

Southern Africa Labour and Development Research Unit



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Fertility and mother's labour market behaviour: Evidence from the 2011 South African Census

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Introduction

The relationship between fertility and female labour force participation has been a subject of attention for several decades. Most of the literature focuses on developed countries and responds to the interest in understanding the evolution of the increasing female role in labour markets during the last century and the possible effect that controlled fertility may have on it.

Fertility, however, is a choice variable and thus endogenous. Therefore, disentangling its impact is not straight forward and several approaches have been proposed over time in order to isolate it. One of those methods is the use of multiple births occurrence as an instrument for exogenous fertility which was introduced by Rosenzweig and Wolpin (1980) and also used by Bronars and Grogger (1994) and Jacobsen et al. (1999) in the context of developed countries and by Careces-Delpiano (2012) and Ponczek and Souza (2012) for developing countries.

In this paper we apply the same strategy to study the effects of fertility on labour force participation and employment in South Africa. We use census data from 2011 which provides us with enough multiple birth occurrences to identify the effects with precision and we focus on African women¹. This approach suggests that there is a negative effect of fertility on employment of 4.9 percentage points per additional child. The effect on labour force participation is also negative and slightly higher at 5.5 percentage points. Less than 30 percent of women in our sample are employed so this is quite a large effect. Labour force

¹ Assisted fertility is not common outside the expensive private health system to which the large majority of the population under study has no access; therefore the use of multiple birth occurrence as an instrument is not problematic.

participation is between 60 and 70 percent depending on the definition used to measure it. Thus, the effect of fertility is not trivial in this case either.

The paper is organized as follows: in the next section we explain in detail the endogeneity problem and our empirical strategy to deal with it. In section 3 we describe the data and section 4 summarizes the results.

Empirical Strategy

The relationship between women's fertility and their labour supply can be characterized by:

(1)

$$S_i = \alpha_0 + \alpha_1 C_i + X_i' \alpha_2 + \varepsilon_i$$

where S_i is the labour supply of woman i , X_i' is a vector of other covariates such as her age and her age at first birth, and C_i is the total number of children ever born to her. In this approach, the coefficient α_1 measures the association between the number of children and the labour supply attachment of woman i . However, when estimated using OLS, α_1 can be subject to bias and is inconsistent due to omitted variables. Therefore we follow a well know identification approach (Rosenzweig and Wolpin 1980?) and instrument the total number of children a woman had with the event of having a multiple birth. In our population multiple births are a random event at a given age and therefore it should not be correlated with the error term ε_i in equation (1). In the first stage of a 2SLS we estimate:

(2)

$$C_i = \beta_0 + \beta_1 MB_i + X_i' \beta_2 + \mu_i$$

where MB_i indicates a multiple birth and takes the value 1 if the birth was multiple and 0 to indicate a singleton birth. Multiple births create an exogenous source of variation in the total number of children the woman has. Therefore, in our second stage we can estimate:

$$S_i = \gamma_0 + \gamma_1 \widehat{C}_i MB_i + X_i' \gamma_2 + \vartheta_i$$

to identify the effect that additional children have on women's labour market behaviour.

Data and Sample Description

In this work we use data from the National Census conducted between October 9th and 31st 2011 by Statistics South Africa. The Census 2011 questionnaire included a fertility section where each woman reported the total number of children she gave birth to regardless of their current vital status, her age at first birth, and the date of birth and sex of the last born

child. In addition, we can identify from the household roster all her co-resident children and their corresponding date of birth.

Table 1 shows the proportion of women between 18 and 40 years of age who have at least 2 children, by age and race. Appendix Table A1 shows the average number of children ever born by age and race for the same sample. We exclude from our sample 1.3 percent of mothers that reported fewer total children ever born to them than the total number of her children co-residing with her at the time of the census. We can see that that by age 30 more than 50 percent of African women have had at least 2 children. This proportion rises to 77 percent by age 40 when the average African woman is mother to 2.8 children. We focus therefore on their second birth as it seems the most relevant for our purpose.

We include in our sample African women between 18 and 40 years of age with at least two children, who had their first birth between ages 15 and 35, and that whose oldest child is below 14.² We exclude women with only two children if the children are twins. This gives us a sample that includes 155,123 mother observations.

Using these data, we are able to classify whether the woman's second birth was a singleton or a multiple birth. In our sample, 133,827 (87.44 percent) second births are singleton and 958 (0.63 percent) are multiple second births. The information we have on fertility history and children's ages is not enough to classify the remaining 11.94 percent of second births as multiple or singleton and therefore we exclude them from our sample.

Table 2 shows basic summary statistics for mothers whose second birth we are able to classify as a singleton or multiple birth (analytical sample) and those whose multiple birth status is missing due to lack of information. None of the mothers with missing multiple birth status co-reside with all their children and nearly half live with none of their children. This is in stark contrast to women whose second birth we are able to classify. Most of these women (64.4 percent) co-reside with all their children and only 14.8 percent have none of their offspring living with them. This is not surprising as data from the household roster on co-resident children is often necessary to be able to classify multiple second births.

The large sample sizes result in statistically significant differences on almost every variable between women who are included and excluded from our sample, even when the magnitude of differences is not substantively interesting. Women who are missing the multiple birth indicator are of a similar age and have their first child only slightly earlier (20.9 years of age versus 21.18) than women included in our sample. However, they have given birth to more than one additional child on average (3.86 children ever born versus 2.34).

Using multiple births as an instrument requires very large datasets that seldom collect comprehensive birth histories. As such, it is common in this literature to restrict the analysis

² Our sample inclusion criteria is similar to that in Caceres-Delpiano (2012) to be able to compare estimates.

to women who co-reside with their children. We are able to classify the second birth for a considerable portion of women who do not co-reside with all or any of their children. However, the women we are unable to classify are significantly less likely to co-reside with their children than those for whom we can assign multiple second birth status. While our identification strategy is valid for the 88% of women we are able to classify, it is possible that women we were unable to classify behave in a different manner.

The 2011 census also included questions related to labour force participation and employment status. Women report if they were working in the week previous to the census. Employment includes all types of employment such as working for wages, self-employment, etc. The questions also capture desire and availability for work if a job is offered from where labour force participation indicators can be computed.

Almost 70 percent of these women are considered labour force participants under its broad definition which includes discouraged workers. The percentage in the labour force is still almost 60 percent when we exclude individuals that are not actively searching for jobs, however just more than half of these women report to be working at the time of the census. Women from whom we cannot classify multiple birth status are slightly more likely to be working (30.9% versus 29.5%) and less likely to be labour force participants (58.0% versus 58.5%).

Before we proceed to analyse the relationship between fertility and labour market behaviour, we examine whether the prevalence of multiple births in our data is consistent with evidence from other populations. In Table 3 we present the frequency of multiple births for children in the 2011 census that are below 1 years of age and co-reside with their mother. As expected the vast majority (98%) of children are from a singleton births and we find that around 1.96 percent of children are twins. A very small percentage of children are triplets or quadruplets. The prevalence of multiple births in our data is very similar to that found by Caceres-Delpiano (2012) in his analysis of Demographic and Health Survey data from 40 developing countries.

Results

Table 4 present results from our analysis of the relationship between fertility and women's labour market behaviour. The first column shows coefficients and standard errors for three separate OLS regressions of the total children ever born on an indicators for working, broad labour force participation and strict labour force participation respectively. The regressions include controls for the woman's age, age squared, age at first birth, years of education, urban status and a full set of indicators for province of usual residence. These regressions reveal a significant negative association between fertility and labour market attachment and

outcomes. We investigate the extent to which this relationship is causal using our indicator for multiple second births as an instrument for total children ever born.

We find a very large correlation between multiple second births and total number of children per woman. The second column of Table 4 shows the first stage estimation of the effect of multiple births on the total number of children that women have. The estimated coefficient is 0.9, highly significant, and similar to estimates for other developing countries (Caceres-Delpiano 2012, for example). The F-test statistic of 2111.243 indicates the strength of our instrument.

The second stage shows that each additional child reduces the woman's probability of working by 4.9 percentage points. This is slightly lower, in absolute value, than the OLS estimate which suggests a reduction of 5.3 percentage points per child but still statistically significant and quite a large effect given that only 30 percent of women in the sample are employed .

Our IV estimates imply that women's labour force participation is reduced by 5.5 percentage points by each additional child when we use the broad definition, and by 5.6 percentage points when we exclude discouraged workers. These estimates are a little larger than the coefficients obtained using OLS which are 3.9 and 4.7 percentage points respectively.

Our results are generally consistent with Caceres-Delpiano (2012) who finds significant effects of fertility on employment, with IV estimates typically larger in absolute magnitude than OLS coefficients. However, for the sub-sample of 26 African countries he only finds significant effects for the third and fourth births. This is likely to be explained by the higher fertility rates in their sample, where the average woman has given birth to more than three children.

Conclusions

Using 2011 Census data and applying an instrumental variable approach, we estimated the effects of fertility on labour market behaviour and outcomes among African women. We find significant and sizable negative effects on both, their labour force attachment and their employment status.

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Table1. Proportion of women having at least two children by age and race

Mother age	Black	Coloured	Indian	White	Other	Total
18	0.030	0.024	0.017	0.015	0.025	0.028
19	0.053	0.043	0.029	0.021	0.072	0.051
20	0.082	0.075	0.030	0.037	0.031	0.078
21	0.122	0.107	0.047	0.042	0.179	0.116
22	0.169	0.152	0.080	0.060	0.189	0.160
23	0.218	0.222	0.099	0.078	0.213	0.209
24	0.261	0.279	0.122	0.092	0.267	0.251
25	0.320	0.314	0.186	0.131	0.291	0.306
26	0.358	0.352	0.184	0.163	0.361	0.342
27	0.406	0.409	0.220	0.180	0.297	0.388
28	0.447	0.464	0.257	0.228	0.392	0.430
29	0.498	0.517	0.344	0.276	0.459	0.482
30	0.532	0.548	0.378	0.335	0.399	0.515
31	0.572	0.590	0.421	0.378	0.408	0.555
32	0.602	0.624	0.482	0.449	0.500	0.589
33	0.635	0.658	0.525	0.486	0.470	0.622
34	0.662	0.677	0.565	0.515	0.578	0.649
35	0.684	0.683	0.617	0.539	0.587	0.669
36	0.707	0.734	0.641	0.588	0.624	0.696
37	0.726	0.722	0.640	0.598	0.538	0.710
38	0.745	0.759	0.683	0.628	0.659	0.733
39	0.754	0.763	0.708	0.624	0.670	0.741
40	0.767	0.766	0.664	0.662	0.656	0.751
Total	0.415	0.445	0.365	0.342	0.373	0.411

Table 2. Summary Statistics

	Analytical sample		Women with multiple 2 nd birth indicator missing	
	Mean	SD	Mean	SD
Mother age	28.99	4.65	29.3	4.4
Mother age at first birth	21.18	3.8	20.9	3.82
Total number of children ever born	2.335	0.64	3.859	1.28
Total number of co-resident children	1.813	1.05	0.856	1.04
All children are co-resident	0.644	0.48	0	0.02
No child is co-resident	0.148	0.35	0.476	0.5
Second birth was multiple	0.007	0.08	--	--
Oldest born age	7.804	3.29	8.427	3.5
Working	0.295	0.46	0.309	0.46
Labor force participant, broad	0.693	0.46	0.68	0.47
Labor force participant	0.585	0.49	0.58	0.49
Mother years of education	10.18	2.93	9.5	3.33
Mother is studying ¹	0.089	0.28	0.096	0.29
Urban	0.582	0.49	0.605	0.49
Province of residency:				
Western Cape	0.053	0.22	0.051	0.22
Eastern Cape	0.112	0.32	0.128	0.33
Northern Cape	0.015	0.12	0.013	0.11
Free State	0.065	0.25	0.05	0.22
Kwazulu-Natal	0.201	0.4	0.247	0.43
North west	0.079	0.27	0.07	0.26
Gauteng	0.25	0.43	0.275	0.45
Mpumalanga	0.09	0.29	0.075	0.26
Limpopo	0.136	0.34	0.091	0.29
Observations	134785		18271	

African women 18 to 40 years old with at least two children, who had their first birth between ages 15 and 35, whose oldest child is below 14 and youngest is older than 1. Women with only two children who are twins not included

¹Sample are reduced to 128,462 observations due to missing information

Table 3. Frequency of multiple births for children under the age of 1 who co-reside with their mother

Type of birth	All		African only	
	Observations	%	Observations	%
Singleton	80251	98.01	68427	98
Twin	1604	1.96	1382	1.98
Triplet	21	0.03	15	0.02
Quadruplets	4	0	0	0
Total	81880	100	69824	100

Table 4. The effect of fertility on labour force attachment

Dependent Variable	OLS	Instrumental Variable		Hausman Test
		First Stage	Second Stage	
Total children ever born		0.900 (0.020)		
Working	-0.053 (0.002)		-0.049 (0.015)	0.814
Labor force participation, broad	-0.039 (0.002)		-0.055 (0.016)	0.320
Labor force participation	-0.047 (0.002)		-0.056 (0.017)	0.574
Observations	134497			
F-test		2111.243		

Sample includes African women 18 to 40 years old with at least two children, who had their first birth between ages 15 and 35, whose oldest child is below 14 and youngest is older than 1. Women with only two children who are twins not included. We include controls for mother's age and age squared, age at first birth, years of education, urban status, and province.

Table 5

	Less than Grade 12		Grade 12 or more		Rural		Urban	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Employed	-0.047*** (0.002)	-0.046** (0.018)	-0.071*** (0.004)	-0.068*** (0.023)	-0.043*** (0.002)	-0.060*** (0.020)	-0.063*** (0.003)	-0.049** (0.021)
Labour force participation broad	-0.039*** (0.003)	-0.103*** (0.022)	-0.042*** (0.003)	-0.008 (0.021)	-0.039*** (0.003)	-0.076*** (0.025)	-0.039*** (0.003)	-0.048** (0.019)
Labour force participation strict	-0.046*** (0.003)	-0.105*** (0.022)	-0.050*** (0.004)	-0.008 (0.023)	-0.043*** (0.003)	-0.051** (0.025)	-0.048*** (0.003)	-0.070*** (0.021)
Observations	78,931	78,931	57,347	57,347	56,815	56,815	79,463	79,463

Table A1: Average number of children ever born by age and race**Average number of children ever born by age and race**

Mother age	Black	Coloured	Indian	White	Other	Total
18	0.293	0.277	0.091	0.085	0.185	0.280
19	0.414	0.401	0.166	0.127	0.351	0.396
20	0.535	0.534	0.191	0.176	0.367	0.511
21	0.675	0.633	0.255	0.226	0.786	0.642
22	0.813	0.771	0.375	0.261	0.748	0.773
23	0.942	0.925	0.427	0.323	0.858	0.899
24	1.044	1.054	0.490	0.372	1.079	0.999
25	1.185	1.144	0.676	0.497	1.027	1.132
26	1.267	1.241	0.704	0.590	1.146	1.211
27	1.382	1.375	0.778	0.649	1.062	1.322
28	1.494	1.489	0.907	0.818	1.236	1.437
29	1.619	1.647	1.097	0.916	1.527	1.563
30	1.722	1.722	1.190	1.048	1.392	1.659
31	1.832	1.855	1.281	1.167	1.523	1.772
32	1.937	1.944	1.425	1.314	1.659	1.878
33	2.057	2.052	1.589	1.369	1.580	1.989
34	2.164	2.104	1.665	1.458	2.069	2.089
35	2.269	2.124	1.782	1.501	1.978	2.176
36	2.387	2.319	1.804	1.652	2.075	2.296
37	2.494	2.285	1.834	1.630	1.871	2.373
38	2.616	2.421	1.897	1.723	2.121	2.487
39	2.705	2.501	2.043	1.713	2.120	2.564
40	2.802	2.544	1.956	1.795	2.118	2.622
Total	1.482	1.509	1.126	1.016	1.304	1.444

Table A2. Summary Statistics

Variable	Women with multiple 2 nd birth		Women with singleton 2 nd birth		
	Mean	SD	Mean	SD	
Mother age	29.7	4.64	29.0	4.65	
Mother age at first birth	21.7	3.78	21.2	3.80	
Mother years of education	10.3	3.06	10.2	2.93	
Working	0.266	0.44	0.295	0.46	
Labor force participant, broad	0.647	0.48	0.693	0.46	
Labor force participant	0.540	0.50	0.586	0.49	
No. children ever born	3.247	0.54	2.328	0.64	
No co-resident children	3.061	0.70	1.805	1.05	
All children co-resident	0.827	0.38	0.643	0.48	
No child co-resident	0.000	0.00	0.149	0.36	
Second birth was multiple	1.000	0.00	0.000	0.00	
Oldest born age	8.045	3.24	7.803	3.29	
Mother is studying ¹	0.082	0.27	0.089	0.28	
Urban	0.541	0.50	0.582	0.49	
Province of Residency					
	1	0.057	0.23	0.053	0.22
	2	0.113	0.32	0.112	0.32
	3	0.010	0.10	0.015	0.12
	4	0.047	0.21	0.065	0.25
	5	0.207	0.41	0.201	0.40
	6	0.067	0.25	0.079	0.27
	7	0.237	0.43	0.250	0.43
	8	0.101	0.30	0.090	0.29
	9	0.161	0.37	0.135	0.34
Observations		958		133827	

¹ Information missing in some cases. Samples are reduced to 920 observation in the case of multiple 2nd birth, 127542 for singleton 2nd birth, and to 17302 for the group with multiple 2nd birth indicator missing.

southern africa labour and development research unit

The Southern Africa Labour and Development Research Unit (SALDRU) conducts research directed at improving the well-being of South Africa's poor. It was established in 1975. Over the next two decades the unit's research played a central role in documenting the human costs of apartheid. Key projects from this period included the Farm Labour Conference (1976), the Economics of Health Care Conference (1978), and the Second Carnegie Enquiry into Poverty and Development in South Africa (1983-86). At the urging of the African National Congress, from 1992-1994 SALDRU and the World Bank coordinated the Project for Statistics on Living Standards and Development (PSLSD). This project provide baseline data for the implementation of post-apartheid socio-economic policies through South Africa's first non-racial national sample survey.

In the post-apartheid period, SALDRU has continued to gather data and conduct research directed at informing and assessing anti-poverty policy. In line with its historical contribution, SALDRU's researchers continue to conduct research detailing changing patterns of well-being in South Africa and assessing the impact of government policy on the poor. Current research work falls into the following research themes: post-apartheid poverty; employment and migration dynamics; family support structures in an era of rapid social change; public works and public infrastructure programmes, financial strategies of the poor; common property resources and the poor. Key survey projects include the Langeberg Integrated Family Survey (1999), the Khayelitsha/Mitchell's Plain Survey (2000), the ongoing Cape Area Panel Study (2001-) and the Financial Diaries Project.



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