.28	36.23	36.41	27.49
Low-skilled	54.03	37.44	56.78	42.43	39.87	41.31	34.8	48.73	50.34
Non-mothers	Western Cape	Eastern Cape	Northern Cape	Free State	Kwa-Zulu Natal	North West	Gauteng	Mpumalanga	Limpopo
High skilled Occup.	24.04	18.29	23.54	16.18	16.91	17.18	19.18	16.29	28.43
Medium-skilled	28.52	39	28.1	40.14	36.74	31.23	37.31	31.32	32.8
Low-skilled	47.45	42.73	46.38	43.68	46.15	51.29	42.68	51.49	38.77

Source: Own calculations using September round of LFS 2007

Notes: Cross entropy Weights have been applied

Figures 1 (a), (b) and (c): Weekly Hours[6] Worked by Women – 2001, 2005, and 2007



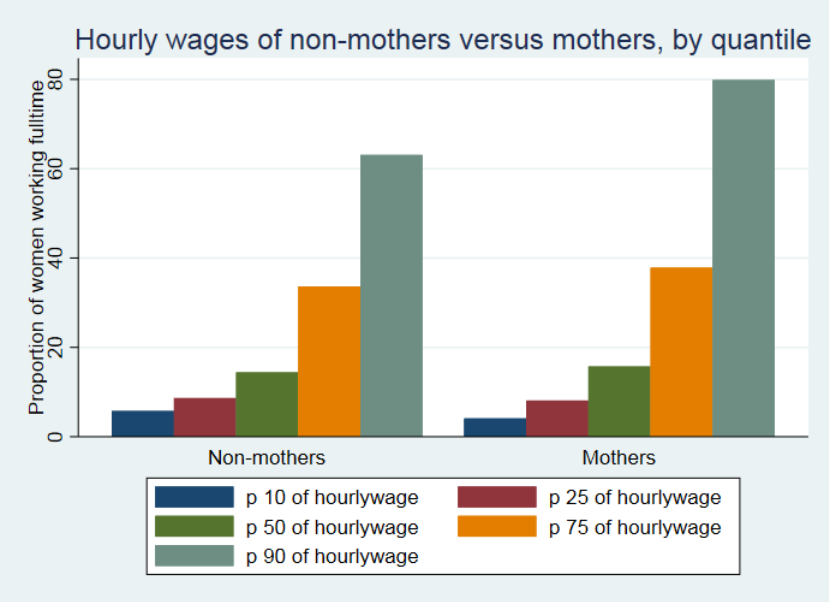
Source: Own calculations using September rounds of LFS 2001, 2005, and 2007
Notes: Coding adapted from (Wittenberg, 2012) Stata practical notes. Earnings data have been deflated to September 2016 for comparability. The data are weighted using Cross entropy Weights.

[6] The weekly hours variable refers to hours worked *in the past 7 days* in the main job and in other activities. Respondents who reported working more than 112 hours a week, or 16 hours per day have been excluded.

The kernel densities in Figure 1 above inspect the difference in the number of workplace hours worked by women over the three years. As confirmed by the graphs above, in 2001 and 2007, the distribution of hours for non-mothers is shifted more to the right than for mothers, meaning that women without children consistently work longer hours than mothers/caregivers. In 2005, more non-mothers work 45 or more hours per week compared to mothers. Along the distribution in 2005, it is clear that at longer hours (80 or more hours per week), mothers dominate. This could be the case in highly demanding occupations. Additionally, mothers who can afford child-care are more likely to work longer hours, especially where their children are older. There may also be a sibling effect[7] at play, where the older siblings take care of the younger ones, allowing the parent to work required hours.

Before modelling the wage returns of mothers/caregivers and childfree women, it is useful to evaluate the difference in earnings levels between the two groups over the years. The figures presented below illustrate the difference in real earnings of women at various points along the wage distribution. A distinction has been made between the hourly wages of full-time working women versus those who work part-time (less than 35 hours per week).

Figure 2: Hourly wages[8] for Full-time and Part-time female workers, 2007

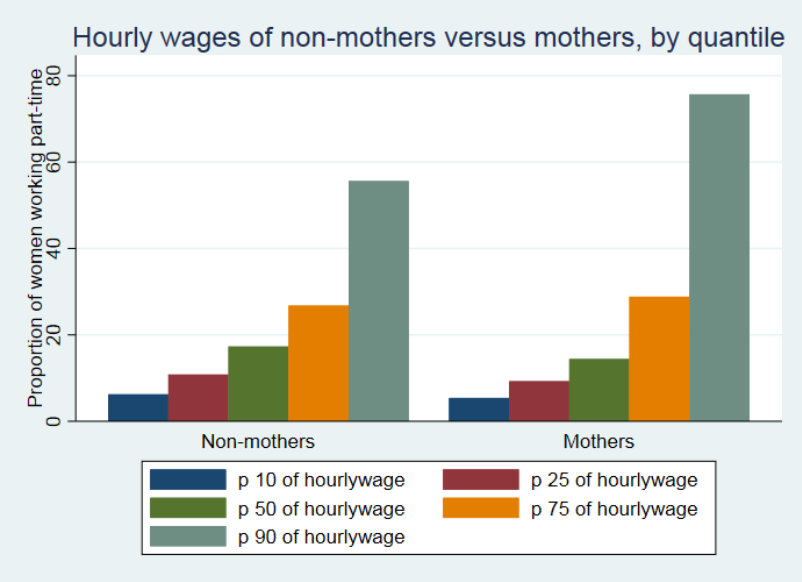


Source: Own calculations using September round of LFS 2007
Notes: Earnings data have been deflated to September 2016 for comparability. The Data is weighted using Cross entropy Weights.

[7] The sibling effect is the case where older siblings take care of younger siblings whilst parents are not home.

[8] Study uses the 2001 LFS rather than the 2000 LFS in light of the fact that the 2000 wage data seems to be an outlier in the series: Burger and Yu (2006) found that average earnings were dramatically higher in the September 2000 LFS than in the surveys directly preceding and following it (Burger & Yu, 2006).

Figure 3: Hourly Wages for Full-time and Part-time Female Workers, 2007

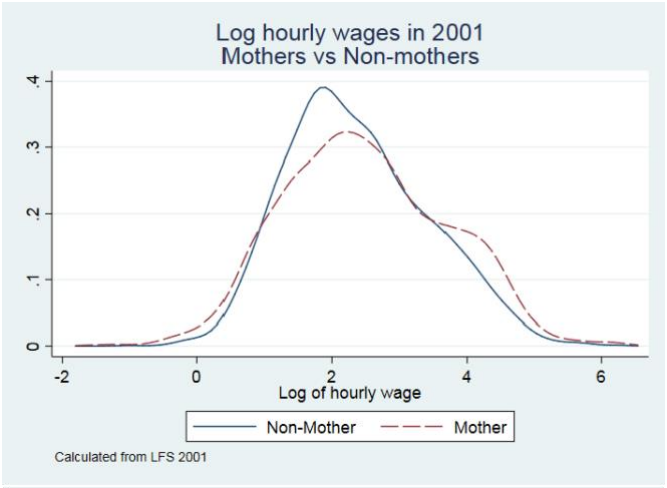


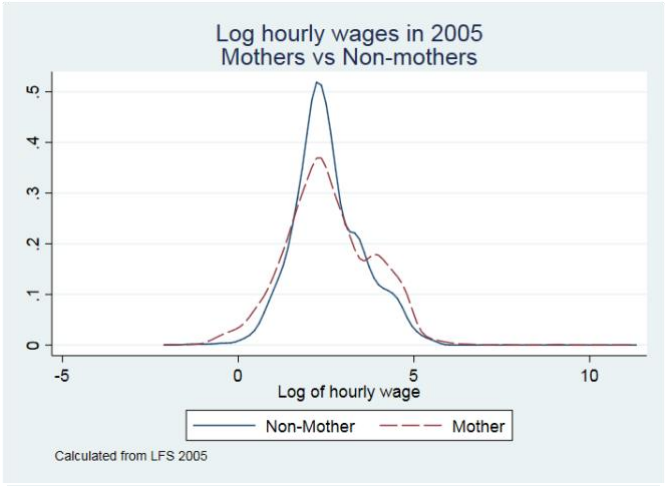
Source: Own calculations using September round of LFS 2007
Notes: Earnings data have been deflated to September 2016 for comparability. The Data is weighted using Cross entropy Weights.

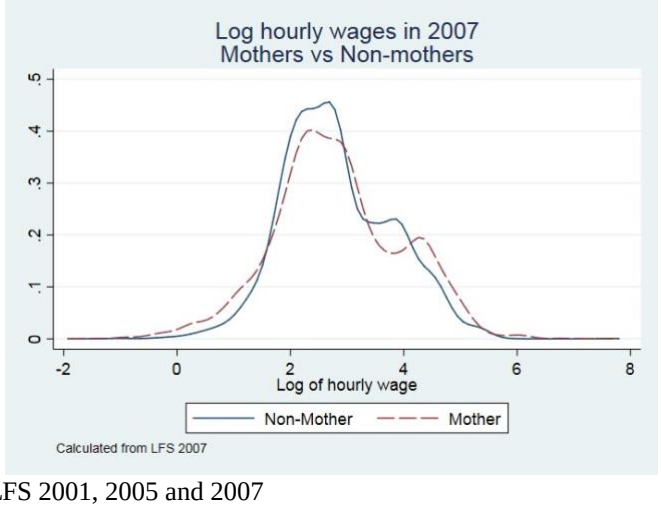
The graphical results in Figures 2 and 3 above imply the following: the fully employed, non-mothers earn more than mothers at the 10^{th} and 25^{th} quantiles in 2007. For part-time employees, non-mothers earn more hourly wages than mothers at the 10^{th}, 25^{th} and 50^{th} (mean) quantiles. Using fixed effects on the LFS 2001-2004, Posel and Muller (2007) find evidence of a significant wage premium to female part-time employment. The authors allude to presence of a wage floor existing below which wages for part-time workers are not allowed to fall as an explanation. The fact that mothers are more likely to work part-time compared to non-mothers could explain to an extent these illustrated wage outcomes. The 2001 and 2005 bar graphs display a similar conclusion and these graphs are in the appendix section.

Tabulations of the mean hourly wages by province for employed mothers and non-mothers are presented in the Appendix Section. The 2001 numbers reveal that in the Western Cape, the North West and Mpumalanga, non-mothers earn more than mothers. In 2007, non-mothers in the Western Cape and the Free State earn more than mothers. For 2007, non-mothers in the Northern Cape, KwaZulu-Natal, and Mpumalanga reported higher earnings than mothers.

Figures 4 (a), (b) and (c): Kernel Density Estimates of Wage[9] Distributions for Mother and Non-mothers – 2001, 2005 and 2007







Own calculations using LFS 2001, 2005 and 2007

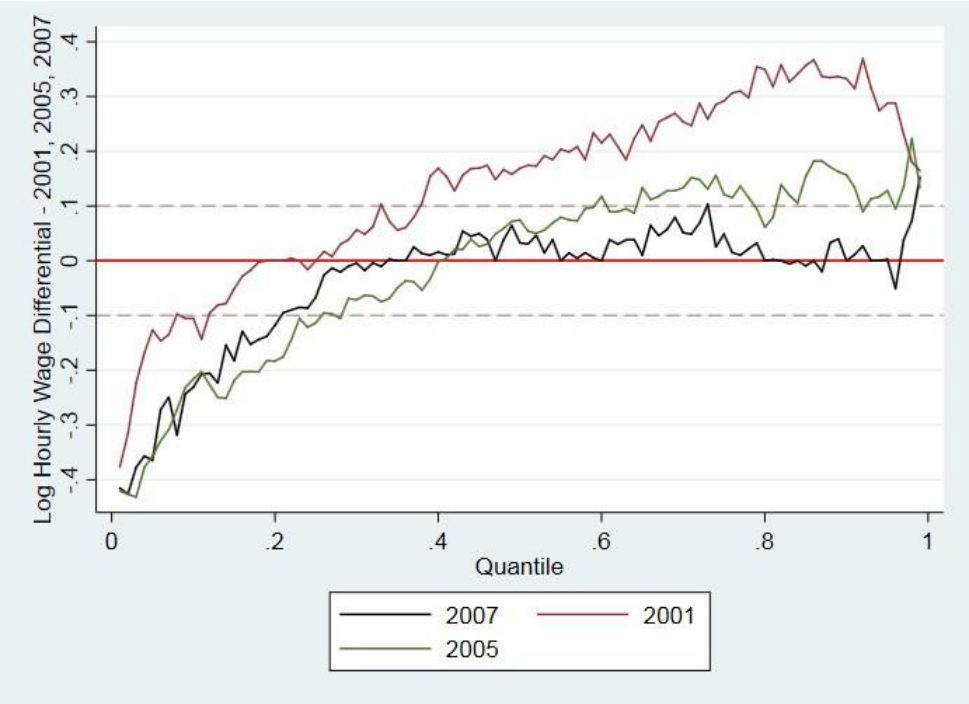
Notes: Coding adapted from (Wittenberg, 2012) Stata practical notes. Earnings data have been deflated to September 2016 for comparability. Data weighted using 2001 cross-entropy Census weights.

The detailed information from LFS on individual earnings and hours worked per week in the primary job is used to construct gross hourly wages deflated to September 2016 values using the consumer price index for comparability between years.

The discussion thus far proves that the wage difference between mothers and non-mothers varies according to where along the wage distribution one observes. Scrutinizing the kernel densities in figure 4 above verifies that at the lower quantiles, the log wages for non-mothers are shifted more to the right than mothers. At higher quantiles the opposite relationship prevails.

The figure below illustrates the wage gap or wage differential between mothers and non-mothers at various quantiles along the wage distribution. The curves represent the log hourly wage of mothers minus the log hourly wages of non-mothers for the three years (2001, 2005, and 2007).

Figure 5: Difference in Log Hourly Wages of Mothers versus Non-mothers by Quantile – 2001, 2005, & 2007



Source: Own calculations using LFS 2001
Notes: Coding retrieved from Stata journal by (Cox, 2004). Earnings data have been deflated to September 2016 for comparability. Data is weighted using 2001 Census (cross-entropy) weights. The separate graphs for the three years are included the appendix section.

In 2001, mothers earn less than non-mothers up until the 20th quantile. In 2005 and 2007, mothers earn less than non-mothers until around the 30th and 40th quantiles, respectively. Around the mean, as corroborated by previous graphs and tables, mothers earn more than non-mothers, especially in 2001. In 2001 and 2005, at higher quantiles, mothers earn significantly

more than non-mothers. Contrastingly, the 2007 dataset shows that the wage gap between mothers and non-mothers narrows around the 80^{th} and 90^{th} percentiles.

5. Estimating the Motherhood/Child Wage Gap

Under Mincer's human capital framework, various factors affect earnings. Pre-market factors such as education are useful to consider in the analysis of wage differentials. The wage estimations contain experience variables instead of age dummies. As can be seen from Table 6 below, ceteris paribus, women in the sample exhibit positive wage returns to education. Weichselbaumer and Winter-Ebmer (2005) indicate that the marital status of an individual can be interpreted as a productivity indicator. The results above indicate that marriage is related to negative wage outcomes for mothers, although not statistically significant. Mothers who are also married suffer a wage penalty in 2001 and 2005, but not in 2007.The OLS results also confirm the assumption that the negative impact of children seems to diminish as children grow: women with younger children (aged 7 or younger) suffer a larger wage penalty than those with older children. Women with two or more children carry a heavier wage penalty than those with one child only. Domestic workers, majority of whom are child-free, earn the least compared to other occupations. These effects are consistent over the three years. In terms of experience, wages increase positively with experience (at an increasing rate at lower quantiles and at a decreasing rate at higher quantiles). Focusing on the mother indicator variable in the first specification for the three years, on average, mothers earned 13.5% less than non-mothers in 2001, 8.87% less than non-mothers in 2005, and 5.5% less than non-mothers in 2007. So on average, there does exist a motherhood penalty.

Table 6: Ordinary Least Squares (OLS) Results – 2001, 2005, & 2007

VARIABLES	2001			2005			2007		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Years of Educ.	0.107***	0.106***	0.107***	0.112***	0.101***	0.103***	0.112***	0.095***	0.096***
	-0.006	-0.004	-0.004	-0.007	-0.004	-0.004	-0.008	-0.009	-0.009
Married	-0.0223	0.156***	0.165***	-0.0237	0.107***	0.116***	-0.0119	0.136***	0.140***
	(0.0658)	-0.029	(0.0285)	(0.0512)	(0.0241)	(0.0244)	(0.0498)	(0.0200)	(0.0200)
Experience	0.00024	0.0151**	0.0162**	0.0187**	0.0273***	0.0279***	0.0275***	0.0355***	0.0363***
	-0.0099	-0.007	(0.00711)	-0.007	(0.00512)	(0.00510)	(0.00679)	(0.00445)	(0.00445)
Experience Sq.	0.0005**	9.26e-05	7.36e-05	9.09e-05	-8.69e-05	-9.48e-05	-5.50e-05	-0.0002**	-0.0003***
	-0.0003	-0.0002	-0.0002	-0.0002	-0.0001	-0.0001	-0.00015	(9.72e-05)	(9.73e-05)
Mother	-0.135**			-0.0887**			-0.0550		
	(0.0576)			(0.0410)			(0.0364)		
Married*mother	0.110			0.0787			0.0793		
	(0.0791)			(0.0665)			(0.0606)		
Children aged<=7		-0.0467***			-0.0702***			-0.0523***	
		(0.0140)			(0.0136)			(0.0106)	
Children aged<=15		-0.0361**			-0.0658***			-0.0167*	
		(0.0172)			(0.0127)			(0.0101)	
One child			-0.113**			-0.106***			-0.0981***
			(0.0444)			(0.0295)			(0.0255)
Two or more children			-0.145***			-0.227***			-0.115***
			(0.0300)			(0.0257)			(0.0209)
Professional	0.387*	0.312***	0.317***	0.474**	0.380***	0.390***	-0.0362	-0.0138	-0.0138
	(0.231)	(0.112)	(0.113)	(0.203)	(0.119)	(0.119)	(0.154)	(0.1000)	(0.0994)
Technical & assoc.	0.089	-0.0498	-0.0432	0.0395	-0.0301	-0.0181	-0.222	-0.291***	-0.295***
Professionals	(0.229)	(0.106)	(0.106)	(0.196)	(0.107)	(0.107)	(0.137)	(0.0795)	(0.0798)
Clerks	-0.489**	-0.515***	-0.506***	-0.438**	-0.386***	-0.373***	-0.545***	-0.668***	-0.666***
	(0.231)	(0.108)	(0.109)	(0.195)	(0.108)	(0.108)	(0.132)	(0.0851)	(0.0844)
Services & Sales	-1.145***	-1.032***	-1.028***	-1.301***	-1.055***	-1.048***	-1.170***	-1.120***	-1.123***
	(0.229)	(0.105)	(0.106)	(0.192)	(0.105)	(0.104)	(0.129)	(0.0874)	(0.0879)
Skilled Agric. & Fisheries	-1.154***	-1.261***	-1.260***	-1.143***	-1.105***	-1.096***	-1.542***	-1.271***	-1.286***
	(0.290)	(0.115)	(0.116)	(0.265)	(0.197)	(0.196)	(0.168)	(0.106)	(0.106)
Craft & Trade	-0.952***	-0.749***	-0.746***	-1.088***	-0.825***	-0.818***	-1.101***	-0.882***	-0.892***
	(0.232)	(0.104)	(0.105)	(0.194)	(0.102)	(0.102)	(0.133)	(0.0753)	(0.0754)
Plant & Machinery	-0.976***	-0.721***	-0.721***	-0.957***	-0.678***	-0.671***	-1.105***	-0.840***	-0.850***
	(0.237)	(0.105)	(0.105)	(0.199)	(0.103)	(0.103)	(0.134)	(0.0841)	(0.0854)
Elementary Occup.	-1.243***	-1.230***	-1.227***	-1.357***	-1.213***	-1.206***	-1.294***	-1.285***	-1.293***
	(0.227)	(0.104)	(0.104)	(0.189)	(0.102)	(0.102)	(0.126)	(0.0756)	(0.0758)
Domestic Work	-1.490***	-1.605***	-1.599***	-1.316***	-1.422***	-1.412***	-1.347***	-1.467***	-1.470***
	(0.226)	(0.104)	(0.105)	(0.186)	(0.102)	(0.102)	(0.132)	(0.0878)	(0.0875)
Constant	2.625***	2.750***	2.762***	2.228***	2.367***	2.357***	2.256***	2.257***	2.248***
	(0.197)	(0.147)	(0.146)	(0.220)	(0.133)	(0.131)	(0.259)	(0.126)	(0.126)
Observations	5,071	11,184	11,184	5,032	10,954	10,954	5,117	11,481	11,481
R-squared	0.448	0.393	0.394	0.463	0.399	0.399	0.498	0.444	0.443

Source: Own calculations using September rounds of LFS 2001, 2005, and 2007.

Notes: Robust standard errors in parentheses (computed using bootstrapping procedure). *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is log of real hourly wages. The base category for occupation categories is Managers. The 'Other' category is excluded from the estimation. The province results have been omitted from the table and are available on request. Data are weighted.

5.1 RIF-OLS regression results

The tables below display the RIF[10] estimates for women from the 10th to the 90th wage quantiles. The discussion focuses on 2007 results as they are comparable to those of 2001 and 2005, as shown in Tables 2A and 3A in appendix. In 2001, child-free women experienced higher returns to education than mothers only at the 90th quantile. At all quantiles, women encounter positive wage returns to experience. Mothers experience higher returns to schooling overall. In terms of experience, mothers experience higher returns than non-mothers, except at the 90th percentile. Married non-mothers experience lower wage returns than their unmarried counterparts at the 10th and 30th quantiles. This result is not significant for mothers. At the 70th and 90th quantiles, married mothers earn more than unmarried mothers. The results are similar for 2005 and 2007. For all three years, at the bottom of the wage distribution – at the 10th and 20th quantiles to be exact – non-mothers earn more than mothers, ceteris paribus. At the other quantiles, mothers earn more than non-mothers.

Higher incomes in some professions, such as medicine, may provide strong incentives to remain employed after the birth of a child, whereas lower paid female-dominated professions may not offer similar incentives. Higher incomes may also offer greater financial resources to purchase high quality childcare. From the descriptive statistics section, it was established that a greater proportion of mothers over non-mothers is self-employed. Self-employed women generally earn more than wage workers. Perhaps this might partly support why at higher quantiles mothers have higher wage returns than non-mothers. Table 7 below presents women's wage returns at different quantiles of the wage distribution.

Observing the 2007 tabulated numbers below, interestingly, mothers at all quantiles except for the 90th quantile benefit more from a degree qualification than non-mothers. In terms of experience, wages increase positively with experience levels. At higher quantiles, married women (both mothers and non-mothers) consistently encounter a marriage premium. There are positive returns to work experience at all quantiles, except for non-mothers at the 70th quantile (this result is not statistically significant). Since the results for the three years relate similar outcomes, the RIF-OLS results for 2001 and 2005 are included in the appendix.

[10] Unconditional Quantile regression gives heteroscedasticity robust standard errors (Melly, 2004).

Table 7: Recentered Influence Function (RIF) -Ordinary Least Squares (OLS) results, 2007

VARIABLES	10th quantile		30th quantile		50th quantile		70th quantile		90th quantile	
	Mother	Non-mother	Mother	Non-mother	Mother	Non-mother	Mother	Non-mother	Mother	Non-mother
Years of Education	0.0824***	0.0671***	0.0782***	0.0587***	0.0781***	0.0784***	0.112***	0.109***	0.133***	0.136***
	(0.0154)	(0.0168)	(0.00794)	(0.00902)	(0.00661)	(0.00937)	(0.00851)	(0.0111)	(0.0115)	(0.0157)
Professional	0.224	0.156	0.0614	0.337**	0.0528	0.479***	0.443**	0.855***	1.757***	1.778**
	(0.201)	(0.207)	(0.0985)	(0.136)	(0.0980)	(0.175)	(0.195)	(0.286)	(0.500)	(0.727)
Technical & assoc.	0.320	0.157	0.0613	0.244*	-0.0144	0.336*	0.316*	0.534*	0.524	0.698
Professionals	(0.196)	(0.201)	(0.0978)	(0.139)	(0.0981)	(0.178)	(0.190)	(0.288)	(0.468)	(0.684)
Clerks	0.314	0.0722	0.0822	0.186	0.0168	0.214	-0.00945	0.125	-1.192***	-1.221*
	(0.192)	(0.209)	(0.0952)	(0.139)	(0.0963)	(0.178)	(0.192)	(0.291)	(0.453)	(0.651)
Services & Sales	-0.184	-0.0858	-0.354***	0.0515	-0.643***	-0.0383	-0.959***	-0.657**	-2.021***	-2.160***
	(0.209)	(0.217)	(0.101)	(0.143)	(0.0987)	(0.181)	(0.184)	(0.284)	(0.430)	(0.617)
Skilled Agric.	-1.170**	-0.276	-0.958***	-0.513**	-0.827***	-0.676***	-1.075***	-1.204***	-1.850***	-1.995***
& Fisheries	(0.468)	(0.377)	(0.189)	(0.214)	(0.157)	(0.222)	(0.235)	(0.279)	(0.431)	(0.618)
Craft & Trade	0.270	0.0474	-0.235**	0.104	-0.539***	-0.0550	-0.985***	-0.578*	-2.019***	-2.099***
	(0.219)	(0.247)	(0.118)	(0.161)	(0.113)	(0.207)	(0.196)	(0.316)	(0.433)	(0.629)
Plant & Machinery	0.221	0.217	-0.0524	0.138	-0.563***	-0.107	-1.109***	-0.862***	-2.101***	-2.305***
	(0.230)	(0.214)	(0.121)	(0.155)	(0.124)	(0.202)	(0.206)	(0.307)	(0.436)	(0.622)
Elementary Occup.	-0.254	0.0117	-0.356***	-0.0976	-0.682***	-0.376**	-1.042***	-0.858***	-2.050***	-2.091***
	(0.204)	(0.210)	(0.0979)	(0.141)	(0.0951)	(0.176)	(0.181)	(0.276)	(0.426)	(0.615)
Domestic Work	0.0747	-0.229	-0.395***	-0.267*	-0.880***	-0.589***	-1.316***	-1.181***	-2.124***	-2.184***
	(0.208)	(0.212)	(0.103)	(0.143)	(0.0975)	(0.177)	(0.180)	(0.273)	(0.425)	(0.611)
Married	-0.0856	-0.0976	0.0311	-0.0132	0.0261	0.0424	0.0959**	0.0999	0.107	0.126
	(0.0661)	(0.0718)	(0.0368)	(0.0427)	(0.0329)	(0.0490)	(0.0439)	(0.0637)	(0.0658)	(0.0981)
Experience	0.00229	0.0149	-0.00721	0.00693	0.00698	0.00364	0.00241	-0.00657	0.0515***	0.0459**
	(0.0146)	(0.0149)	(0.00806)	(0.00852)	(0.00721)	(0.00968)	(0.00964)	(0.0124)	(0.0121)	(0.0193)
Experience Squared	0.000103	-6.66e-05	0.000323*	8.70e-05	6.73e-05	0.000250	0.000392*	0.000724***	-0.000428*	-0.000383
	(0.000365)	(0.000373)	(0.000196)	(0.000207)	(0.000168)	(0.000226)	(0.000215)	(0.000277)	(0.000249)	(0.000383)
Constant	0.907***	1.090***	1.956***	1.845***	2.580***	2.138***	2.626***	2.721***	3.364***	3.415***
	(0.301)	(0.312)	(0.160)	(0.194)	(0.155)	(0.248)	(0.259)	(0.363)	(0.487)	(0.693)
Observations	3,454	1,617	3,454	1,617	3,454	1,617	3,454	1,617	3,454	1,617
R-squared	0.066	0.074	0.160	0.168	0.257	0.256	0.308	0.336	0.347	0.373

Source: Own calculations using September round of LFS 2007

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The sample includes all Africans between 20 and 50 who are employed and have non-missing wages and hours of work data, and the data are weighted using 2001 Census weights. The dependent variable is log of real hourly wages. The standard errors are shown in brackets below the estimates. The base category for occupation is managers. The 'Other' category is excluded from the estimation. The province results have been omitted from the table and are available on request.

The RIF-OLS results above confirm that the effect of motherhood may differ amongst lower and higher wage workers. Women in elite, male-dominated professions are likely qualitatively different than women in other professions in ways that cannot be measured (Buchmann &

Mcdaniel, 2016), which may affect the results. The unconditional or marginal quantile regression model (UQR) decomposition will help in testing whether penalties or rather wage inequalities differ by skill and wage level (observable traits). The results for 2001 and 2005 reveal similar associations.

5.2 Decomposition results

RIF (unconditional quantile regression framework) decomposition regression analysis builds on the pre-existing discrimination literature which was focused on the mean, rather than specific percentiles of the wage distribution. If one assumes that childless women are compensated fairly and mothers are undercompensated, one would use the non-mothers' coefficients as reference coefficients, and vice versa (Jann, 2008). Table 8 below displays the decomposition results for 2007, using the mother coefficients as the reference coefficients.

Table 8: RIF Decomposition Results of the Motherhood Earnings Gap, 2007

	Gap		**Explained**		**Unexplained**	
10th quantile	0.136***	(0.0430)	0.0108	(0.0164)	0.126***	(0.0439)
	100%		7.9%		92.1%	
20th quantile	0.0418	(0.0385)	0.00812	(0.0177)	0.0337	(0.0380)
	100%		19.4%		80.6%	
30th quantile	-0.113***	(0.0351)	-0.00597	(0.0194)	-0.107***	(0.0332)
	100%		5.3%		94.7%	
40th quantile	-0.117***	(0.0364)	-0.0161	(0.0223)	-0.101***	(0.0330)
	100%		13.7%		86.3%	
50th quantile	-0.157***	(0.0378)	-0.0225	(0.0243)	-0.135***	(0.0334)
	100%		14.0%		86.0%	
60th quantile	-0.138***	(0.0452)	-0.0455	(0.0304)	-0.0926**	(0.0389)
	100%		33.0%		67.1%	
70th quantile	-0.153***	(0.0558)	-0.0427	(0.0375)	-0.110**	(0.0473)
	100%		27.9%		71.9%	
80th quantile	-0.319***	(0.0639)	-0.0627*	(0.0371)	-0.256***	(0.0563)
	100%		19.7%		80.3%	
90th quantile	-0.466***	(0.0689)	-0.0867***	(0.0329)	-0.379***	(0.0655)
	100%		18.6%		81.3%	
Observations	6,635	6,635	6,635	6,635	6,635	6,635

Source: Own calculations using September round of LFS 2007

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The sample includes all Africans between 20 and 50 who are employed and have non-missing wages and hours of work data, and the data are weighted. The dependent variable is log of real hourly wages.

The motherhood pay gap is highest at the 90th quantile, with mothers earning more than non-mothers at this point. The motherhood pay gap is smallest at the 20th quantile, where non-mothers earn more than mothers. The unexplained proportion of the wage gap is higher than the explained proportion of the gap at all quantiles. This implies a greater proportion of the motherhood pay gap is explained by unobservable characteristics such as discrimination with

regard to earnings between the two groups than by differences in observable characteristics. At the mean for instance, unobserved traits account for 86% of the gap. In other words, the results suggest that productive characteristics account for less of the wage gap. This outcome actually corroborates findings in a similar study conducted by Anderson et al. (2003).

In their comparable study amongst White women in the United States, Budig and Hodges (2014) discover that mechanisms contributing towards the penalty vary by earnings level. Consequently, they posited that family resources, work effort and compensating differentials[10] account for a greater portion of the penalty amongst low earners (ibid.). For high wage earners, personal and intrinsic factors might be contributing towards the direction and magnitude of the gap. Results for Black South African women are more nuanced compared to international studies. Most Black women lie at the lower end of the income distribution. Clearly there exists a penalty for motherhood, but when analysing the two groups separately (mothers versus non-mothers), the penalty seems less obvious or rather prominent only at lower income quantiles.

Even for women in high-wage occupations, survey data analysis in the West by Buchmann and Daniel (2016) confirms that mothers are paid less than childless women, however the negative penalty is less in low-wage female dominated occupations. Where the motherhood/child penalty is stark and prominent in international studies, in the case of South Africa only women at lower income levels experience this negative phenomenon more noticeably.

The decomposition results imply that most of the wage gap is due to unexplained characteristics. For instance, in her decomposition analysis of women's labour force participation rates in South Africa, Ntuli (2007) finds that the differential in wages cannot be fully explained by differences between mothers and other women in work experience and job characteristics. Considering mothers' high non-participation and unemployment rates, the findings exhibit that female participation responds positively to education which has been the prime factor for positive employment and wage outcomes. Amongst high-skilled (education) wage earners, motherhood might have a less pronounced effect on earnings differences. Furthermore, non-labour income, marriage, fertility and geographical variations may have an effect on the decomposition results.

[10] A compensating differential is the additional amount of income that a given worker must be offered in order to motivate them to accept a given undesirable job (Cahuc, et al., 2014).

6. Conclusion

This study has investigated the motherhood wage differential amongst women in South Africa using 2001, 2005 and 2007 cross-sectional data from the Labour Force Survey. Evidence from this study confirms that the motherhood penalty does exist, especially at lower wage levels. After controlling for observable labour market characteristics, the results verify that the family penalty is largest when a woman's children are young and declines with children's age. The women most vulnerable to wage penalties for having child dependents are those at the lower end of the wage distribution. Contrary to international studies such as that of Budig and England (2014), in the case of South Africa, marriage has positive wage effects for mothers at higher wage quantiles.

The RIF-OLS results confirm that at lower wage quantiles, mothers earn less than women who do not have children while at higher quantiles, the reverse is observed. This effect may indicate that high-skilled women with children might experience more favourable employment conditions. Alternative explanations to the direction of the wage gap at higher income levels may include the existence of a part-time work premium. In addition, self-employed women, majority of whom are mothers, earn more than non-mothers. These findings lead to the conclusion that less skilled women tend to suffer a heavy penalty for motherhood. This highlights the value of higher education for women. Some discrimination due to motherhood may still exist at higher wage levels; but as substantiated by the decomposition results, a better understanding of the unobservable traits is a requirement.

The decomposition results confirm that a large component of the wage gap between mothers and non-mothers is unexplained by the model. By focusing on the experiences of working women alone, past studies and this study have ignored the selectivity into employment and have not considered how motherhood may influence employment decisions. Selection into certain occupations may affect the unexplained differences between the groups. For instance, Table 1 in the descriptive statistics section proves that most mothers either do not participate in the labour force or are unemployed. This is an important part of the discussion with regard to the child gap and it is clear that work needs to be done on this, even if it was not the focus of this study.

Historically, most South African studies have dealt with the sample selection problem by using the Heckman procedure to account for selection effects. Here, the earnings function is modelled on the characteristics of earners conditional on the fact that these earners are a subsample of all the employed, which is in turn a subsample of potential participants (Bhorat

& Goga, 2013). More recently, in line with the international literature, more studies have cited the difficulty of applying appropriate exclusion restrictions. In addition, the selection procedure may result in a problem of measurement error since an estimate of the expected value of the error term is used in the second stage of the procedure. In previous South African studies where selection has been accounted for, the female selection bias correction terms were largely insignificant (Ntuli & Wittenberg, 2013). This study does not apply these correction measures, which presents the first limitation to the study.

Secondly, The Oaxaca-Blinder decomposition strategy assumes three identifying assumptions (Cahuc, Carcillo, & Zylberberg, 2014, p. 507): firstly, the set of explanatory variables influencing wage levels should be the same for both men and women. Second is the conditional mean assumption (distribution of unobservable characteristics independent of group membership conditional on observable characteristics). This assumption may not hold considering that group membership such as union membership may be endogenous based on unobservable traits. Another restriction is the assumption of the invariance of the conditional distributions, which excludes the possibility of equilibrium effects and self-selection into groups based on unobservable traits. Considering the sample being studied, this condition may not be satisfied.

Thirdly, because the motherhood penalty calculations are based on wages only, it is difficult to debate differentials in bonuses and non-pecuniary work benefits amongst females. Unobservable factors such as the timing of child-bearing and even sibling effects may complicate modelling impact of motherhood on labour market outcomes. Moreover, some childfree women might have to take care of elderly parents or grandparents (England, et al., 2016), which may affect their wages. The study cannot control for unobservables such as network effects either. It is also useful to take into account the difference in the characteristics of women who stay behind to take care of children versus those who migrate to other provinces for work. Some of these traits may not be represented by available survey data variables. For this reason they could not be controlled for in estimation, in spite of their relevance.

Finally, the Labour Force Survey which has rich info on labour market on wage outcomes does not link biological mothers to their children due to lack of birth history information. The methodology section explains how this challenge is overcome to define motherhood status. Furthermore, to calculate a motherhood pay gap between mothers and non-mothers presupposes that motherhood does not affect the pay of non-mothers. This in turn suggests that pay discrimination is separate from and not linked to women's roles as mothers, except when women are actively engaged in

motherhood (Grimshaw & Rubery, 2015). This is why behavioural studies are pertinent in understanding dynamics surrounding motherhood wage gap. For example, Kricheli-Katz (2012) conducts a hiring experiment in a laboratory in Israel to distinguish between discrimination-based and productivity-based explanations of the motherhood penalty. The author finds n sormative discrimination against mothers. Bedi et al. (2017) discover parallel results in India for a similar study. The penalty is worse in cultures of patrilineal[11] origin in India. Societal norms therefore affect nature and extent of labour market discrimination against women in general.

Labour market policy which accommodates women with children at lower wage levels could have positive results for labour market outcomes. More educational attainment opportunities for women are crucial for improved labour market outcomes for mothers and non-mothers alike. Considering the low participation and employment rates of mothers, it would be beneficial for future research to conduct behavioural studies to understand better this substantial unexplained portion of the motherhood wage gap in the South African labour market.

[11] Patrilineal means patriarchal norms shape the image of the "ideal" mothers

References

Aguero, J. M., Marks, M. & Raykar, N., 2012. *The Wage Penalty for Motherhood in Developing Countries*, California: University of California.

Anderson, D. J., Binder, M. & Krause, K., 2003. The motherhood wage penalty revisited: experience, heterogeneity, work effort, and work-schedule flexibility. *Industrial and Labor Relations Review,* 56(2), pp. 273-294.

Angrist, J. D. & Evans, W. N., 1998. Children and Their Parents' Labor Supply: Evidence from Exogenous Variation in Family Size. *The American Economic Review,* 88(3), pp. 450-477.

Avellar, S. & Smock, P. J., 2003. Has the Price of Motherhood Declined Over Time? A Cross-Cohort Comparison of the Motherhood Wage Penalty. *Journal of Marriage and Family,* Volume 65, pp. 597-607.

Baker, M., 2010. Motherhood, employment and the "child penalty". *Women's Studies International Forum,* Volume 33, pp. 215-224.

Becker, G. S., 1977. *A Theory of the Production and Allocation of Effort,* Stanford: National Bureau of Economic Research (NBER).

Bedi, A., Majilla, T. & Rieger, M., 2017. *Gender Norms and the Motherhood Penalty: Experimental Evidence from India*, Rotterdam: The International Institute of Social Studies (ISS).

Benard, S. & Correll, S. J., 2010. Normative discrimination and the motherhood penalty. *Gender & society*, 24(5), pp. 616-646.

Bhorat, H. & Goga, S., 2013. The GenderWage Gap in Post-Apartheid South Africa: A Re-examination. *Journal of African Economies*, 00(0), pp. 1-22.

Bhorat, H. & Leibbrandt, M., 2001. Modelling Vulnerability and Low Earnings in the South African Labour Market. In: *Fighting poverty: Labour Markets and Inequality in South Africa*. Cape Town: UCT Press, pp. 107-129.

Buchmann, C. & McDaniel, A., 2016. Motherhood and the Wages of Women in Professional Occupations. *Russell Sage Foundation Journal,* 2(4), pp. 128-150.

Budig, M. J. & England, P., 2001. The Wage Penalty for Motherhood. *American Sociological Review,*, 66(2), pp. 204-225.

Budig, M. J. & Hodges, M. J., 2010. Differences in Disadvantage: Variation in the Motherhood Penalty across White Women's Earnings Distribution. *American Sociological Review,*, 75(5).

Budig, M. J. & Hodges, M. J., 2014. Statistical Models and Empirical Evidence for Differences in the Motherhood Penalty across the Earnings Distribution. *American Sociological Review,* 79(2), pp. 358-364.

Budlender, D., Chobokoane, N. & Mpetsheni, Y., 2001. *A Survey of Time Use: How South African women and men spend their time,* Pretoria: Statistics South Africa.

Burger, R. & Yu, D., 2006. *Wage Trends in Post-Apartheid South Africa: Constructing an Earnings Series from Household Survey Data,* s.l.: Stellenbosch University.

Cahuc, P., Carcillo, S. & Zylberberg, A., 2014. *Labor Economics.* 2nd ed. Cambridge(Massachusetts): The MIT Press.

Cahusac, E. & Kanji, S., 2014. Giving Up: How Gendered Organizational Cultures Push Mothers Out. *Gender, Work and Organization,* 21(1), pp. 57-70.

Casale, D. & Posel, D., 2005. Women and the Economy: How Far Have We Come?. *Agenda: Empowering Women for Gender Equity,,* Volume 64, pp. 21-29.

Casale, M. d. P. & Barham, B. L., 2013. Motherhood wage penalties and labour market segmentation: Evidence from Argentina. *C E P A L R E V I E W,* Volume 111, pp. 57-78.

Connell, R. W., 1998. Masculinities and Globalization. *SAGE journals,* 1(1), pp. 3-23.

Cornick, J. C., Meyers, M. K. & Ross, K. E., 1996. *Supporting the Employment of Mothers: Policy Variation Across Fourteen Welfare States,* s.l.: SURFACE.

Department of Labour, 2007. Women in the South African Labour Market: 1995-2005, Pretoria: Department of Labour.

Development Policy Research Unit, 2012. *An Overview of the Youth Labour Market since 2008,* Cape Town: Employment Promotion Program.

DiNardo, J., Fortin, N. M. & Lemieux, T., 1996. Labor Market Institutions and the Distribution of Wages. 1973-1992: A Semiparametric Approach. *Econometrica,* 64(5), pp. 1001-1044.

England, P., Bearak, J., Budig, M. J. & Hodges, M. J., 2016. Do Highly Paid, Highly Skilled Women Experience the Largest Motherhood Penalty?. *American Sociological Review,* 81(6), pp. 1161-1189.

Even, W. & Macpherson, D., 1993. The Decline of Private Sector Unionism and Gender Wage Gap. *Journal of Human Resources,* 28(2), pp. 279-296.

Firpo, S., Fortin, N. & Lemieux, T., 2007. *Decomposing Wage Distributions using Recentered Influence Function Regressions,* s.l.: University of British Columbia.

Firpo, S., Fortin, N. M. & Lemieux, T., 2008. *Unconditional Quantile Regressions,* Cambridge: National Bureau of Economic Research (NBER).

Firpo, S., Fortin, N. M. & Lemieux, T., 2009. Unconditional quantile regressions. *Econometrica,* 77(3), pp. 953-973.

Gamboa, L. F. & Zuluaga, B., 2013. Is There a Motherhood Penalty? Decomposing the Family Wage in Colombia. *Journal of Family and Economic Issues,* Volume 34, pp. 421-434.

Gornick, J. C., Meyers, M. K. & Ross, C. E., 1998. Public Policies and the Employment of Mothers: A Cross-National Study. *Social Science Quarterly,* 79(1), pp. 35-54.

Grimshaw, D. & Rubery, J., 2015. *The motherhood pay gap: A review of the issues, theory and international evidence,* Geneva: INTERNATIONAL LABOUR OFFICE.

Jann, B., 2008. The Blinder-Oaxaca Decomposition for Linear Regression Models. *The Stata Journal,* 8(4), pp. 453-479.

Jia, N. & Dong, X.-Y., 2013. Economic transition and the motherhood wage penalty in urban China: investigation using panel data. *Cambridge Journal of Economics,* pp. 819-843.

Joshi, H., Paci, P. & Wadfogel, J., 1999. The wages of motherhood: better or worse?. *Cambridge Journal of Economics,* Volume 23, pp. 543-564.

Kahn, J. R., Garcia-Manglano, J. & Bianchi, S. M., 2014. The Motherhood Penalty at Midlife: Long-Term Effects of Children on Women's Careers. *Journal of Marriage and Family,* 76(1), pp. 56-72.

Kalist, D. E., 2008. Does Motherhood Affect Productivity, Relative Performance, and Earnings?. *Journal of Labour Research,* Volume 29, pp. 219-235.

Killewald, A. & Bearak, J., 2014. Is the Motherhood Penalty Larger for Low-Wage Women? A Comment on Quantile Regression. *American Sociological Review,* pp. 350-357.

Kricheli-Katz, T., 2012. Choice, Discrimination, and the Motherhood Penalty. *Law and Society Review,* 46(3), pp. 557-587.

Kwenda, P. & Ntuli, M., 2015. *A Detailed Decomposition Analysis of the,* Bonn: IZA - Institute of Labor Economics.

Leibbrandt, M., Finn, A. & Woolard, I., 2012. Describing and decomposing post-apartheid income inequality in South Africa. *Development Southern Africa,* 29(1), pp. 19-34.

Melly, B., 2004. *Decomposition of differences in distribution using quantile regression,* Geneva: Swiss Institute for International Economics and Applied Economics Research (SIAW).

Mincer, J., 1974. *Schooling, Experience and Earnings.* New York: Columbia University Press.

Nicodemo, C., 2009. *Gender Pay Gap and Quantile Regression in European Families,* Barcelona: IZA.

Ntuli, M., 2007. *Determinants of South African Women's Labour Force Participation, 1995–2004,* Bonn: Institute for the Studies of Labor.

Ntuli, M. & Wittenberg, M., 2013. Determinants of South African Women's Labour Force Participation, 1995–2004. *Journal of African Economies,* 22(3), pp. 347-374.

Oaxaca, R. L., 2007. The challenge of measuring labor market discrimination against women. *SWEDISH ECONOMIC POLICY REVIEW,* Volume 14, pp. 199-231.

Oesch, D., Lipps, O. & McDonald, P., 2017. The wage penalty for motherhood: Evidence on discrimination from panel data and a survey experiment for Switzerland. *DEMOGRAPHIC RESEARCH,* 37(56), pp. 1793-1824.

Petreski, M. & Blazevski, N. M., 2015. *The gender and motherhood wage gap in the former Yugoslav Republic of Macedonia: An econometric analysis,* Budapest: International Labour Organization.

Piras, C. & Ripani, L., 2005. *The Effects of Motherhood on Wages and Labor Force Participation: Evidence from Bolivia, Brazil, Ecuador and Peru,* Washington DC: Inter-American Development Bank.

Posel, D., 2011. *Gender differences in the South African labour market (1995-2007): A descriptive review.* Johannesburg, UKZN School of Development Studies, p. 24.

Posel, D. & Muller, C., 2007. *Is there evidence of a wage penalty to female part-time employment in South Africa?,* Durban: University of KwaZulu Natal.

Posel, D. & van der Stoep, G., 2008. *Co-resident and absent mothers: Motherhood and labour force participation in South Africa,* Durban: University of kwaZulu-Natal.

Staff, J. & Mortimer, J. T., 2012. Explaining the Motherhood Wage Penalty During the Early Occupational Career. *Demography,* Volume 49, pp. 1-21.

United Nations, 2015. *The World's Women 2015: Trends and Statistics,* New York: United Nations Statistics Division.

van Klaveren, M., Tijdens, K., Hughie-Williams, M. & Ramos Martin, N., 2009. *An overview of women's work and employment in South Africa. - rev. ed.,* Amsterdam: Amsterdam Institute for Advanced Labour Studies.

Vinkenburg, C. J., van Engen, M. L., Coffeng, J. & Dikkers, J. S., 2012. Bias in Employment Decisions about Mothers and Fathers: The (Dis)Advantages of Sharing Care Responsibilities. *Journal of Social Issues,* 68(4), pp. 725-741.

Waldfogel, J., 1998. Understanding the ''Family Gap'' in Pay for Women with Children. *Journal of Economic Perspectives,* 12(1), pp. 137-156.

Weichselbaumer, D. & Winter-Ebmer, R., 2005. A META-ANALYSIS OF THE INTERNATIONAL GENDER WAGE GAP. *JOURNAL OF ECONOMIC SURVEYS,* 19(3), pp. 479-511.

Data and Stata Reference List

Cox, N. J. (2004). Speaking Stata: Graphing distributions. The Stata Journal, 4(1), 66-88.

Kerr, Andrew, David Lam and Martin Wittenberg (2017), Post-Apartheid Labour Market Series [dataset]. Version 3.2. Cape Town: DataFirst [producer and distributor], 2017. Link has instructions on how to do rifreg: http://faculty.arts.ubc.ca/nfortin/datahead.html

Firpo, Sergio, Nicole Fortin and Thomas Lemieux, Unconditional Quantiles Regressions," NBER Technical Paper T339, July 2007. (forthcoming in Econometrica).

Firpo, Sergio, Nicole Fortin and Thomas Lemieux, Decomposing Wage Distributions using Recentered Influence Function Regressions". June 2007.

Wittenberg, M. (2017), Non-Parametrics Practical Lecture do file, UCT School of Economics.

Appendices

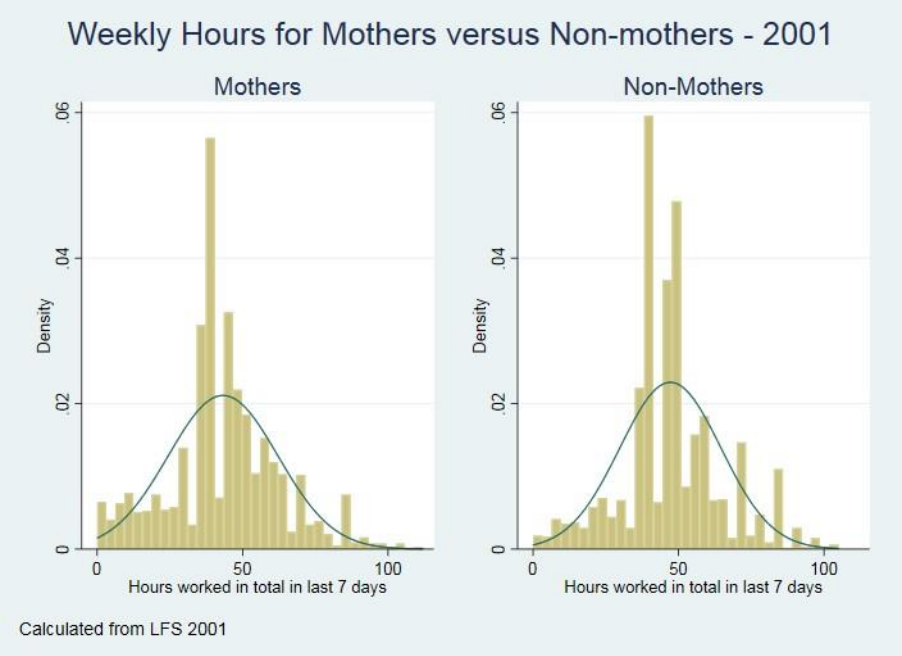
Appendix A

Table 1A: Mean Hourly Earnings of Mothers and Non-Mothers by Province – 2001, 2005, and 2007

	2001				2005				2007			
	Mother		Non-mother		Mother		Non-mother		Mother		Non-mother	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Western Cape	16.43	13.93	27.18	42.5	16.2	15.2	17.8	11.3	25.16	28.87	23.42	23.65
Eastern Cape	24.99	35.75	15.31	23.5	156.7	2298.96	27.02	37.95	34.99	45.05	26.6	34.53
Northern Cape	20.7	26.36	8.43	8.5	20.05	19.68	19.6	21.04	22.56	22.63	31.35	32.06
Free State	19.98	28.88	19.5	27.04	21.3	33.23	23.9	30.9	28.89	39.58	24.26	26.75
KwaZulu-Natal	22.63	39.81	15.1	18.4	21.99	34.9	19.2	21.3	25.08	29.28	29.19	97.96
North West	22.67	30.5	25.14	55.3	33.4	51.5	26.86	36.54	33.73	44.89	25.9	29.27
Gauteng	37.6	59.77	22.7	30.6	29.9	35.9	20.02	28.22	38.96	54.77	29.52	35.27
Mpumalanga	17.39	23.16	17.6	22.4	24.1	31.9	23.48	34.03	20.65	25.45	27.08	35.01
Limpopo	24.82	49.24	20.8	34.6	24.4	37.34	23.94	34.71	34.18	76.97	26.15	28.54

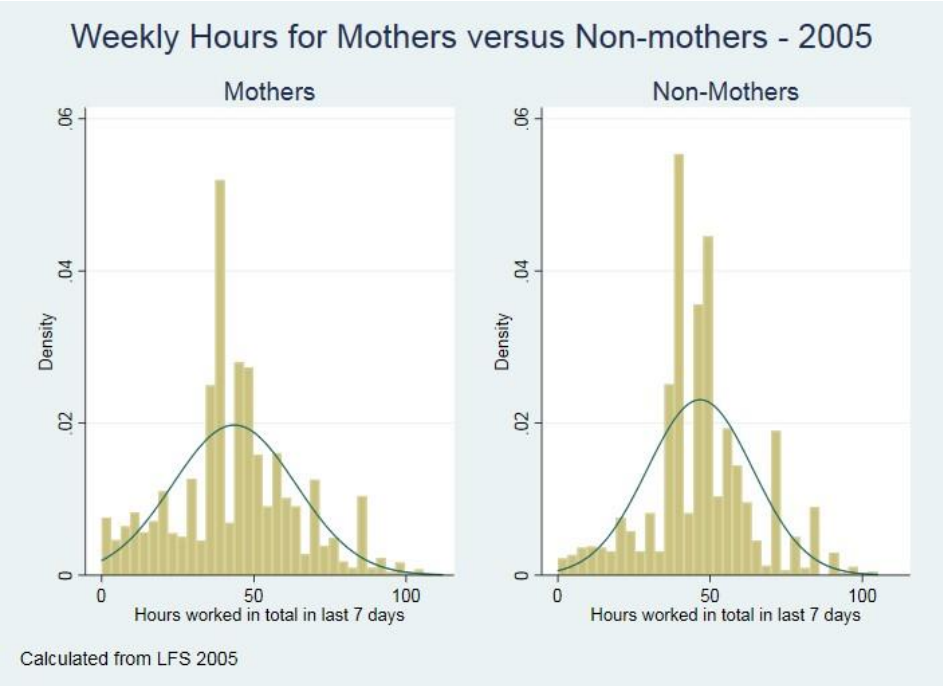
Source: Own calculations using September rounds of LFS 2001, 2005 and 2007
Notes: Cross entropy Weights have been applied

Figure 1A: Histogram and Distribution of Hours Worked – 2001



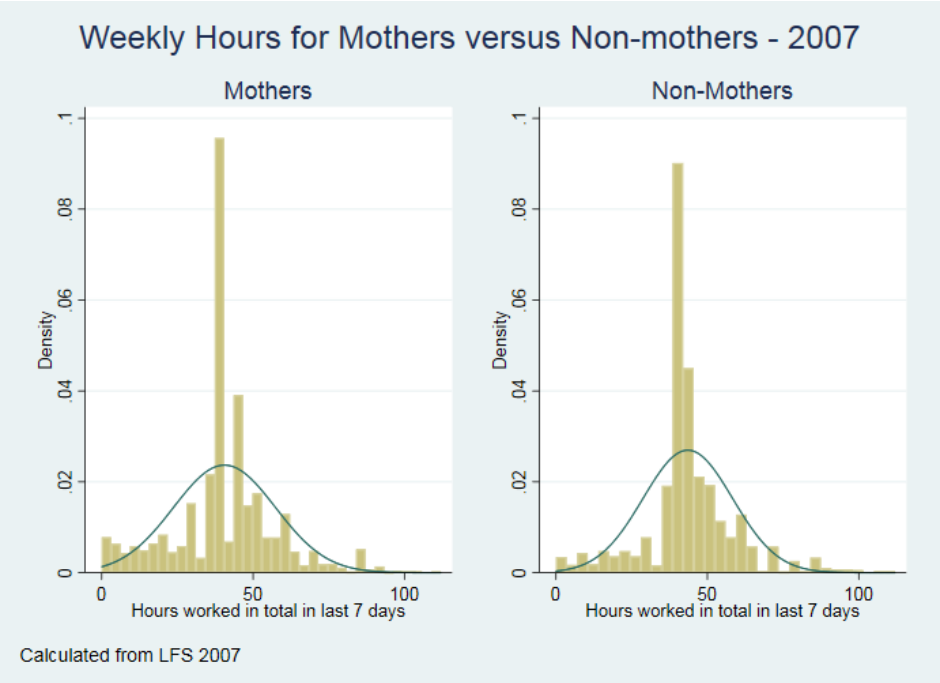
Source: Own calculations: LFS (2001, September)
Notes: the sample includes all Africans between 20 and 50 who are employed and have non-missing wage and work hours data. The data are weighted using 2001 Census weights.

Figure 2A: Histogram and Distribution of Hours Worked – 2001



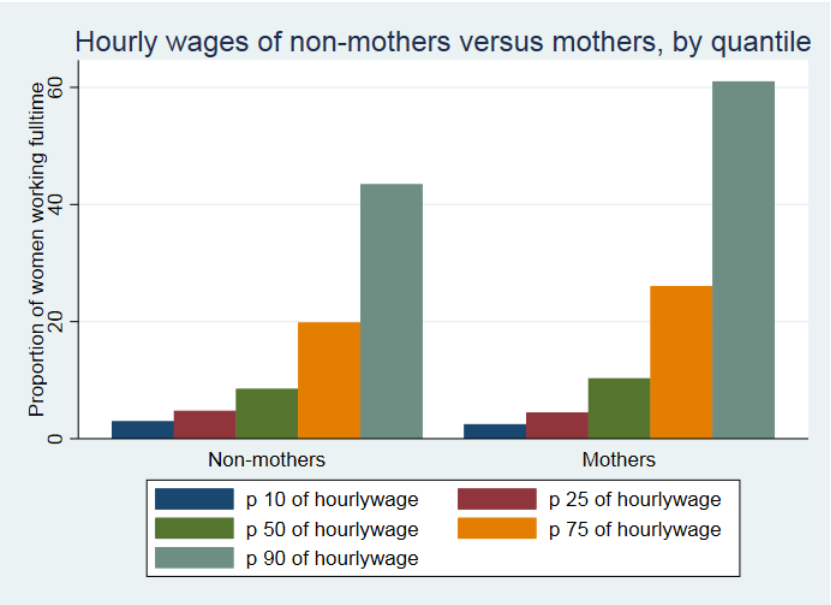
Source: Own calculations: LFS (2005, September)
Notes: the sample includes all Africans between 20 and 50 who are employed and have non-missing wage and work hours data. The data are weighted using 2001 Census weights.

Figure 3A: Histogram and Distribution of Hours Worked – 2001

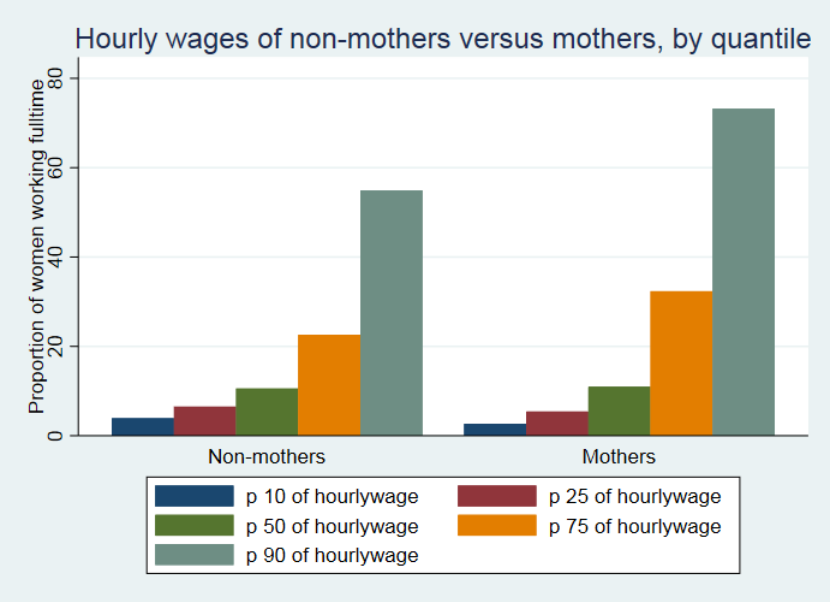


Source: Own calculations: LFS (2007, September)
Notes: the sample includes all Africans between 20 and 50 who are employed and have non-missing wage and work hours data. The data are weighted using 2001 Census weights.

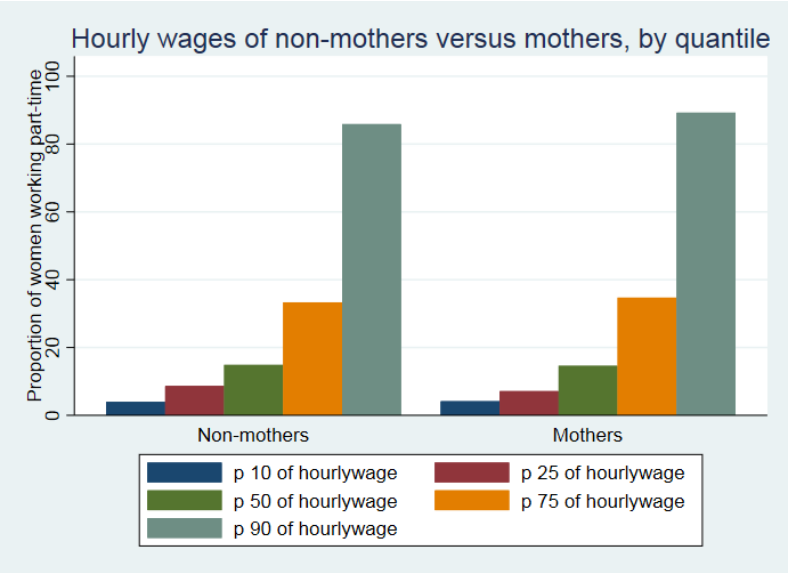
Figures 4A (a), (b), (c) and (c): Hourly Wages for Full-time and Part-time Female Workers, 2001 and 2005



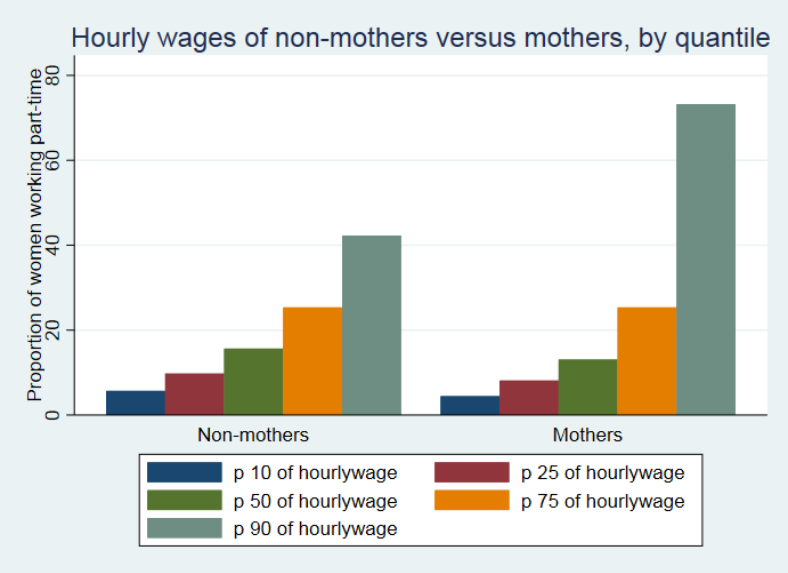
Source: Own calculations using LFS 2001
Notes: Earnings data have been deflated to September 2016 for comparability. The data are weighted.



Source: Own calculations using LFS 2005
Notes: Earnings data have been deflated to September 2016 for comparability. The data are weighted.

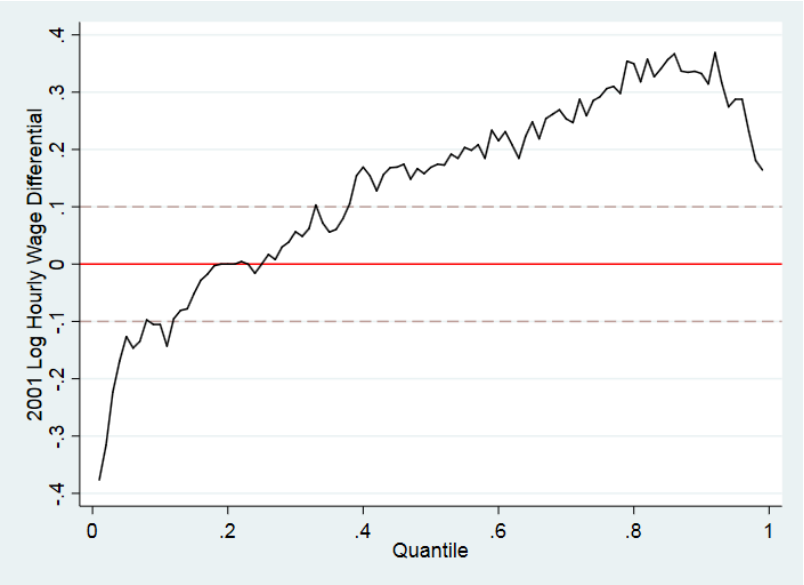


Source: Own calculations using LFS 2001
Notes: Earnings data have been deflated to November 2014 for comparability. The data are weighted.



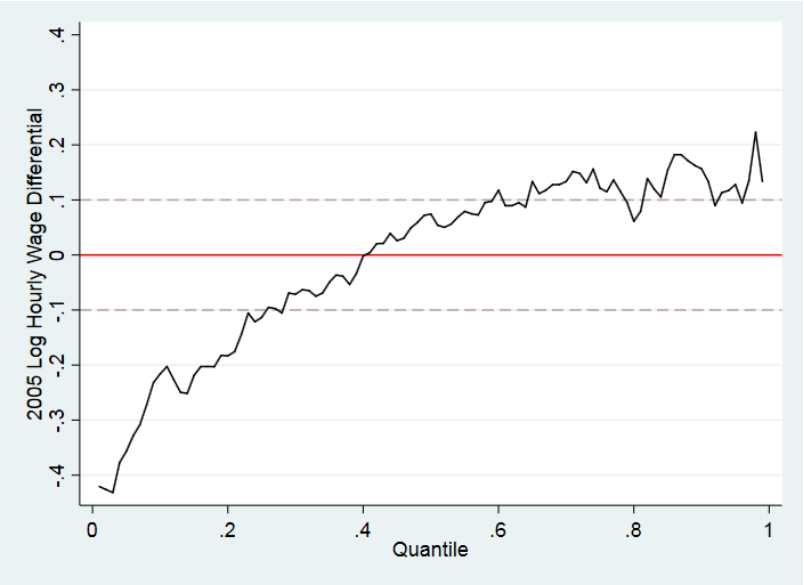
Source: Own calculations using LFS 2005
Notes: Earnings data have been deflated to November 2014 for comparability. The data are weighted.

Figures 5A (a), (b) and (c): Motherhood Wage Differential by Quantiles – 2001, 2005 and 2007



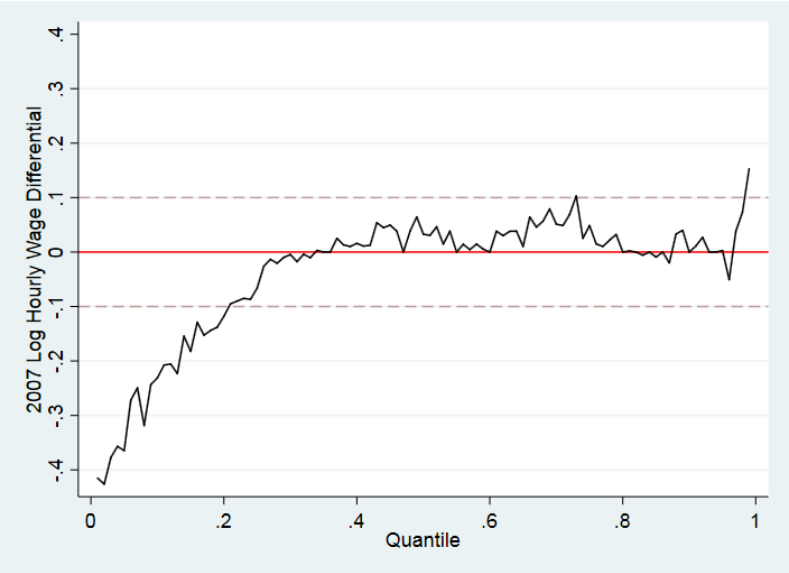
Source: Own calculations using LFS 2001

Notes: Coding retrieved from Stata journal by (Cox, 2004). Earnings data have been deflated to September 2016 for comparability. Data weighted using 2001 Census weights



Own calculations using LFS 2005

Notes: Coding retrieved from Stata journal by (Cox, 2004). Earnings data have been deflated to September 2016 for comparability. Data weighted using 2001 Census weights



Own calculations using LFS 2007

Notes: Earnings data have been deflated to November 2014 for comparability. Data weighted using 2001 Census weights. Coding retrieved from Stata journal by (Cox, 2004).

Table 2A: Recentred Influence Function (RIF) -Ordinary Least Squares (OLS) results, 2001

VARIABLES	10th quantile		30th quantile		50th quantile		70th quantile		90th quantile	
	Mother	Non-mother	Mother	Non-mother	Mother	Non-mother	Mother	Non-mother	Mother	Non-mother
Years of Educ.	0.0787***	0.0592***	0.127***	0.0809***	0.134***	0.0961***	0.114***	0.0988***	0.0666***	0.0873***
	(0.0108)	(0.0115)	(0.00920)	(0.00986)	(0.00870)	(0.00990)	(0.00900)	(0.0111)	(0.00964)	(0.0160)
Professional	0.0170	-0.354**	-0.0178	-0.0555	-0.0195	0.193	0.353	0.239	2.642***	3.891***
	(0.143)	(0.151)	(0.151)	(0.272)	(0.157)	(0.349)	(0.262)	(0.430)	(0.628)	(1.182)
Technical & assoc.	0.0987	-0.277**	0.0802	0.0270	-0.0341	0.299	0.122	0.278	0.493	1.692
Professionals	(0.140)	(0.137)	(0.149)	(0.270)	(0.153)	(0.347)	(0.260)	(0.423)	(0.576)	(1.166)
Clerks	0.0961	-0.373**	0.0662	-0.114	-0.194	0.0127	-0.691**	-0.615	-1.460***	-1.089
	(0.141)	(0.155)	(0.151)	(0.276)	(0.158)	(0.355)	(0.270)	(0.439)	(0.564)	(1.154)
Services & Sales	-0.282*	-0.430***	-0.379**	-0.245	-0.976***	-0.383	-1.910***	-1.302***	-2.064***	-1.781
	(0.156)	(0.152)	(0.159)	(0.275)	(0.161)	(0.351)	(0.261)	(0.427)	(0.547)	(1.127)
Skilled Agric.	-0.160	-0.161	-0.723**	-0.750**	-1.427***	-0.730	-1.789***	-2.028***	-1.844***	-2.563**
& Fisheries	(0.324)	(0.247)	(0.333)	(0.380)	(0.286)	(0.452)	(0.381)	(0.464)	(0.604)	(1.118)
Craft & Trade	0.0903	-0.183	-0.140	-0.0209	-0.824***	-0.145	-1.712***	-1.168**	-2.099***	-2.435**
	(0.161)	(0.165)	(0.171)	(0.291)	(0.177)	(0.376)	(0.277)	(0.456)	(0.550)	(1.125)
Plant & Machinery	0.0776	-0.157	-0.0768	0.0404	-0.694***	-0.276	-1.795***	-1.176**	-2.197***	-2.593**
	(0.169)	(0.161)	(0.182)	(0.298)	(0.193)	(0.388)	(0.291)	(0.471)	(0.550)	(1.115)
Elementary Occupation	-0.334**	-0.416***	-0.555***	-0.429	-0.985***	-0.587*	-2.030***	-1.445***	-2.117***	-2.244**
	(0.153)	(0.149)	(0.156)	(0.274)	(0.157)	(0.350)	(0.258)	(0.423)	(0.544)	(1.117)
Domestic Work	-0.282*	-0.612***	-0.713***	-0.631**	-1.467***	-1.025***	-2.391***	-2.064***	-2.186***	-2.513**
	(0.154)	(0.146)	(0.159)	(0.272)	(0.158)	(0.347)	(0.256)	(0.418)	(0.543)	(1.113)
Married	-0.0413	-0.151***	0.0184	-0.130**	0.124***	-0.0898	0.159***	0.00134	0.119*	0.116
	(0.0508)	(0.0572)	(0.0452)	(0.0517)	(0.0445)	(0.0564)	(0.0488)	(0.0635)	(0.0644)	(0.0970)
Experience	0.0166	0.0561***	0.0258**	0.0326***	0.0230**	0.0197*	0.0204*	0.0251**	0.0259**	0.0230
	(0.0122)	(0.0125)	(0.0104)	(0.0103)	(0.0104)	(0.0108)	(0.0114)	(0.0125)	(0.0123)	(0.0200)
Experience Squared	0.000119	-0.000941***	0.000106	-0.000213	0.000233	0.000127	0.000139	3.82e-05	-0.000309	-8.03e-05
	(0.000284)	(0.000295)	(0.000239)	(0.000237)	(0.000230)	(0.000246)	(0.000238)	(0.000272)	(0.000231)	(0.000389)
Constant	0.399	0.706***	0.866***	1.368***	1.972***	2.140***	3.255***	3.431***	4.436***	4.231***
	(0.248)	(0.222)	(0.237)	(0.320)	(0.249)	(0.393)	(0.341)	(0.487)	(0.584)	(1.180)
Observations	3,413	1,704	3,413	1,704	3,413	1,704	3,413	1,704	3,413	1,704
R-squared	0.088	0.121	0.227	0.218	0.324	0.318	0.413	0.372	0.352	0.408

Source: Own calculations using September round of LFS 2001

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The sample includes all Africans between 20 and 50 who are employed and have non-missing wages and hours of work data, and the data are weighted using 2001 Census weights. The dependent variable is log of real hourly wages. The standard errors are shown in brackets below the estimates. The base category for occupation is managers. The 'Other' category is excluded from the estimation. The province results have been omitted from the table and are available on request.

Table 3A: Recentred Influence Function (RIF) -Ordinary Least Squares (OLS) results, 2005

VARIABLES	10th quantile		30th quantile		50th quantile		70th quantile		90th quantile	
	Mother	Non-mother	Mother	Non-mother	Mother	Non-mother	Mother	Non-mother	Mother	Non-mother
Years of Education	0.0589***	0.0648***	0.0766***	0.0654***	0.0905***	0.0706***	0.124***	0.103***	0.104***	0.0966***
	(0.0132)	(0.0173)	(0.00885)	(0.00926)	(0.00739)	(0.00813)	(0.00855)	(0.0119)	(0.0117)	(0.0162)
Professionals	0.333	-0.0633	0.361**	-0.0361	0.355**	0.0379	0.941***	0.140	4.162***	3.561***
	(0.223)	(0.131)	(0.143)	(0.0827)	(0.142)	(0.175)	(0.227)	(0.361)	(0.560)	(1.193)
Technical & assoc.	0.285	-0.0624	0.195	-0.0533	0.225	0.0584	0.506**	0.0889	1.872***	1.689
Professional	(0.224)	(0.122)	(0.146)	(0.0832)	(0.142)	(0.173)	(0.230)	(0.349)	(0.503)	(1.128)
Clerks	0.372*	-0.307*	0.271*	-0.188**	0.179	-0.127	0.0111	-0.369	-0.422	-1.612
	(0.221)	(0.159)	(0.146)	(0.0890)	(0.146)	(0.179)	(0.241)	(0.357)	(0.491)	(1.110)
Services & Sales	-0.394	-0.537***	-0.379**	-0.479***	-0.581***	-0.535***	-1.105***	-1.447***	-1.408***	-2.900***
	(0.241)	(0.166)	(0.150)	(0.0978)	(0.144)	(0.181)	(0.227)	(0.353)	(0.457)	(1.075)
Skilled Agric.	-0.299	-0.360	-0.393	-0.692**	-0.473**	-1.002***	-0.625*	-1.853***	-1.220**	-3.175***
& Fisheries	(0.420)	(0.502)	(0.244)	(0.310)	(0.216)	(0.266)	(0.326)	(0.433)	(0.493)	(1.072)
Craft & Trade	0.138	-0.314	-0.147	-0.274**	-0.349**	-0.400**	-1.008***	-1.253***	-1.453***	-2.915***
	(0.244)	(0.212)	(0.161)	(0.120)	(0.152)	(0.199)	(0.236)	(0.378)	(0.456)	(1.081)
Plant & Machinery	0.481**	-0.261	0.119	-0.142	-0.395**	-0.384*	-0.920***	-1.580***	-1.351***	-3.201***
	(0.229)	(0.223)	(0.175)	(0.137)	(0.173)	(0.208)	(0.263)	(0.377)	(0.472)	(1.070)
Elementary Occupations	-0.347	-0.466***	-0.286*	-0.464***	-0.510***	-0.582***	-1.060***	-1.633***	-1.305***	-2.997***
	(0.234)	(0.148)	(0.146)	(0.0886)	(0.141)	(0.177)	(0.224)	(0.345)	(0.453)	(1.068)
Domestic Workers	0.320	-0.321**	-0.201	-0.660***	-0.589***	-0.765***	-1.311***	-1.835***	-1.486***	-3.050***
	(0.232)	(0.147)	(0.150)	(0.0898)	(0.144)	(0.177)	(0.225)	(0.343)	(0.452)	(1.068)
Married	0.0277	-0.0869	0.0162	-0.0270	0.0723**	0.0229	0.140***	0.0413	0.0741	-0.0358
	(0.0663)	(0.0845)	(0.0423)	(0.0478)	(0.0362)	(0.0446)	(0.0475)	(0.0649)	(0.0696)	(0.102)
Experience	0.0293*	0.0653***	0.0186**	0.0288***	0.00961	0.0273***	0.0122	0.0297***	0.0296**	0.0247
	(0.0151)	(0.0192)	(0.00943)	(0.00961)	(0.00792)	(0.00843)	(0.0104)	(0.0115)	(0.0146)	(0.0202)
Experience Sq.	-0.000553	-0.00131***	-0.000159	-0.000351	0.000206	-0.000253	0.000354	-7.41e-05	-1.41e-05	-7.14e-05
	(0.000352)	(0.000460)	(0.000222)	(0.000229)	(0.000182)	(0.000194)	(0.000225)	(0.000254)	(0.000307)	(0.000395)
Constant	0.632**	0.909***	1.492***	1.737***	2.038***	1.987***	2.250***	2.598***	2.897***	4.401***
	(0.322)	(0.283)	(0.211)	(0.177)	(0.202)	(0.245)	(0.299)	(0.429)	(0.512)	(1.115)
Observations	3,439	1,593	3,439	1,593	3,439	1,593	3,439	1,593	3,439	1,593
R-squared	0.066	0.075	0.131	0.180	0.220	0.245	0.312	0.353	0.378	0.472

Source: Own calculations using September round of LFS 2001

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The sample includes all Africans between 20 and 50 who are employed and have non-missing wages and hours of work data, and the data are weighted using 2001 Census weights. The dependent variable is log of real hourly wages. The standard errors are shown in brackets below the estimates. The base category for occupation is managers. The 'Other' category is excluded from the estimation. The province results have been omitted from the table and are available on request.