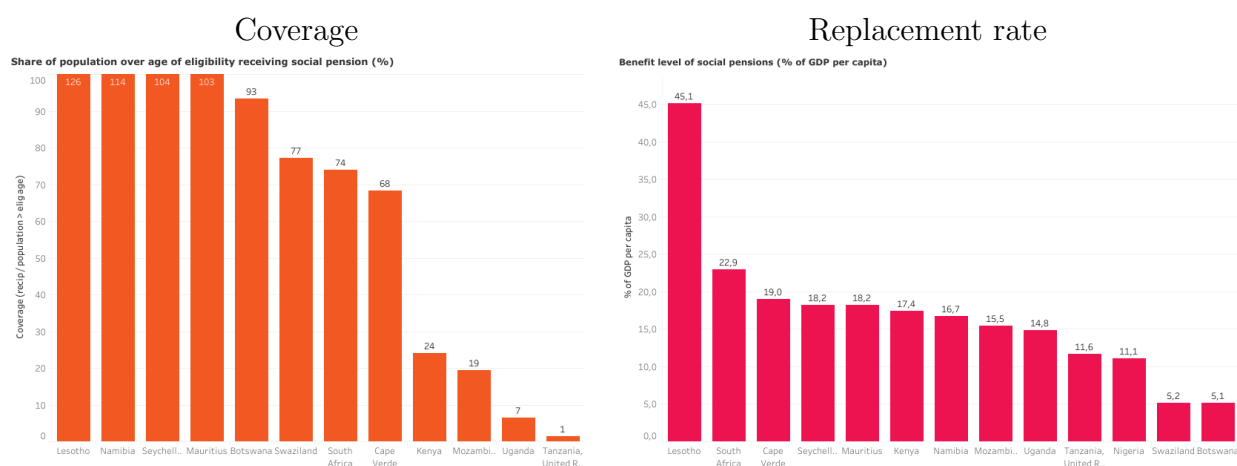# Online Appendix
The Old-Age Security Motive for Fertility: Evidence from the Extension of Social Pensions in Namibia

Pauline ROSSI and Mathilde GODARD

Figure A.1: Current social pension systems in Sub-Saharan Africa
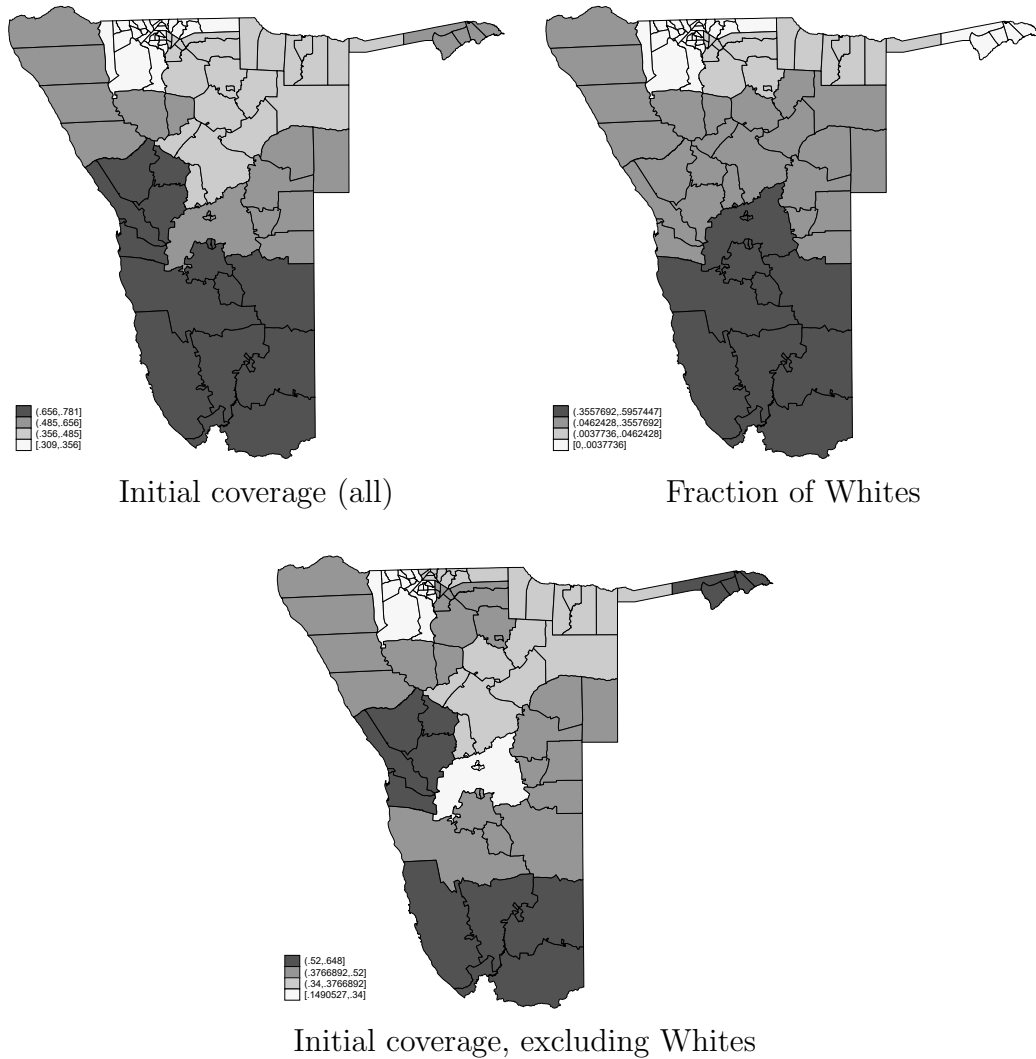

The graph on the left shows the share of population over age of eligibility receiving social pensions. The graph on the right shows the benefit level of social pensions as a percentage of GDP per capita. Countries that are not listed do not have a social pension system. Source: pension-watch.net, 2019

Figure A.2: Initial coverage predicts change in coverage by region
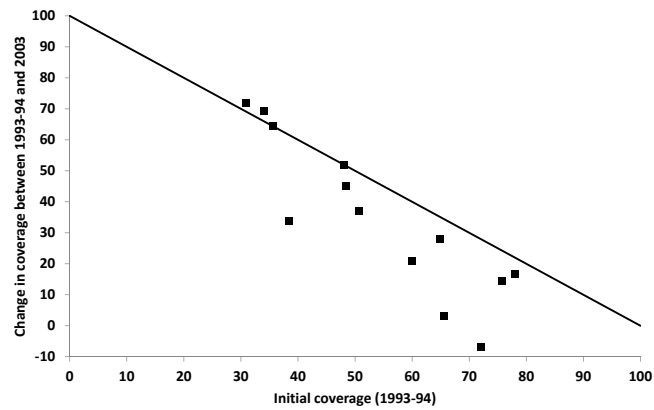
The graph plots the coverage in 1993-94 on the x-axis and the change in coverage between 1993-94 and 2003 on the y-axis. Each dot is a region. The line $y = 100 - x$ represents the attainment of universal coverage between the two periods. Source: own computation based on **?** and **?**

Figure A.3: Initial coverage partly reflects fraction of Whites in the population

(.656,.781]	
(.485,.656]	
(.356,.485]	
[.309,.356]	

Initial coverage (all)

(.3557692,.5957447]	
(.0462428,.3557692]	
(.0037736,.0462428]	
[0,.0037736]	

Fraction of Whites

|	
(.52,.648]	
(.3766892,.52]	
(.34,.3766892]	
[.1490527,.34]	

Initial coverage, excluding Whites

The map on the top left shows the initial coverage for the whole population, by region, computed by **?** using NHIES 1993-94. The map on the top right shows the fraction of Whites among people above age 60, by region, that we computed using NHIES 1993-94. The map on the bottom shows the estimated initial coverage for Blacks only, by region, that we computed under the assumption that the coverage for Whites is 100%.

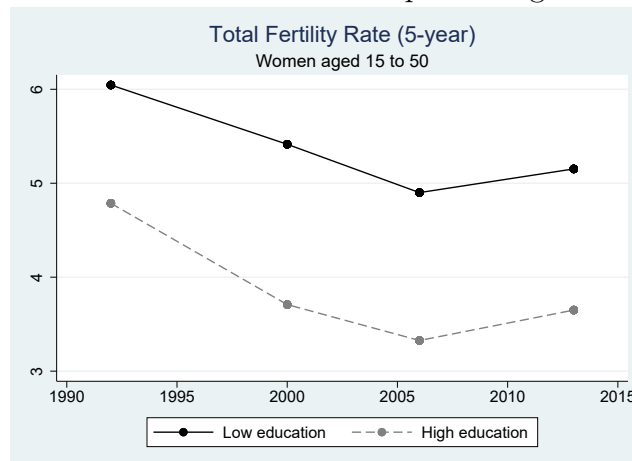Figure A.4: No *global* convergence in fertility between 1992 and 2000

(a) Rural areas do not catch-up with urban areas
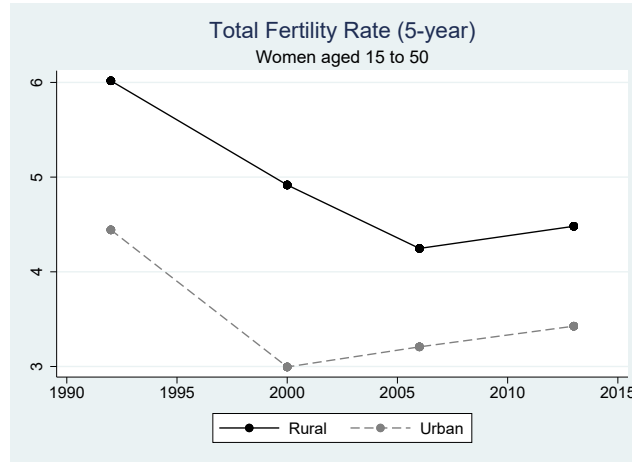
(b) Poor households do not catch-up with rich households
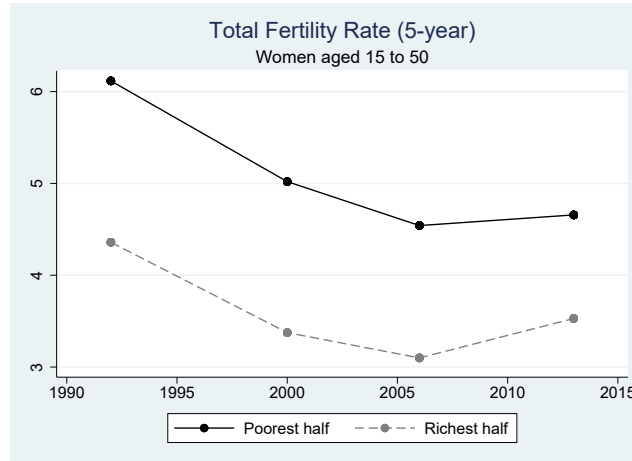
(c) Low educated mothers do not catch-up with high educated mothers

The graphs show the evolution of Total Fertility Rates in different sub-populations: (a) rural (in black) and urban (in grey) areas; (b) households with a wealth index below median (in black) and above median (in grey); (c) mothers with no or only primary education (in black) and mothers with secondary or tertiary education (in grey). The extension of pensions took place between 1992 and 1997. Source: own computation based on age-specific birth rates in the five years preceding each survey. Sample: women aged 15 to 50, White ethnic group and Khomas region are excluded. Data: DHS.

Figure A.5: Confounders: other drivers of fertility tend to diverge during the extension
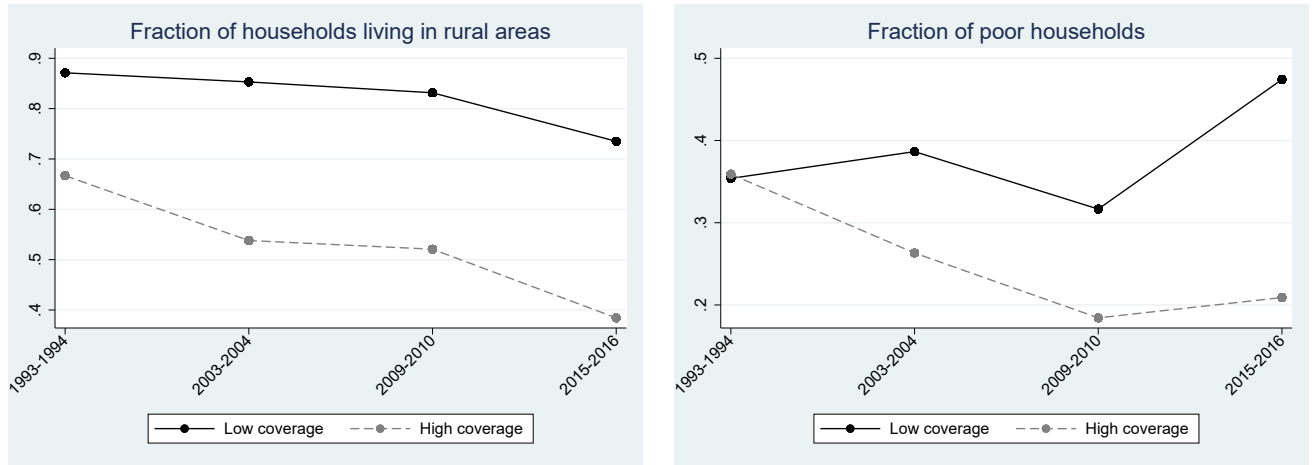
The graphs show the evolution of the fraction of rural (on the left) and poor (on the right) households in regions with low (North) and high (Northeast and South) initial pension coverage. The extension of pensions took place between 1992 and 1997. Sample: non-Whites. Data: NHIES.

Figure A.6: Robustness: catch-up in fertility is not driven by migration
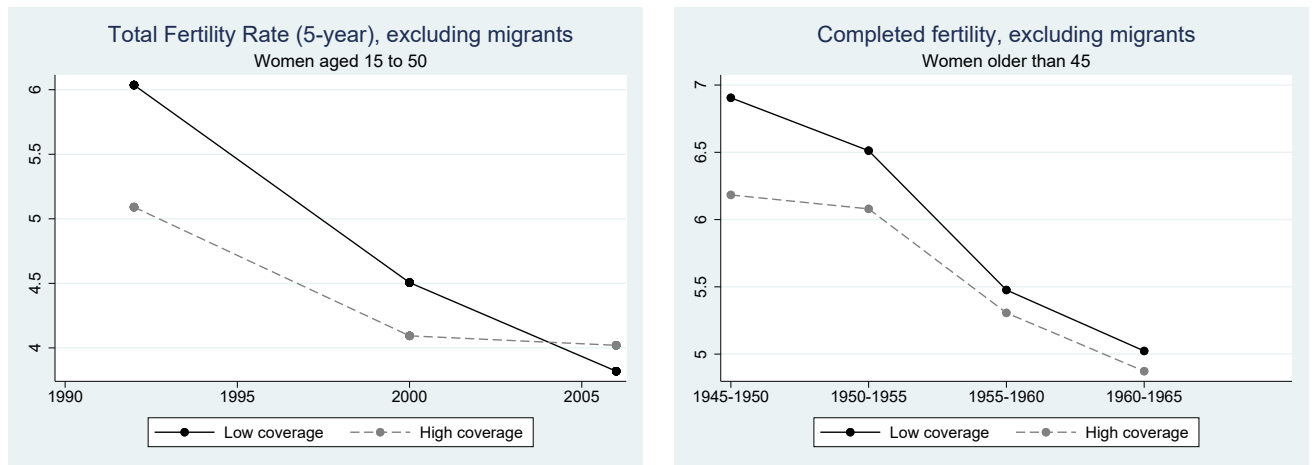
The graphs show the evolution of the 5-year total fertility rate (on the left) and completed fertility (on the right) in regions with low (North) and high (Northeast and South) initial pension coverage. We exclude people who migrated in the 10 years preceding the survey. Information on the migration status was not collected in the last DHS wave (2013). See Figure **??** for more details.

Figure A.7: Robustness: difference-in-differences coefficients with mother fixed effects
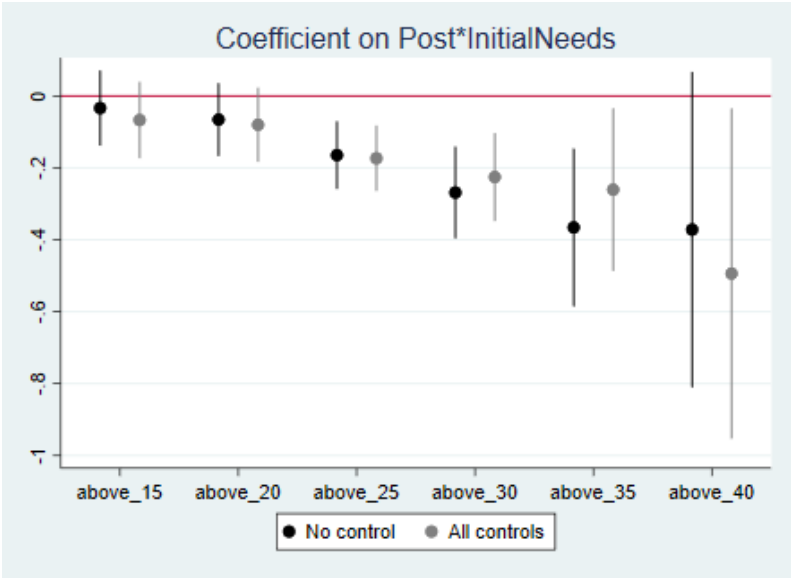
The graph plots γ, the coefficient on the interaction between $InitialNeeds_c$ and $Post_t$ in Equation 1 with mother fixed effects instead of cluster fixed effects, controlling or not for a restricted set of controls (urban and wealth), for women above age a in 1992. The vertical lines represent the confidence intervals at 95%.

Figure A.8: Mechanisms: rule out changes in female labor and ability to control
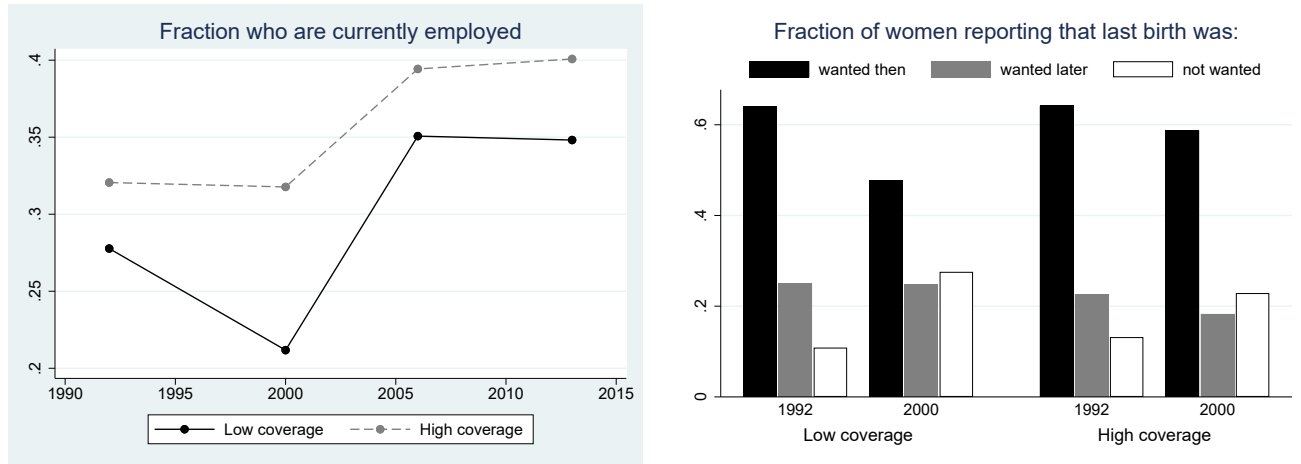
The graph on the left shows the evolution of the fraction of women currently employed in regions with low (North) and high (Northeast and South) initial pension coverage. Women are considered as unemployed if they answered that their occupation is "not working" or "self-employed in agriculture". We aggregated these two categories to make sure that answers are comparable across waves. Women working on fields without receiving any payment in kind or in cash were registered as "self-employed in agriculture" in 2006 and as "not working" in the other waves. Data: DHS.
The graph on the right shows the evolution of the fraction of births wanted then (black bars), wanted later (grey bars) and not wanted (white bars) in regions with low (North) and high (Northeast and South) initial pension coverage, before (1992) and after (2000) the extension of pensions. Data: DHS.

Figure A.9: Simulations: optimal number of children in the LSF model
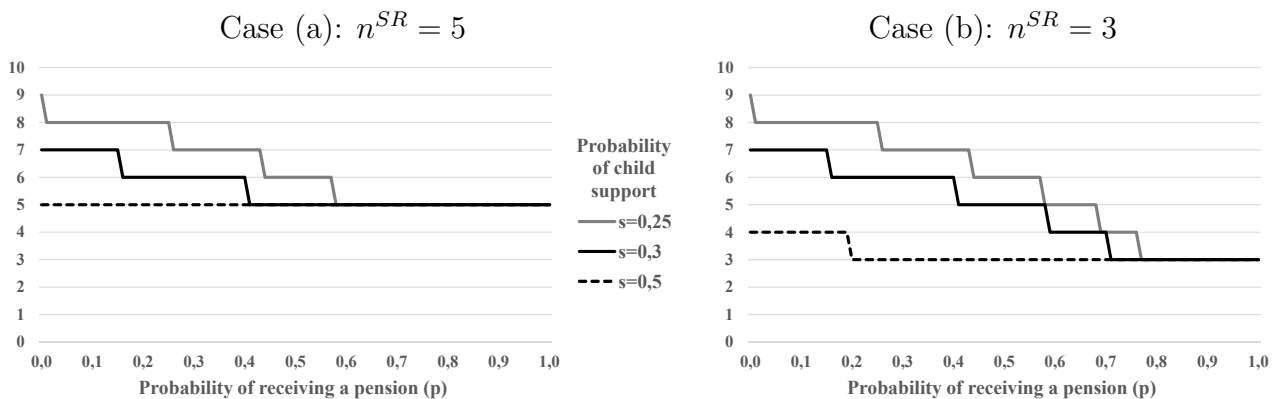
The graphs plot $max(n^{SR}; n^{LR})$ as a function of p, the probability of receiving a pension. n^{LR} is the smallest n such that $(1-s)^n \times (1-p) \leq 0.1$ and $n^{SR} = 5$ (graph on the left) or $n^{SR} = 3$ (graph on the right).
Each line is drawn for a specific value of s, the probability of child support: $s = 0.25$ (grey solid line), $s = 0.3$ (black solid line) and $s = 0.5$ (black dashed line).

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Table A.1: Sample selection: using propensity score matching to identify clusters in the common support

	PREDICTORS OF TREATMENT		
	Poverty rate (1)	Access to health services (2)	Share active in agriculture (3)
Panel A: list of clusters not in the common support and excluded from Panels B and C	Khomas-Herero	Khomas-Herero Khomas-Owambo	Khomas-Herero Khomas-Owambo Kavango-Owambo
Panel B: period analysis	DEP VAR: PROBABILITY OF BIRTH		
Post*LowInitialNeeds	0.004	0.002	0.001
	(0.019)	(0.019)	(0.016)
Post*HighInitialNeeds	-0.025	-0.022	-0.035
	(0.014)	(0.015)	(0.013)
Year FE	Yes	Yes	Yes
Cluster FE	Yes	Yes	Yes
Observations	153603	144834	130039
Clusters	37	36	35
R^2	0.015	0.014	0.013
Panel C: cohort analysis (partial)	DEP VAR: NUMBER OF BIRTHS		
Exposure*LowInitialNeeds	-0.53	-0.52	-0.58
	(0.81)	(0.71)	(0.72)
Exposure*HighInitialNeeds	-0.89	-1.08	-1.12
	(0.46)	(0.49)	(0.52)
Cohort FE	Yes	Yes	Yes
Cluster FE	Yes	Yes	Yes
Observations	1893	1825	1669
Clusters	30	29	28
R^2	0.226	0.202	0.208

In Panel A, we define the treatment as high initial pension coverage (Northeast, South and Erongo). We use the command pscore, comsup in stata to identify which clusters in the treatment/control groups are not in the common support. We use different indicators of socio-economic development as predictors of treatment: poverty rate (column 1), access to health services (column 2) and share active in agriculture (column 3). In Panels B and C, we estimate our main specifications (see notes below Tables **??** and **??**) restricting the sample to clusters in the common support: we drop the Herero group in Khomas in column 1, the Herero and Owambo/Kavango/Caprivi groups in Khomas in column 2, the Herero and Owambo/Kavango/Caprivi groups in Khomas as well as the Owambo/Kavango/Caprivi group in Kavango in column 3. The results are the same as in Table **??** column 9 and Table **??** column 3 where we drop the Herero, Owambo/Kavango/Caprivi and Damara groups in Khomas.

Table A.2: Statistical significance of differences before the extension of pensions

	All						Blacks only					
	High coverage	Low coverage	Khomas	t-stat 1 vs 3	t-stat 2 vs 3	t-stat 1 vs 2	High coverage	Low coverage	Khomas	t-stat 7 vs 9	t-stat 8 vs 9	t-stat 7 vs 8
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Individual characteristics												
Ethnicity												
% European/Afrikaans	0.15	0.00	0.39	3.9	824.8	2.6	-	-	-	-	-	-
% Damara	0.25	0.01	0.22	-0.4	16.3	3.5	0.29	0.01	0.36	0.7	27.2	2.9
% Herero	0.18	0.00	0.09	-1.1	167.7	2.2	0.21	0.00	0.15	-0.6	274.1	2.2
% Owambo/Kavango/Caprivi	0.42	0.98	0.30	-0.8	-52.9	-3.6	0.49	0.99	0.49	-0.0	-39.3	-3.0
Education (at least primary)	0.43	0.31	0.35	-0.7	<0.1	1.0	0.33	0.31	0.28	-0.6	<0.1	0.3
Panel B: Regional controls												
% poor	0.32	0.38	0.07	-8.6	-4.2	-0.8	0.36	0.38	0.10	-9.4	-3.8	-0.3
% living in urban areas	0.33	0.10	0.88	6.1	12.9	2.3	0.27	0.09	0.83	7.2	12.2	1.8
% econ. active in agriculture	0.44	0.59	0.05	-5.0	-7.0	-1.5	0.50	0.60	0.07	-5.8	-6.7	-0.9
% with bank/saving account	0.40	0.28	0.68	7.6	6.8	1.8	0.36	0.28	0.64	8.6	6.1	1.3
% 10-14 economically active	0.07	0.07	0.00	-2.2	-5.4	0.2	0.08	0.07	0.00	-2.5	-5.8	0.5
% 5-14 ever in school	0.86	0.93	0.94	2.9	0.5	-2.1	0.84	0.93	0.93	3.0	0.3	-2.4
% with hospital/clinic > 1 hour-walk	0.51	0.50	0.15	-5.3	-4.8	0.1	0.56	0.50	0.14	-6.3	-5.0	0.6
Prevalence of HIV	0.10	0.09	0.07	-1.0	-1.3	0.1	0.10	0.09	0.07	-1.0	-1.3	0.2
Infant mortality rate	0.08	0.06	0.05	-2.1	<0.1	1.2	0.08	0.06	0.05	-2.6	<0.1	1.7
Observations NHIES	11204	10874	2906				9194	10841	1743			
Observations DHS	2711	2149	561				2213	2137	499			

The table describes important variables, separately for regions with low (North) initial pension coverage, regions with high (Northeast, South and Erongo) initial pension coverage and the region of the capital city Khomas. In columns 1 to 6, all ethnic groups are included. In columns 7 to 12, only Blacks are included. Means are displayed in columns 1-3 and 7-9 and t-stats are displayed in columns 4-6 and 10-12. Columns 4 and 10 compare the means between Khomas and high coverage regions; columns 5 and 11 compare the means between Khomas and low coverage regions; columns 6 and 12 compare the means between low and high coverage regions. The sample of interest for our analysis excludes Whites and Khomas, and corresponds to the means in columns 7 and 8 and to the t-stat in column 12. Data: DHS 1992 for education and infant mortality, NHIES 1993-94 for all other variables.

Table A.3: Period analysis: Robustness checks

| | DEPENDENT VARIABLE: PROBABILITY OF BIRTH | | | | | |
| | Model (1) | Model (2) | Model (3) | Model (4) | Model (5) | Model (6) |
	Baseline with controls	Northern regions only	Rural only	Owambo specific trend	Khomas specific trend	Pension coverage
Post*InitialNeeds	-0.173	-0.191	-0.228	-0.107	-0.202	
	(0.043)	(0.083)	(0.058)	(0.061)	(0.055)	
Post*IniLackCoverage						-0.118
						(0.014)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	141637	116695	83967	141637	155774	141637
Clusters	35	26	34	35	38	12
R^2	0.015	0.016	0.015	0.015	0.015	0.014

Data: DHS and NHIES. Level of observation: woman*year. Sample: women aged 15 to 40 in year t; White ethnic group and Khomas region are excluded, except in model (5) where Khomas is included; in model (2): only Northern regions; in model (3): only rural households. OLS regression. Standard errors are clustered at the region*ethnicity level. *InitialNeeds* is the difference between the poverty line and the expected annual pension for a given ethnic group in a given region before the extension, in thousand rands (average in the bottom half=0.28; average in the top half=0.43). *IniLackCoverage* is equal to 1 minus the pension coverage in a given region before the extension (average in the bottom half=0.47; average in the top half=0.65). *Post* is a dummy for years after 1992 (date of the Pension Act). All regressions control for urban (share living in urban areas, share active in the agricultural sector), wealth (poor, savings account), access to services (distance to hosp.), cost of children (schooling rate 5-14, share of 10-14 economically active), AIDS, U5 mortality, indiv. time-invariant controls (maternal education; ethnicity for model (6)). We add the interaction of *Post* with a dummy for the Owambo ethnic group in model (4) and the interaction of *Post* with a dummy for the Khomas region in model (5).

Table A.4: Cohort analysis, partial exposure specification: Robustness checks

| | DEPENDENT VARIABLE: NUMBER OF BIRTHS | | | | | |
| | Model (1) | Model (2) | Model (3) | Model (4) | Model (5) | Model (6) |
	Baseline with controls	Northern regions only	Rural only	Owambo specific trend	Khomas specific trend	Pension coverage
Exposure*InitialNeeds	-4.59	-3.13	-7.83	-5.23	-4.18	
	(1.63)	(1.10)	(1.80)	(1.62)	(1.67)	
Exposure*IniLackCoverage						-3.60
						(0.83)
Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1798	1479	1194	1798	1914	1798
Clusters	28	20	26	28	31	12
R^2	0.204	0.205	0.196	0.204	0.224	0.205

Data: DHS and NHIES. Level of observation: woman. Sample: women aged 44 to 50 in wave w; White ethnic group and Khomas region are excluded, except in model (5) where Khomas is included; in model (2): only Northern regions; in model (3): only rural households. OLS regression. Standard errors are clustered at the region*ethnicity level. $InitialNeeds$ is the difference between the poverty line and the expected annual pension for a given ethnic group in a given region before the extension, in thousand rands (average in the bottom half=0.28; average in the top half=0.43). $IniLackCoverage$ is equal to 1 minus the pension coverage in a given region before the extension (average in the bottom half=0.47; average in the top half=0.65). $Exposure = max(min(10; k - 1955); 0)/10$ for cohort k and varies from 0 (before 1955) to 1 (after 1965). All regressions control for urban (share living in urban areas, share active in the agricultural sector), wealth (poor, savings account), access to services (distance to hosp.), cost of children (schooling rate 5-14, share of 10-14 economically active), AIDS, U5 mortality, indiv. time-invariant controls (maternal education; ethnicity for model (6)). We add the interaction of $Exposure$ with a dummy for the Owambo ethnic group in model (4) and the interaction of $Exposure$ with a dummy for the Khomas region in model (5).

Table A.5: Separating income and insurance channels: heterogeneity by co-residence with an elderly

	DEP VAR: PROBABILITY OF BIRTH			
	Lives with no elderly		Lives with an elderly	
	No control	All controls	No control	All controls
	(1)	(2)	(3)	(4)
Post*InitialNeeds	-0.153	-0.237	-0.111	-0.094
	(0.069)	(0.056)	(0.129)	(0.040)
Year FE	Yes	Yes	Yes	Yes
Cluster FE	Yes	Yes	Yes	Yes
Observations	107302	107302	34335	34335
Clusters	35	35	29	29
R^2	0.008	0.016	0.007	0.016

Data: DHS and NHIES. Level of observation: woman*year. Sample: women aged 15 to 40 in year t; White ethnic group and Khomas region are excluded; the sample is split between households with zero and with at least one member older than 60. OLS regression. Standard errors are clustered at the region*ethnicity level. *InitialNeeds* is the difference between the poverty line and the expected annual pension for a given ethnic group in a given region before the extension, in thousand rands (average in the bottom half=0.28; average in the top half=0.43). *Post* is a dummy for years after 1992 (date of the Pension Act). Controls: urban (share living in urban areas, share active in the agricultural sector), wealth (poor, savings account), access to services (distance to hosp.), cost of children (schooling rate 5-14, share of 10-14 economically active), AIDS, under-5 mortality, indiv. time-invariant controls (maternal education).