Family planning and fertility in South Africa under apartheid

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During the apartheid era, all South Africans were formally classified as white, African, colored, or Asian. Starting in 1970, the government directly provided free family planning services to residents of townships and white-owned farms. Relative to African residents of other regions of the country, the share of African women that gave birth in these townships and white-owned farms declined by nearly one-third during the 1970s. Deferral of childbearing into the 1980s partially explains the decline, but lifetime fertility fell by one child per woman.

1. Introduction

In 1950, the total fertility rate stood at more than six children per woman in both South Africa and Sub-Saharan Africa as a whole. By 1990, fertility had nearly halved in South Africa but barely changed across Sub-Saharan Africa ([United Nations 2014a](#)). During this period, the national government in South Africa expanded its provision of family planning services by establishing thousands of stationary and mobile clinics, sending family planning advisors door-to-door, and offering free contraception. Government expenditure on family planning rose from a tiny amount in the 1950s to comprise roughly one-quarter of all government spending on health in the late 1980s ([Republic of South Africa 1950–1989](#)).

[Brown \(1987\)](#), [De Vos \(1988\)](#), and [Kaufman \(1996, 2000\)](#) argue that the coincidence of rising public provision of family planning services and falling fertility suggests that these services contributed to South Africa's fertility decline. However, as shown in figure 1, the fertility decline was underway by the 1960s, before government spending on family planning started to surge in the 1970s. The time series of family planning expenditure and fertility rates over the last half of the twentieth century alone are not sufficient to establish whether public provision of family planning contributed to South Africa's fertility decline. In this article, I develop a new approach that additionally uses spatial variation in the availability of family planning services. This variation directly resulted from the political ideology governing South Africa at the time.

From 1948 until 1994, South Africa was governed by a system of apartheid. Apartheid was political, economic, and residential separation on the basis of race. White South Africans controlled the national government and major economic institutions. All other South Africans—formally, African, colored, or Asian¹—could not vote and faced restrictions on their mobility and employment. This separation was particularly acute for Africans, who comprised roughly

¹ Appendix A provides additional description of racial classifications during apartheid.

Figure 1. *Total fertility rate and government spending per capita on family planning*

Notes: *Spending per capita equals national government spending divided by the total population of South Africa.*

Data sources: See appendix [I.2](#), [I.4](#), [I.5](#), [I.6](#), and [I.7](#).

three-quarters of the population. Every African was officially a citizen of one of ten “homelands”. These generally poor, rural homelands covered 13 percent of the land area of South Africa, and by 1960 every African was required to reside in a homeland unless he or she had permission to live and work in the more prosperous “white areas”. Roughly half of Africans lived in homelands, the rest in urban townships and white-owned farms in white areas. Apartheid therefore generated separation not just between whites and non-whites but also between Africans living in white areas and Africans living in homelands.

This separation extended to access to family planning services. White South Africans consistently exhibited the lowest birth rates of the four racial groups and, by the early 1960s, national government officials cited a dwindling white minority as cause for alarm ([Brown 1987](#); [Mostert et al. 1988](#); [Chimere-Dan 1993](#); [Kaufman 1996](#)). In response, the government encouraged immigration from Europe, urged white families to have additional children, and expanded direct provision of family planning services ([Smith 1976](#); [Brown 1987](#)). Because many white residents but few non-white residents already enjoyed access to family planning services through private physicians, this expansion most substantially increased access to family planning services for non-white residents. However, the national government delegated control over homeland health services to homeland governments ([Department of Health 1973](#)). These governments largely declined to provide family planning services, in part due to the overtly political motive behind the national government’s provision of family planning services ([Republic of South Africa 1983](#); [De Beer 1984](#)). As a result, African residents of white areas generally enjoyed easier access to family planning services than did African residents of the homelands.

Using a new compilation of demographic surveys conducted since the 1970s, I measure use of family planning services and childbearing patterns over time separately for African women in white areas and African women in homelands. I show that African women living in white areas were consistently more likely to use contraception and be visited by family planning advisors than were African women living in homelands. I also show that fertility rates among African women declined sharply in white areas relative to homelands in the early 1970s as the national government began to directly provide family planning services. The average interval between births in white areas grew by nearly two years, deferring births until the 1980s, when fertility rates in white areas partially rebounded relative to homelands. However, lifetime fertility also fell: Among cohorts of African women who entered their main childbearing years after 1970, the average number of children ever born fell by one child per woman in white areas relative to homelands.

Imperfect recordkeeping during the apartheid era prevents a complete accounting of the many factors that may have contributed to South Africa's fertility decline. Particularly in the homelands, wage rates and other employment information is largely unknown, and incomplete coverage in many censuses makes even precise population counts difficult to establish. However, the timing of the decline in African fertility in white areas in the early 1970s strongly suggests that the corresponding surge in government provision of family planning services in these areas helped women have fewer children. The national government achieved its immediate objective of slowing population growth. But, if this slowdown in African population growth helped the apartheid government stay in power, the effect did not last long: apartheid ended barely a generation after the government first provided family planning services.

2. Government provision of family planning services in South Africa

Since at least the start of the twentieth century, private physicians in South Africa supplied contraception to white patients. Dedicated family planning clinics first opened in Cape Town in 1932, and local family planning associations founded clinics in other major cities over the subsequent decades. Family planning services during the first half of the twentieth century were generally restricted to white residents (aside from a single clinic in Cape Town) and received little government funding ([Caldwell 1992](#); [Caldwell and Caldwell 1993](#); [Klausen 2004](#)).

By the early 1960s, a National Family Planning Association operated several dozen urban clinics that offered family planning services to members of all racial groups. In 1963, the national government first provided a small grant to the National Family Planning Association. These grants rose steadily throughout the rest of the decade and, in 1970, the government fully funded and began to assume control of the Association's clinics ([Caldwell 1992](#); [Caldwell and Caldwell 1993](#)). In 1974, having taken control of all of the clinics, the government announced a National Family Planning Program ([Bernstein 1985](#); [Brown 1987](#)). Stand-alone clinics, mobile clinics, and door-to-door recruiters offered free contraception and family planning counseling ([Department of Health 1976](#)). By the end of the 1980s, there were thousands of stationary clinics and tens of thousands of mobile service delivery points ([Department of Health 1987](#)). This increase in the public provision of family planning services came amidst a wave of similar programs in other countries, and the distribution of services was shaped by the political environment in South Africa.

2.1 *Family planning in international context*

During a period of particularly rapid population growth during the middle of the twentieth century, Malthusian concerns about famine and large populations outstripping scarce resources motivated publications, such as Paul Ehrlich's *The Population Bomb*, and a series of United Nations conferences on population (Ehrlich 1968; Finkle and Crane 1975; Lam 2011; United Nations 2014b). In response, many countries relaxed restrictions on the distribution of contraception, increased subsidies to encourage their use, and expanded public provision of family planning services (Finlay *et al.* 2012). South Africa was one of these countries. As early as 1955, a government commission proposed a planned parenthood campaign as a solution to “the population problem in South Africa” (Union of South Africa 1955, p. 25). Little more than a decade later, one projection held that, if left unchecked, South Africa's population would rise from 21 million in 1970 to 700 million within a century. In response, Connie Mulder, South Africa's Minister of Information, advocated for family planning as a way to prevent “such an unrealistic growth to eventuate—a growth which must inevitably lead to poverty, under-nourishment, bankruptcy and ruin in South Africa” (Van Rensburg 1972, p. viii). Other officials expressed similar concerns, and government expenditure on family planning services climbed steadily throughout the 1970s and 1980s.

Developments in birth control technology facilitated expanded public provision of family planning services. Through the early twentieth century, available forms of artificial birth control (as opposed to withdrawal, rhythm, and other natural methods) largely consisted of barrier methods that often suffered from high failure rates and, in the case of condoms, required that men cooperate with their use (Potts and Tsang 2002). The development of more reliable oral and injectable contraceptives in the 1950s and 1960s allowed women greater autonomy, and these forms of birth control became central to public family planning campaigns aimed at women in many countries. The government of South Africa heavily promoted the injectable contraceptive Depo Provera, oral contraceptives, and intrauterine devices, and these became the most commonly used forms of contraception among African residents (Kaufman 1996). Because Depo Provera was administered on a three-month schedule, mobile family planning vans were able to travel on regular routes through rural areas, increasing the reach of the family planning program beyond residents that lived near stationary clinics in cities. Condoms gained popularity alongside widespread public awareness of HIV in the 1990s, but HIV was not yet a primary focus of public contraception campaigns in South Africa during most of the apartheid era.

There is little evidence that the apartheid government forced residents to involuntarily avert births (Brown 1987). Sterilization and abortion—two forms of birth control that have been used coercively in China, India, Sweden, and elsewhere (Vicziány 1982; Hyatt 1997; Ebenstein 2010; Zampas and Lamačková 2011)—were relatively rare in South Africa. By the late 1980s, less than 5 percent of African residents had been sterilized, while white residents were more than twice as likely to have been sterilized (Kaufman 1997). Except in strict circumstances, abortion remained illegal in South Africa until 1996 (Klugman 1993; Cooper *et al.* 2004).

2.2 *Family planning in domestic political context*

Starting in the mid-nineteenth century, a series of white-controlled governments progressively partitioned South Africa into white areas and African areas (Bundy 1979). In 1913, the government of what was then the Union of South Africa formally set aside 9 percent of

the land for the country's African residents (Horrell 1969). Over the following five decades, white-controlled governments established pass laws mandating that African men, and later women, demonstrate proof of employment in order to remain in white areas of the country (these pass laws were repealed in 1986; Platzky and Walker 1985; Savage 1986; Phillips 1997; Simkins 1999; Beinart 2001). During the apartheid era, the government forcibly removed millions of African residents from white areas (Platzky and Walker 1985). Starting in the 1960s, the apartheid government consolidated and enlarged the reserves to cover 13 percent of the country's land area and began to consider them ethnic "homelands" (or "black states" or "Bantustans") that would eventually become independent countries.² In the late 1970s and early 1980s, the government conferred nominal independence, which no other country recognized, on four of the homelands (Transkei, Bophuthatswana, Venda, and Ciskei); the other six (Gazankulu, KaNgwane, KwaNdebele, KwaZulu, Lebowa, and Qwaqwa) remained "self-governing" (Posel 1991; Beinart 2001). Upon the end of apartheid, all homelands were reintegrated into a unified South Africa.

Maintenance of white political control motivated both the partitioning of South Africa and the provision of family planning services to non-white residents of white areas. Soon after the formal start of apartheid in 1948, government officials worried that the growing non-white share of the population would imperil the white minority's political power. While speaking before Parliament in 1962, Prime Minister H. F. Verwoerd asserted that, "If the one multiracial state were to become ... truly democratic and in harmony with the spirit of the times, it would inexorably lead to Bantu domination" (Chimere-Dan 1993, p. 32). Other government officials expressed concern about social instability in the face of rising numbers of underemployed African residents (Brown 1987). In response, the government encouraged immigration from Europe, urged white families to have additional children, and extended access to family planning services to previously underserved non-white residents (Brown 1987; Caldwell and Caldwell 1993). Although particularly overt, the politicization of family planning was not unique to South Africa. Many governments have targeted family planning to particular groups, including rural residents in Mexico, members of lower castes in India, and poor residents in the United States (Vicziány 1982; Browner 1986; Potter 1999; Bailey *et al.* 2014).

African leaders generally advocated against family planning. Ferreira (1984, p. 7) states that, "For a large number of Blacks, family planning and the political apparatus of the White government are still perceived as indivisible with the result that the motives of the [National Family Planning Program] remain suspect." The *African Communist* newspaper summarized the skepticism: "The so-called national family planning program is being used to perpetuate White domination and the oppression and exploitation of the Black majority" (Unsigned 1982, p. 87). Concerns about cancer-causing effects of Depo Provera further generated suspicion. Several countries, including the United States and Zimbabwe, restricted the sale of Depo Provera, but the South African government consistently offered it at family planning clinics (Kaler 1998). As nominally independent or self-governing territories, the homelands assumed full financial and administrative responsibilities for their health services and declined to establish extensive family planning programs (Department of Health 1973; Mostert *et al.* 1988). Per-capita expenditure on family planning services in homelands never exceeded 7 percent of that in white areas.³

² Appendix B provides a map of homeland boundaries.

³ Appendix C provides an annual comparison of homeland and national government spending on family planning services.

3. Empirical strategy

Through the 1960s, contraception was available to African women in South Africa at only a few clinics in major cities. Given the legal restrictions on African residents' mobility, many African women did not have access to these clinics. Starting in the early 1970s, the national government opened additional clinics in urban areas, sent mobile clinics to rural areas, and offered contraception for free at these clinics. The government therefore increased the number of family planning clinics, reduced the sticker price of contraception by offering it for free, and reduced transportation costs that African women faced in obtaining contraception. Although there is no record of the quantity of contraceptives distributed, the jump in the number of clinics from a few dozen in the 1960s to thousands in the 1980s suggests a substantial increase in the supply of contraception.

Public provision of family planning services may have also changed demand for contraception. By sending family planning advisors door-to-door, the government tried to increase information about and demand for contraception. However, concerns about the program's political objectives could have had the reverse effect and dampened demand among African residents. If demand remained price-inelastic or even declined, it is possible that the large increase in supply translated into little additional use of contraception and had little effect on fertility. In the remainder of this article, I evaluate whether greater use of family planning services and lower fertility rates accompanied the government's family planning program.

3.1 Identification strategy

Branson and Byker (2015) use the precise location of family planning clinics that targeted youth during the post-apartheid era to show that women who grew up near clinics were less likely to give birth as a teenager. A similar strategy would be ideally suited for evaluating whether proximity to family planning clinics allowed African women to have fewer children during the apartheid era. Unfortunately, I am unable to find information about the precise location of family planning clinics during this period. Annual government expenditure and health reports offer the most complete surviving documentation. These reports record annual expenditure on family planning services in white areas and most homelands, and in some years record the total number of clinics in white areas. It is these reports that indicate a surge in family planning expenditure in the 1970s in white areas and a relative lack of funding in the homelands.

The empirical strategy in this article uses the fact that expansion of family planning services followed the partitioning of South Africa into white areas and homelands. Family planning clinics and advisors served African residents of townships and white-owned farms, while African residents of homelands generally lived further away from these services. This distinction was not absolute—some residents that lived near the edges of homelands could travel to white areas to obtain services (Kaufman 1997)—but the greater concentration of services in white areas suggests that any resulting increase in the use of contraception and decline in fertility should have been greater in white areas. I separately group together all residents of white areas and all residents of homelands, and I compare differences in use of contraception and fertility over time between these two groups. Because nearly all residents of homelands were African, I similarly consider only African residents of white areas.

I employ a difference-in-differences empirical strategy to compare fertility rates in white areas and homelands before and after the government began directly providing family

planning services in 1970. I show that fertility rates were similar in white areas and homelands in the 1960s. After 1970, there was a sharp drop in fertility in white areas, the timing of which coincides with the large surge in government provision of family planning services. However, to causally attribute the decline in fertility to the family planning program, a parallel trends assumption must be satisfied: absent family planning, any difference in fertility rates between African women living in white areas and African women living in homelands before 1970 would have continued after 1970.

There are other factors that may have contributed to a decline in fertility in white areas over time. African residents of white areas were by regulation employed and African women living in white areas, many of whom were employed as domestic workers and could have lost their jobs upon becoming pregnant, had strong incentive to postpone childbearing (Caldwell and Caldwell 1993). In the densely populated homelands, jobs were scarcer and incomes generally lower (Wilson and Ramphele 1989; Wilson 2011), suggesting lower opportunity cost of giving birth. Additionally, due to labor migration of African men from homelands into white areas, there were 56 adult men for every 100 adult women in the homelands at the end of the 1950s. This distorted sex ratio eased over the subsequent decades as the apartheid government forcibly removed millions of African residents from white areas (Wilson 1972; Simkins 1983; Moultrie 2001), and balanced sex ratios may have facilitated family formation in the homelands.

These internal migration restrictions and segmented labor markets generated incentives to have fewer children in white areas. However, there is insufficient annual information on forced removals or labor market conditions to fully account for these factors when tracking birth rates over time. Therefore, although I do not know of evidence that these factors changed sharply in 1970 in a way that could explain suddenly lower relative fertility in white areas, I cannot conclude that public provision of family planning services alone changed relative fertility rates in white areas and homelands after 1970. I will only be able to conclude that the coincident timing of family planning expansion and fertility changes suggests that, in combination with economic, social, and political factors, rising public provision of family planning services contributed to changes in fertility.

3.2 Data on use of contraception

South Africa's Human Sciences Research Council (HSRC) conducted several surveys during the apartheid era that recorded use of contraception by African women. Surveys in 1969 and 1982 were administered only in white areas, but surveys in 1974 and 1987 were administered nationwide and allow a comparison between use of contraception among African women living in white areas and African women living in homelands (Du Plessis and Coetzee 1974; Van Tonder 1985; Caldwell and Caldwell 1993). After a series of reports in the late 1970s and early 1980s, the 1974 Fertility Survey remained unused in the HSRC archives (Lötter and van Tonder 1976; Lötter 1977). In 2014, with the assistance of several HSRC staff and researchers, I was able to locate the 1974 survey records. The Demographic and Health Survey (DHS), administered between 1987 and 1989, is available at the National Research Foundation's South African Data Archive. By using both surveys, this article for the first time tracks use of contraception by African residents over time in both white areas and homelands.⁴

⁴ Appendix I lists the sources for each survey, and for all other data used in this article.

3.3 Data on fertility

Demographic measurement of African residents was incomplete during the apartheid era. The national government maintained vital registries of births for white, colored, and Asian but not African residents, and censuses were often incompletely administered in African communities (Moultrie and Timaeus 2003). In this article, I use household surveys that record whether a woman has given birth and, if so, the date of each birth. These birth history surveys offer the most representative record of African fertility in both white areas and homelands. Birth history surveys suffer from four shortcomings, discussed below. Despite these shortcomings, birth history surveys have been used in studies of fertility in South Africa and elsewhere (Burger *et al.* 2012; Bongaarts and Casterline 2013).

First, birth history surveys do not record births to women who have died. Because the apartheid government did not maintain registries of deaths of African residents, it is not possible to adjust later birth histories for mortality in white areas and homelands.

Second, mothers may inaccurately report their children's dates of birth or may not report children who have died (Potter 1977; Beckett *et al.* 2001). Among all children born between 1953 and 1992 that are in the main dataset used in this article, 21.5 percent are recorded as having been born in years ending in zero or five, above the expected 20 percent in a truly random large sample. This birth-year heaping indicates some misreporting of children's dates of birth, but is of similar magnitude in white areas and homelands (21.7 and 21.3 percent), suggesting similar ability to remember and report previous births.

Third, while the retrospective nature of birth history surveys permits calculation of fertility rates in the years leading up to the survey, these surveys are often collected only from women of childbearing age at time of survey. Because some women are too old to be interviewed, births many years earlier are only recorded if the mothers were young at the time. All birth history surveys were conducted at and after the end of apartheid, so the fertility statistics in the early years of apartheid are calculated using women who were young at the time.

Fourth, birth history surveys do not record each child's place of birth, and a woman's place of current residence may not be the same as where she previously gave birth. This final shortcoming is particularly relevant for South Africa. More than three million African residents were forcibly removed from white areas during apartheid, and there was substantial internal migration after mobility restrictions were lifted in 1985 (Platzky and Walker 1985; Reed 2013). Among African women in the main dataset used in this article, 25 percent of women born in white areas were observed living in a homeland at time of survey, and 8 percent of women born in homelands lived in a white area at time of survey. Because migration itself could be a consequence of family planning (women with access to contraception may be better able to delay childbearing and migrate in search of work), I use a woman's place of birth to represent where she lived during her childbearing years.

Two surveys conducted during and after the end of apartheid record place of birth and complete birth histories from all women of childbearing age: the 1994 and 1995 October Household Surveys (OHS) record birth histories from all women aged 12–54, and the National Income Dynamics Study (NIDS) that began in 2008 records birth histories from all women aged 15 and above. The OHS records each woman's magisterial district of birth, and the NIDS records each woman's district council of birth. Because magisterial district boundaries in the early 1990s align closely with historical white area/homeland boundaries, but many post-apartheid district council boundaries substantially overlap both historical white areas and historical homelands, I use OHS data for the main analyses and supplement with NIDS data to measure lifetime fertility. I mark as white areas all districts in which at

least 90 percent of the land area lies within historical white area boundaries. I mark all other districts as homelands. Table 1 compares women born in white areas and women born in homelands. The NIDS sample is smaller and more concentrated in homelands. In both surveys, African women born in white areas are older, have more standards of schooling (roughly equivalent to years of schooling), are more likely to live in an urban area, and are more likely to have ever been married than are African women born in homelands.⁵

4. Results

4.1 Increased use of contraception

Increased use of contraception accompanied the increase in public provision of family planning services during the 1970s and 1980s. As given in figure 2a, 35 percent of African women living in white areas in 1974 had ever used contraception. In the homelands, this value was lower, at 17 percent. By the late 1980s, the share of women who had ever used contraception rose by about 40 percentage points in both white areas and homelands. As given in figure 2b, the share of women currently using contraception similarly rose over time countrywide and remained higher in white areas. These statistics indicate that, between the early 1970s and late 1980s, use of contraception among African women rose substantially and African women living in white areas remained consistently more likely to use contraception than African women living in homelands.⁶ As given in figure 2c, among African women that were using contraception, those living in white areas in 1987 had been doing so for forty one months on average, slightly longer than the thirty nine-month average in homelands.

African women living in white areas were also consistently more likely to report having access to family planning services. As given in figure 2d, 9 percent of African women living in white areas in 1974 had been visited by a family planning advisor in the past year. In homelands, this value stood at 2 percent. As given in figure 2e, 14 percent of African women living in white areas in the late 1980s received contraception from a mobile clinic or family planning advisor, but only 7 percent of African women in homelands did so. However, as given in figure 2f, reported intentions to use contraception varied little between white areas and homelands: 54 percent of African women living in white areas who were not using contraception in the late 1980s reported that they intended to use contraception in the future, a value that was just one percentage point higher than in the homelands. Again, though, use of contraception is observed only for women who have ever been married, are in a partnership, have ever given birth, or are pregnant. The national government's family planning program initially targeted only married women (Caldwell and Caldwell 1993).⁷ Access to and use of family planning services were likely reduced for unmarried women.

Although there was no measurement of the use of contraception in both white areas and homelands before national government involvement in family planning, the evidence in figure 2

⁵ Appendix D provides additional information about the composition of each survey's sample.

⁶ Appendix E compares rates of use of contraception by age. Between 1974 and 1987 in both white areas and homelands, use of contraception increased among women of all ages, particularly among women in their twenties and early thirties.

⁷ In other countries as well, contraception was initially only available to married women. For example, in the United States contraception was regulated under anti-obscenity statutes, and was not legally available to all unmarried women nationwide until 1976 (Bailey 2006).

Table 1. *Sample characteristics*

	(a) 1994 and 1995 OHS			(b) 2008 NIDS		
	Born in white areas	Born in homelands	Difference	Born in white areas	Born in homelands	Difference
Number of women	33,757	21,961		1,978	5,124	
Average age at survey	28.402 (0.066)	26.525 (0.081)	1.876*** (0.105)	33.581 (0.449)	32.238 (0.289)	1.343** (0.534)
Average standards of schooling	5.806 (0.019)	5.608 (0.022)	0.197*** (0.029)	7.223 (0.090)	7.032 (0.058)	0.191* (0.107)
Share that live in an urban area	0.555 (0.003)	0.160 (0.002)	0.395*** (0.004)	0.851 (0.010)	0.388 (0.012)	0.463*** (0.015)
Share that have ever been married	0.391 (0.003)	0.348 (0.003)	0.043*** (0.004)	0.450 (0.018)	0.408 (0.011)	0.042** (0.021)

Notes: Standard errors given in parentheses. Calculations performed using sampling weights that accompany each survey. Statistical significance at the 10, 5, and 1 percent levels denoted by *, **, and ***. *Data sources:* See appendix I.1.

Figure 2. *Use of and access to contraception*

Notes: Sample consists of African women aged 15–44 who have ever been married, are living with a man, have ever given birth, or are currently pregnant, as observed in the 1974 Fertility Survey (5,728 women) and 1987 DHS (15,123 women). Calculations performed using sampling weights that accompany the 1987 DHS (the 1974 Fertility Survey does not have sampling weights).

Data sources: See appendix I.1 and I.3.

shows that, once the family planning program was underway in the 1970s and 1980s, African women in white areas were consistently more likely to use contraception than were women in homelands. Visits by family planning advisors and mobile clinics were more common in white areas and may have facilitated greater use of contraception in white areas. Women living in homelands likely had to travel further to obtain contraception. However, reported intentions to use contraception, while only a course measure of demand, suggest that desire to use contraception was similar countrywide. These comparisons suggest that widespread provision of family planning services in white areas, rather than particularly strong demand for contraception in white areas, was responsible for greater use of contraception in white areas. In the next section, I show that differences in fertility accompanied these differences in use of contraception.

4.2 Fertility decline in white areas relative to homelands

Fertility rates in white areas and homelands diverged in the early 1970s. As shown in the first panel of figure 3, through the 1960s the annual share of African woman born in white areas who gave birth was generally the same as the share of African women born in

Figure 3. *Share of women who gave birth, by year*

Notes: Sample as in panel (a) of table 1. Data reshaped to consist of one observation per woman per year for each year the woman was age 12–54. Calculations performed using sampling weights. The second graph plots difference-in-difference estimates of δ_y from specification 1.

Data sources: See appendix I.1 and I.3.

homelands who gave birth. As the government first provided family planning services in white areas in the early 1970s, fertility fell in white areas relative to homelands. In 1960, about three percent of women born in white areas and homelands gave birth; in 1977, 9 percent of women born in white areas gave birth while 13 percent of women born in homelands gave birth. (Again, the share of women that gave birth appears to rise in the 1950s and 1960s in both white areas and homelands because of sample censoring: the OHS records only women who were teenagers in the 1950s, but by the 1970s a wider age range of mothers are recorded.)

The relative decline in fertility in white areas was substantial. The following event study difference-in-differences, or interrupted time series, calculates the difference in fertility among African women born in white areas and African women born in homelands in each year minus the difference in 1969, the year before the government first directly provided family planning services:

$$b_{it} = \alpha L_i + \sum_{y \neq 1969} \beta_y 1(t = y) + \sum_{y \neq 1969} \delta_y L_i \times 1(t = y) + \varepsilon_{it}. \quad (1)$$

Each woman, i , has a separate observation for each year, t , in which she was between the ages of 12 and 54. b_{it} equals one if woman i gave birth in year t , L_i equals one if woman i was born in a white area, and $1(t = y)$ equals one if $t = y$ for years $y \neq 1969$. The δ_y coefficients presented in the second panel of figure 3 provide the difference-in-differences estimates of the likelihood of giving birth in white areas minus homelands in year y minus the difference in 1969. At its nadir in 1977, the difference in the share of women born in white areas that gave birth minus the share of women born in homelands that gave birth was nearly 4 percentage points lower than in 1969. Given that 13 percent of African women born in homelands gave birth in 1977, this difference stood at nearly one-third of African fertility in the homelands in 1977.

Fertility rates among African women born in white areas and African women born in homelands converged somewhat starting in the 1980s. The gap of more than 3 percentage points in

the likelihood of giving birth in the early 1980s decreased to less than 2 percentage points by the early 1990s. The timing of this narrowing of the fertility gap coincided with the 1986 repeal of the pass laws that limited non-white mobility, which may have allowed Africans born in homelands easier access to family planning services by either visiting or moving to white areas.⁸

4.3 Deferral of childbearing and decline in lifetime fertility

In this section, I use using a sample of women age 40 and above when observed by the 2008 NIDS to calculate changes in completed fertility among women who were of childbearing age in the 1970s and 1980s.⁹ Figure 4a presents the average age at first birth among African women born in white areas and African women born in homelands, calculated for five-year birth cohorts of women. Women born in white areas in the late 1930s first gave birth on average at age 20. Average age at first birth rose by 2.5 years for women born in white areas in the early 1940s, fell below 20 for women born in white areas in the late 1940s, and then remained around age 21 for cohorts born in the 1950s and early 1960s. Average age at first birth was 23.4 for women born in homelands in the late 1930s, and fell to 21 for women born in homelands in the early 1960s. Women born in white areas generally first gave birth earlier in life than did women born in homelands, although the difference is never statistically distinguishable from zero. However, starting with women born in the early 1950s, average age at first birth rose slightly in white areas relative to homelands.

Figure 4b demonstrates that women born in white areas also generally stopped giving birth earlier in life than did women born in homelands. Again, though, starting with women born in the early 1950s, average age at last birth rose in white areas relative to homelands. Women born in white areas in the late 1940s stopped giving birth five years earlier than women born in homelands on average, but this difference narrowed to one year by the early-1960s cohort.

As given in figure 4c, the average length of the interval between births fluctuated between forty two and fifty three months for women born in homelands. For cohorts of women born in white areas, average spacing rose smoothly, from forty one months among women born in the late 1930s to sixty one months for women born in the early 1960s.¹⁰ Once again, as with age at first birth and age at last birth, average spacing among women born in white areas relative to women born in homelands rose consistently starting with women born in the early 1950s.

Compared to women born in homelands in the late 1930s through the 1940s, women born in white areas on average first gave birth up to three years earlier in life, last gave birth up to five years in life, and had up to ten fewer months between births. As depicted in figure 4d, lifetime fertility for these cohorts was similar for women born in white areas and homelands, at about 5.5

⁸ Appendix F compares difference-in-differences estimates across various subgroups of women. The decline in fertility in white areas relative to homelands was delayed, but more sustained, among younger women; was of similar magnitude among more and less-educated women; and was earliest and most persistent among women living in urban areas and among women who had ever been married. Appendix G compares difference-in-differences estimates across homelands. The decline in fertility in white areas was most sustained when compared to fertility in homelands that had few men per woman in 1970 and whose residents were located far from white area boundaries.

⁹ Although some women give birth after turning 40, this age is commonly used as a cutoff to identify women who have generally completed childbearing (Schoen *et al.* 1999; Hayford 2009; Modrek and Ghobadi 2011; Beaujouan and Solaz 2013; Cornolli and Bernardi 2015).

¹⁰ Longer spacing between births improves each child's likelihood of survival, and the lengthening of birth intervals as family planning services became available in white areas is consistent with use of contraception to space apart births in other parts of Sub-Saharan Africa (Lesthaeghe *et al.* 1981; Cohen 1998; Westoff 2006).

Figure 4. *Characteristics of childbearing, by women's year of birth*

Notes: Sample as in panel (b) of Table 1, restricted to women aged 40 and older. Calculations performed using sampling weights. Sample sizes for white areas and homelands are 595 and 1,596 in panels (a), (b), and (d). Sample sizes for white areas and homelands are 573 and 1,549 in panel (c), and include only women who report month of birth of all of their children.

Data sources: See appendix I.1 and I.3.

children on average. Figure A3a and b indicates that women born in white areas in the 1940s experienced a reduction in fertility in the 1970s relative to women born in homelands, followed by a rebound in the 1980s. Given that lifetime fertility was similar for women born in both locations, these older cohorts born in white areas may have used family planning services to defer rather than ultimately avoid having children. Bongaarts (1999) presents a related example from Colombia, in which deferral of childbearing led to a temporary decline in fertility in the 1970s and 1980s, but fertility rose once the deferral of childbearing slowed in the 1990s.

Women born in the early 1950s entered their twenties just as the national government began directly providing family planning services in white areas in the early 1970s. Starting with this cohort, the gap between white areas and homelands in age at first birth and age at last birth began to narrow or reverse, and spacing between births lengthened in white areas, suggesting increasing deferral of childbearing in white areas relative to homelands. However, deferral of childbearing alone does not explain the entire drop in fertility in white areas relative to homelands in the 1970s. Later cohorts exhibit no rebound in fertility in figure A3c and d, and the countrywide drop in lifetime fertility starting with the early 1950s cohort in figure 4d was particularly steep among women born in white areas. In these later cohorts, women born in white areas had one fewer child on average than did women born in homelands. Given that women born in homelands in the 1960s had about four children on average, this difference in lifetime fertility of one child per woman suggests that government provision of family planning services accounted for up to a 25 percent drop in the number of children born to African residents of white areas.

There was little change in the extensive margin of fertility over this period. Figure 5 presents the distribution of lifetime fertility by women's birth cohort. The bottom region of each graph represents the share of African women born in each cohort who had zero children. Among African women born in white areas in the late 1930s, less than 1 percent had zero children. This share stayed roughly constant across later cohorts, never rising above 4 percent. Similarly, among African women born in homelands from the late 1930s through the early 1960s, no more than 4 percent had zero children. The combination of falling aggregate fertility (as depicted in figure 4d) without a corresponding rise in childlessness is not without precedent. For example, in the late nineteenth century into the early twentieth century United States, fertility rates fell yet the share of women who never had a child remained constant or even fell (Morgan 1991; Bailey 2013).

Instead, changes in the intensive margin drove the fertility decline among African residents of South Africa. Two percent of African women born in white areas in the late 1930s had a single child; for the cohort born in the early 1960s, this share had risen to 10 percent. There were similar increases in the shares of women who had two children, three children, and four children. However, the share of women who had five or more children fell substantially, from 54 percent of women born in the late 1930s to 20 percent of women born in the early 1960s. These changes were considerably more muted in the homelands. For example, the share of women with five or more children fell from 59 percent to 42 percent, a 17-percentage point decline that was half the 34-percentage point decline in white areas. A family with five or more children remained most common in the homelands, while a two-child family became most common in white areas.

5. Family planning, fertility, and a legacy of apartheid

Over the last half of the twentieth century, the total fertility rate nearly halved among African residents of South Africa but barely declined in Sub-Saharan Africa as a whole. This remarkable decline in fertility occurred during the formation, expansion, decay, and dissolution of the apartheid state in South Africa. Starting in the early 1970s, the national government provided free family planning services in white areas of the country. Although many African leaders expressed apprehension, over the following two decades rates use of contraception by African women doubled and birth rates fell. Despite a rebound in childbearing in the 1980s, lifetime fertility fell by one child per woman in white areas relative to homelands during the last half of the apartheid era.

Figure 5. *Distribution of total number of children, by women's year of birth*

Notes: Sample and sample weights as given in figure 4.

Data sources: See appendix I.1 and I.3.

Available fertility records do not permit calculation of the total number of births that the family planning program averted. The apartheid government did not maintain vital records of African residents, censuses did not fully cover all homelands, and most household surveys conducted after the end of apartheid collected birth histories only from women who were young during the early years of the family planning program. However, the aggregate reduction in fertility serves as an upper bound on the number of births averted. Between 1970 and 1994, there were 25.326 million births in South Africa. Had 1969's crude birth rate remained unchanged, there would have been 30.460 million births over this period.¹¹ Because many factors may have contributed to falling fertility, 5.134 million (30.460 million – 25.326 million) is an upper bound on the number of births that government provision of family planning services averted during the last half of the apartheid era. Between 1970 and 1994, the apartheid government spent \$778 million (2012 USD) on family planning and population development, yielding an estimated cost per averted birth between 1970 and 1994 of at least \$152 (\$778 million ÷ 5.134 million).

Table 2 compares the effects of family planning programs in several countries. Although the decline in fertility was of similar magnitude in South Africa as in other countries, the cost per averted birth in South Africa matched or exceeded that in the Matlab region of Bangladesh. As in Bangladesh, South Africa's family planning program involved intense outreach over many years and was effective but expensive (Joshi and Schultz 2007). Lifetime fertility in South Africa declined sharply among African women born in white areas in the early 1950s, the first cohort to enter their childbearing years as the national government provided family planning services. While funding for these services continued to rise steadily through the 1980s, fertility declines slowed, suggesting diminished marginal effectiveness of this additional expenditure. This conclusion corroborates Caldwell and Caldwell's (1993) assertion that South Africa's fertility decline was not as steep as might have been expected considering the large government expenditure on family planning.

¹¹ Appendix H provides the calculations used to estimate this counterfactual number of births.

Table 2. *Reductions in fertility attributable to family planning programs*

	Dates	Absolute reduction in children born per woman	Percent reduction in children born per woman	Cost per birth averted (2012 USD)
South Africa	1970–1989	≤1	≤25	≥\$152
Bangladesh (Matlab) ^[A]	1978–1985		21	\$384
Colombia ^[B]	1964–1993	0.25–0.33	5	\$124–\$167
Ethiopia ^[C]	1990–2004	1	20	
Ghana (Navrongo) ^[D]	1993–1999	1	15	
Indonesia ^[E]	1982–1987	0.04–0.08	1–2	
Iran ^[F]	1967–2006		18–28	
Peru ^[G]	1985–1991	0.93–1.30	25–35	
Tanzania ^[H]	1970–1991		10.9–21.0	
United States ^[I]	1988–2003		1.7–8.9	\$6,800

Notes: Values for South Africa described in Sections 4.3 and 5.

Sources: [A] Simmons, Balk, and Faiz 1991; [B] Miller 2009; [C] Portner, Beegle, and Christiaensen 2011; [D] Phillips, Bawah, and Binka 2006; [E] Gertler and Molyneaux 1994; [F] Modrek and Ghobadi 2011; [G] Angeles, Guilkey, and Mroz 2005; [H] Angeles, Guilkey, and Mroz 1998; [I] Kearney and Levine 2009.

The full consequences of family planning in South Africa extend beyond a tally of averted births. Family planning was central to the apartheid state's population control objectives: slower population growth among African residents in white areas would permit the white-controlled government to maintain power. Family planning effectively lowered fertility but did not achieve its political objective, at least not for long: apartheid formally ended in 1994, barely twenty years after the government first provided family planning services. By expanding access to family planning services to members of all racial groups, government provision of family planning narrowed the racial gap in access to health care. However, these services were available mostly in white areas. The homelands remained poorer than the rest of the country during the apartheid era and after reunification, and family planning was one of many apartheid policies that entrenched differences between African residents of white areas and African residents of the homelands.

Supplementary material

Supplementary material is available at *European Review of Economic History* online.

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References

- ANGELES, G., GUILKEY, D.K. and MROZ, T.A. (1998). Purposive program placement and the estimation of family planning program effects in Tanzania. *Journal of the American Statistical Association* **93**(443), pp. 884–99.
- ANGELES, G., GUILKEY, D.K. and MROZ, T.A. (2005). The determinants of fertility in rural Peru: program effects in the early years of the National Family Planning Program. *Journal of Population Economics* **18**(2), pp. 367–89.
- BAILEY, M.J. (2006). More power to the pill: the impact of contraceptive freedom on women's life cycle labor supply. *Quarterly Journal of Economics* **121**(1), pp. 289–320.
- BAILEY, M.J. (2013). Fifty years of family planning: new evidence on the long-run effects of increasing access to contraception. *Brookings Papers on Economic Activity Spring*, pp. 341–409.
- BAILEY, M.J., MALKOVA, O. and NORLING, J. (2014). Do family planning programs decrease poverty? Evidence from public census data. *CESifo Economic Studies* **60**(2), pp. 312–37.
- BEAUJOUAN, E. and SOLAZ, A. (2013). Racing against the clock? Childbearing and sterility among men and women in second unions in France. *European Journal of Population* **29**(1), pp. 39–67.
- BECKETT, M., DA VANZO, J., SASTRY, N., PANIS, C. and PETERSON, C. (2001). The quality of retrospective data: an examination of long-term recall in a developing country. *Journal of Human Resources* **36**(3), pp. 593–625.
- BEINART, W. (2001). *Twentieth-Century South Africa* (2nd edn). Oxford: Oxford University Press.
- BERNSTEIN, H. (1985). *For Their Triumphs & for Their Tears: Women in Apartheid South Africa*. London: International Defense and Aid Fund for Southern Africa.
- BONGAARTS, J. (1999). The fertility impact of changes in the timing of childbearing in the developing world. *Population Studies* **53**(3), pp. 277–89.
- BONGAARTS, J. and CASTERLINE, J. (2013). Fertility transition: is sub-Saharan Africa different? *Population and Development Review* **38**(1), pp. 153–68.
- BRANSON, N. and BYKER, T. (2015). Impact of a youth-targeted reproductive health initiative on teen childbearing in South Africa. Working paper.
- BROWN, B.B. (1987). Facing the 'black peril': the politics of population control in South Africa. *Journal of Southern African Studies* **13**(2), pp. 256–73.
- BROWNER, C.H. (1986). The politics of reproduction in a Mexican village. *Signs* **11**(4), pp. 710–24.
- BUNDY, C. (1979). *The Rise and Fall of the South African Peasantry*. London: James Currey Ltd.
- BURGER, R., BURGER, R. and ROSSOUW, L. (2012). The fertility transition in South Africa: a retrospective panel data analysis. *Development Southern Africa* **29**(5), pp. 738–55.
- CALDWELL, J.C. (1992). Family planning programs and official policy decisions in southern Africa. Health Transition Working Paper, no. 15. Canberra: Australian National University.
- CALDWELL, J.C. and CALDWELL, P. (1993). The South African fertility decline. *Population and Development Review* **19**(2), pp. 225–62.
- CHIMERE-DAN, O. (1993). Population policy in South Africa. *Studies in Family Planning* **24**(1), pp. 31–9.
- CHRISTOPHER, A.J. (2002). 'To define the indefinable:' population classification and the census in South Africa. *Area* **34**(4), pp. 401–8.
- COHEN, B. (1998). The emerging fertility transition in sub-Saharan Africa. *World Development* **26**(8), pp. 1431–61.
- COOPER, D., MORRONI, C., ORNER, P., MOODLEY, J., HARRIES, J., CULLINGWORTH, L. and HOFFMAN, M. (2004). Ten years of democracy in South Africa: documenting transformation in reproductive health policy and status. *Reproductive Health Matters* **12**(24), pp. 70–85.

- CORNOLLI, C.L. and BERNARDI, F. (2015). The causal effect of the great recession on childlessness of white American women. *IZA Journal of Labor Economics* 4(1), pp. 1–24.
- DE BEER, C. (1984). *The South African Disease: Apartheid Health and Health Services*. Yeoville, South Africa: Southern African Research Services.
- DE VOS, S. (1988). Population and development among blacks in South Africa. University of Wisconsin-Madison, Center for Demography and Ecology, Working Paper 88–25.
- Department of Health. (1973, 1976, and 1987). Annual report. Pretoria, South Africa: Republic of South Africa.
- DU PLESSIS, J.L. and COETZEE, J.K. (1974). *Fertility and Family Planning among Bantu in Metropolitan Areas of the Republic of South Africa: A Review*. Pretoria: Human Sciences Research Council.
- EBENSTEIN, A. (2010). The ‘missing girls’ of china and the unintended consequences of the one child policy. *Journal of Human Resources* 45(1), pp. 87–115.
- EHRlich, P. (1968). *The Population Bomb*. New York: Ballantine.
- FERREIRA, M. (1984). *Some Attitudes of Black Opinion Leaders Towards Family Planning and the National Family Planning Programme*. Pretoria, South Africa: Human Sciences Research Council.
- FINKLE, J.L. and CRANE, B.B. (1975). The politics of Bucharest: population, development and the new international economic order. *Population and Development Review* 1(1), pp. 87–114.
- FINLAY, J.E., CANNING, D. and Po, J.Y.T. (2012). Reproductive health laws around the world. Harvard University Program on the Global Demography of Aging, Working Paper No. 96.
- GERTLER, P.J. and MOLYNEAUX, J. (1994). How economic development and family planning programs combined to reduce Indonesian fertility. *Demography* 31(1), pp. 33–63.
- HAYFORD, S. (2009). The evolution of fertility expectations over the life course. *Demography* 46(4), pp. 765–83.
- HORRELL, M. (1969). *The African Reserves of South Africa*. Johannesburg, South Africa: South Africa Institute of Race Relations.
- HYATT, S. (1997). A shared history of shame: Sweden’s four-decade policy of forced sterilization and the eugenics movement in the United States. *Indiana International and Comparative Law Review* 8, pp. 475–503.
- JOSHI, S. and SCHULTZ, T.P. (2007). Family planning as an investment in development: evaluation of a program’s consequences in Matlab, Bangladesh. Yale University, Economic Growth Center, Discussion Paper No. 951.
- KALER, A. (1998). A threat to the nation and a threat to the men: the banning of Depo-Provera in Zimbabwe, 1981. *Journal of Southern African Studies* 24(2), pp. 347–76.
- KAUFMAN, C. (1996). The politics and practice of reproductive control in South Africa: a multilevel analysis of fertility and contraceptive use. University of Michigan, Ph.D. thesis.
- KAUFMAN, C. (1997). Reproductive control in South Africa. Population Council, Policy Research Division, Working Paper No. 97.
- KAUFMAN, C. (2000). Reproductive control in apartheid South Africa. *Population Studies* 54(1), pp. 105–14.
- KEARNEY, M.S. and LEVINE, P.B. (2009). Subsidized contraception, fertility, and sexual behavior. *Review of Economics and Statistics* 91(1), pp. 137–51.
- KLAUSEN, S.M. (2004). *Race, Maternity and the Politics of Birth Control in South Africa*. New York: Palgrave MacMillan, pp. 1910–39.
- KLUGMAN, B. (1993). Balancing means and ends; population policy in South Africa. *Health Matters* 1(1), pp. 44–57.
- LAM, D. (2011). How the world survived the population bomb: lessons from 50 years of extraordinary demographic history. *Demography* 48(4), pp. 1231–62.
- LESTHAEGHE, R., OHADIKE, P., KOCHER, J. and PAGE, H. (1981). Child-spacing and fertility in sub-Saharan Africa: an overview of issues. In H. PAGE and R. LESTHAEGHE (eds), *Chapter 1 of Child-Spacing in Tropical Africa: Traditions and Change*. New York: Academic Press, pp. 3–23.
- LÖTTER, J.M. (1977). The effect of urbanization and education on the fertility of blacks in South Africa. *Humanitas* 4(1), pp. 21–8.

- LÖTTER, J.M. and VAN TONDER, J.L. (1976). *Fertility and Family Planning Among Blacks in South Africa: 1974*. Pretoria: Human Sciences Research Council.
- MILLER, G. (2009). Contraception as development? New evidence from family planning in Colombia. *Economic Journal* **120**(545), pp. 709–36.
- MODREK, S. and GHOBADI, N. (2011). The expansion of health houses and fertility outcomes in rural Iran. *Studies in Family Planning* **42**(3), pp. 137–46.
- MORGAN, P. (1991). Late nineteenth-and early twentieth-century childlessness. *American Journal of Sociology* **97**(3), pp. 779–807.
- MOSTERT, W.P., HOFMEYR, B.E., OOSTHUIZEN, J.S. and VAN ZYL, J.A. (1998). *Demography: Textbook for the South African Student*. Pretoria: Human Sciences Research Council.
- MOSTERT, W.P., VAN TONDER, J.L. and HOFMEYR, B.E. (1988). Demographic trends in South Africa. In H.C. MARAIS (ed.), *South Africa: Perspectives on the Future*. Owen Burgess: Pinetown, South Africa.
- MOULTRIE, T.A. (2001). Racism and reproduction: the institutional effects of apartheid on the South African fertility decline. Paper presented at the XXIV IUSSP General Population Conference, Salvador, Brazil.
- MOULTRIE, T.A. and TIMAEUS, I. (2003). The South African fertility decline: evidence from two censuses and a Demographic and Health Survey. *Population Studies* **57**(3), pp. 265–83.
- PHILLIPS, H. (1997). Utilization of maternal health care services among African Women in South Africa. University of Michigan, Ph.D. thesis.
- PHILLIPS, H. (1999). Demographic survey data in South Africa: an evaluation of methodology and quality. *Southern African Journal of Demography* **7**(1), pp. 1–10.
- PHILLIPS, J.F., BAWAH, A.A. and BINKA, F.N. (2006). Accelerating reproductive and child health programme impact with community-based services: the Navrongo experiment in Ghana. *Bulletin of the World Health Organization* **84**(12), pp. 949–55.
- PLATZKY, L. and WALKER, C. (1985). *The Surplus People: Forced Removals in South Africa*. Johannesburg: Raven Press.
- PORTNER, C., BEEGLE, K. and CHRISTIAENSEN, L. (2011). Family planning and fertility: estimating program effects using cross-sectional data. World Bank, Policy Research Working Paper No. 5812.
- POSEL, D. (1991). *The Making of Apartheid 1948–1961*. Oxford: Clarendon Press.
- POSEL, D. (2001). Race as common sense: racial classification in twentieth-century South Africa. *African Studies Review* **44**(2), pp. 87–113.
- POSEL, D. and CASALE, D. (2013). The relationship between sex ratios and marriage rates in South Africa. *Applied Economics* **45**(4), pp. 663–76.
- POTTER, J. (1977). Problems in using birth-history analysis to estimate trends in fertility. *Population Studies* **31**(2), pp. 335–64.
- POTTER, J. (1999). The persistence of outmoded contraceptive regimes: the cases of Mexico and Brazil. *Population and Development Review* **25**(4), pp. 703–39.
- POTTS, M. and TSANG, T. (2002). History of contraception. *Gynecology and Obstetrics* **6**(8), pp. 1–23.
- REED, H. (2013). Moving across boundaries: migration in South Africa, 1950–2000. *Demography* **50**(1), pp. 71–95.
- Republic of South Africa (1950–1989). *Estimate of the Expenditure to be Defrayed from State Revenue Account*. Pretoria: Government Printer.
- Republic of South Africa (1983). *Report of the Science Committee of the President's Council on Demographic Trends in South Africa*. Cape Town: Government Printer.
- SAVAGE, M. (1986). The imposition of pass laws on the African population in South Africa 1916–1984. *African Affairs* **85**(339), pp. 181–205.
- SCHOEN, R., ASTONE, N.M., KIM, Y., NATHANSON, C. and FIELDS, J. (1999). Do fertility intentions affect fertility behavior? *Journal of Marriage and Family* **61**(3), pp. 790–9.
- SIMKINS, C. (1983). *Four Essays on the Past, Present, and Possible Future of the Distribution of the Black Population in South Africa*. Cape Town: University of Cape Town.
- SIMKINS, C. (1999). The political economy of South Africa in the 1970s. *South African Journal of Economic History* **14**(1), pp. 11–36.

- SIMMONS, G.B., BALK, D. and FAIZ, K.K. (1991). Cost-effectiveness analysis of family planning programs in rural Bangladesh: evidence from Matlab. *Studies in Family Planning* 22(2), pp. 83–101.
- SMITH D.M. (ed.) (1976). *Separation in South Africa: People and Policies*. London: University College London.
- Union of South Africa (1955). *Summary of the Report of the Commission for the Socio-Economic Development of the Bantu Areas within the Union of South Africa*. Pretoria: Government Printer.
- United Nations. (2014a). UNdata. Downloaded from <<http://data.un.org/Data.aspx?d=PopDiv&f=variableID:54>>, accessed February 14, 2014.
- United Nations. (2014b). United Nations Conferences on Population. Available at <<http://www.un.org/en/development/desa/population/events/conference/index.shtml>>, accessed September 4, 2014.
- Unsigned (1982). Family planning in South Africa—a kind of genocide? *African Communist* 3, pp. 73–88.
- VAN RENSBURG, N.J. (1972). *Population Explosion in Southern Africa*. Pretoria: Aurora Printers.
- VAN TONDER, J.L. (1985). *Fertility Survey 1982: Data Concerning the Black Population of South Africa*. Pretoria: Human Sciences Research Council.
- VICZANY, M. (1982). Coercion in a soft state: the family-planning program of India: Part I: the myth of voluntarism. *Pacific Affairs* 55(3), pp. 373–402.
- WESTOFF, C. (2006). New estimates of unmet need and the demand for family planning. DHS Comparative Reports No. 14. Calverton, Maryland: ICF Macro.
- WILSON, F. (1972). *Labour in the South African Gold Mines 1911–1969*. London: Cambridge University Press.
- WILSON, F. (2011). Historical roots of inequality in South Africa. *Economic History of Developing Regions* 26(1), pp. 1–15.
- WILSON, F. and RAMPHELE, M. (1989). *Uprooting Poverty: The South African Challenge*. New York: Norton.
- ZAMPAS, C. and LAMAČKOVÁ, A. (2011). Forced and coerced sterilization of women in Europe. *International Journal of Gynecology and Obstetrics* 114(2), pp. 163–6.

Appendix A: Racial classification in South Africa

The apartheid government assigned each resident membership in one of four racial groups, formally known as population groups: white, African, colored, or Asian. White residents were alternatively referred to as European; African residents as native, Bantu, or black; colored residents as mixed; and Asian residents as Indian (Christopher 2002). From the start of apartheid until 1985, marriage and sexual contact between white residents and members of any other race was illegal. However, the boundaries of each group were not always clearly defined, and Posel (2001) reviews the complicated, subjective way in which people were assigned a racial group.

In the early 1950s, white residents comprised 19.0 percent of the population and had a total fertility rate of 3.4 children per woman. By the early 1960s, white residents comprised 16.8 percent of the population and had a total fertility rate of 3.3 children per woman. These values continued to fall throughout the apartheid era and stood at 12.7 percent and 1.7 children per woman in the early 1990s. Total fertility rates for African, colored, and Asian residents were all above six children per woman in the early 1950s. Each of these groups experienced substantial declines in fertility throughout the apartheid era, but always had higher fertility rates than did white residents (Mostert *et al.* 1998). As depicted in figure 1, because Africans comprised roughly three-quarters of the population, their fertility decline drove the overall fertility decline.

Appendix B: White area and homeland boundaries

Figure A1 provides a map of white area and homeland boundaries during apartheid. Again, African residents lived in both white areas and homelands.

Figure A1. *Partitioning of South Africa during apartheid*

Data source: See appendix I.3.

Appendix C: Homeland and national government spending on family planning services

Figure A2 compares homeland government and national government spending on family planning services between 1974 and 1994. Homeland government spending was highest at 6.2 percent of national government spending in 1977, and lowest at 0.4 percent in 1986. This comparison includes only homelands and years in which expenditure reports itemize health department spending. National government spending on family planning services is available in all years. Population counts are available every year for the country as a whole, in 1970 for all homelands except KwaNdebele, and in 1985 for all homelands. I impute missing annual KwaNdebele population counts by assuming it grew at the same rate as the country as a whole. For every other homeland, I impute missing population counts assuming constant growth between 1970 and 1985, and assuming that the homeland grew at the same rate as the country as a whole after 1985.

Figure A2. *Homeland government spending per capita on family planning services as a percentage of national government spending per capita on family planning services*

Data sources: See appendix I.2, I.4, and I.6.

Appendix D: Sample composition

D.1 Data on use of contraception

Of the 6,000 original cases in the 1974 Fertility Survey, 5,792 remain. The intended sample for both the 1974 Fertility Survey and the 1987 DHS was women who have ever been married, are living with a man, have ever given birth, or are currently pregnant (Lötter and van Tonder 1976; Phillips 1999). The 1987 DHS also included women who had ever been pregnant. The 1974 Fertility Survey targeted women ages 15–44, and the 1987 DHS targeted women ages 12–49. However, each survey included several dozen respondents who do not fit in these categories. Of the 5,792 African women observed by the 1974 Fertility Survey, 64 are outside the target population. Of the 16,743 African women observed by the 1987 DHS, 27 are outside the target population. In order to draw a comparable sample from both surveys, I restrict analysis to African women aged 15–44 who have ever been married, are in a partnership, have ever given birth, or are currently pregnant, yielding a final sample of 5,728 women from the 1974 Fertility Survey and 15,123 women from the 1987 DHS.

D.2 Data on fertility

The sample drawn from the 1994 and 1995 OHS consists of all African women aged 12–54 whose magisterial district of birth is recorded and who have never given birth or who report the year of birth of all of their children. The sample drawn from the 2008 NIDS consists of all African women aged 15 and older whose district council of birth is recorded and who have never given birth or who report the year of birth of all of their children. OHS respondents live in 378 magisterial districts, 105 of which lie entirely within former homeland boundaries, 62 of which lie between 90 and 99 percent within former white area

boundaries, and 211 of which lie entirely within former white area boundaries. NIDS respondents live in 53 district councils, 7 of which lie entirely within former homeland boundaries, 21 of which lie between 44 and 89 percent within former white area boundaries, 6 of which lie between 90 and 99 percent in former white area boundaries, and 17 of which lie entirely in former white area boundaries. Section 4.2 finds a decline in fertility in white areas relative to homelands, with white areas defined as districts in which at least 90 percent of the land area lies within historical white area boundaries. In unreported results, I find that estimates in mixed districts are generally in between those of districts that lie entirely in historical white areas and districts that lie entirely in historical homelands.

Appendix E: Use of contraception by age

Differences in the relationship between age and use of contraception emerged between 1974 and 1987. As depicted in figure A3a, 25 percent of African women aged 15–19 living in white areas in 1974 had ever used contraception; among African women aged 40–44 in white areas in 1974, 27 percent had ever used contraception. For African women in their twenties and thirties, the share was between 10 and 13 percentage points higher. In 1987, the age profile was more pronounced, with African women in white areas in their late twenties up to 22 percentage points more likely to have ever used contraception than were younger or older women. Use of contraception in each year in homelands is lower in both years but similarly has a steeper age profile in 1987 than in 1974. In figure A3b, the age profile of current use of contraception in white areas in 1987 similarly has a peak at ages 25–29 that is more pronounced than in 1974, in both white areas and homelands. These steeper age profiles in 1987 than in 1974 suggest that, over the course of the 1970s and 1980s, use of contraception rose particularly among women in their twenties and early thirties.

Figure A3. *Use of contraception by age*

Notes: Sample and sample weights as given in figure 2. Each y-axis measures the percentage of women in each five-year age group who have ever used or are currently using contraception, as observed in the 1974 Fertility Survey and 1987 DHS.

Data sources: See appendix I.1 and I.3.

Appendix F: Robustness of fertility decline across subgroups

Figure A4 repeats the difference-in-differences estimates presented in the second panel of figure 3 for subsamples grouped according to women's birth cohort, educational attainment, urban/rural residence, and marriage status. Because of small sample sizes in some years, these estimates of δ_y are calculated as follows for five-year groups ($y = 1955\text{--}1959, 1960\text{--}1964, \dots, 1990\text{--}1994$):

$$b_{it} = \alpha L_i + \sum_{y \neq 1965-69} \beta_y 1(t = y) + \sum_{y \neq 1965-69} \delta_y L_i \times 1(t = y) + \varepsilon_{it}. \quad (2)$$

Figure A4. Difference-in-differences estimates by subgroup

Notes: Sample and sample weights as given in figure 3. Calculations performed according to specification 2 for various subgroups of women. Sample sizes for white areas and homelands in each panel are as follows: (a) 1,575 and 951; (b) 2,177 and 1,195; (c) 2,784 and 1,552; (d) 3,370 and 1,876; (e) 21,254 and 14,002; (f) 10,345 and 6,230; (g) 18,001 and 4,470; (h) 13,843 and 15,888; (i) 13,276 and 7,784; (j) 18,568 and 12,574.

Data sources: See appendix I.1 and I.3.

Figure A4a and b demonstrates that, among women born in the 1940s, the likelihood of giving birth fell by 4 percentage points during the 1970s for women born in white areas relative to women born in homelands. For women born in the 1950s depicted in panels (c) and (d), this decline did not begin until the late 1970s, perhaps because these cohorts were only teenagers when the national government began directly providing family planning services in 1970. However, while women born in white areas in the 1940s exhibited a rebound in fertility in the 1980s relative to women born in homelands, there was no such rebound among women born in the 1950s. The decline in fertility in white areas relative to homelands was delayed, but more sustained, among younger women. The more pronounced age profile in use of contraception that emerged by the late 1980s may help explain the lack of a rebound in fertility for these younger cohorts. Women born in the 1950s were in their late twenties or early thirties in the 1980s—ages that, as depicted in figure A3, were particularly likely to have ever used or to be currently using contraception.

Figure A4e and f demonstrates that the decline in fertility was of similar magnitude among women with more and less education. Figure A4g and h demonstrates that the decline was earliest and most persistent among women living in urban areas, consistent with the rollout of clinics and family planning advisors first in urban areas and then in rural areas (Department of Health 1976). Similarly, figure A4i and j demonstrates that the decline was earliest and most persistent among women who had ever been married, suggesting that the increases in use of family planning services among married women depicted in figure 2 may have been tempered for women who had never been married.

Again, though, educational attainment, urban/rural residence, and marriage status were measured only in 1994 and 1995, after women had made childbearing decisions. Available data do not permit measuring changes in fertility by contemporary educational attainment, urban/rural residence, or marriage status. For example, in both urban and rural areas, the decline in fertility for women born in white areas relative to women born in homelands, as given in figure A4g and h, was smaller in magnitude than the overall decline depicted in figure 3. Because fertility has historically been lower in urban areas than in rural areas, this comparison suggests that some of the overall fertility decline may have been due to urbanization in white areas relative to homelands in the 1970s. Alternatively, the apparently muted declines in urban and rural areas could be due to migration of women with many children from rural homelands to urban white areas in between when their children were born and when urban/rural status is recorded. This alternative explanation is particularly plausible given that urban/rural location is recorded in 1994 and 1995, after migration restrictions were repealed in 1986.

Appendix G: Robustness of fertility decline across homelands

The estimates in figure 3 group together all homelands. Figure A5 presents the estimates of specification 2 performed separately for each homeland, comparing fertility in white areas to fertility in each homeland. Again, these difference-in-differences estimates measure the share of African women born in white areas who gave birth minus the share of African women born in each homeland who gave birth, in each five-year period minus the difference in 1965–1969. Negative values after 1970 indicate that fertility fell more quickly, or rose more slowly, in white areas relative to a homeland. For example, compared to the late 1960s, the share of women who gave birth in the early 1970s fell by nearly 4 percentage points in white areas relative to the change in KaNgwane. On the other hand, fertility in the

early 1970s rose in white areas in comparison to Ciskei and Venda. Small samples sizes for individual homelands may contribute to the wildly varying series for some homelands in figure A5. For example, as indicated in column 1 of table A1, the combined 1994 and 1995 OHS dataset contains only 248 African women aged 12–54 who were born in Qwaqwa.

Figure A5. *Difference-in-differences estimates by homeland*

Notes: Sample and sample weights as given in figure 3. Calculations performed according to specification 2 for each homeland. Sample sizes given in column 1 of table 2.

Data sources: See appendix I.1 and I.3.

Table A1. *Characteristics of homelands*

	1994 and 1995 OHS		Census
	Sample size	Distance to nearest white area (km)	Sex ratio in 1970
Bophuthatswana	2,815	10.1	79.0
Ciskei	1,195	11.1	63.5
Gazankulu	1,393	9.4	43.8
KaNgwane	975	11.5	66.3
KwaNdebele	381	6.2	
KwaZulu	3,735	8.1	58.2
Lebowa	3,246	7.8	51.6
Qwaqwa	248	10.3	60.7
Transkei	7,093	34.6	51.2
Venda	880	17.3	39.3

Notes: From the sample in panel (a) of Table 1, column 1 records the number of women born in each homeland. Column 2 records the average distance from each woman's district of birth to the nearest white area boundary, calculated using sampling weights that accompany each survey. Column 3 records the number of African men per 100 African women living in each homeland, as observed in the 1970 census.

Data sources: See appendix I.1 and I.4.

Different patterns for homelands in figure A5 may reflect differences in access to family planning services. Residents of homelands who lived near white area boundaries were sometimes able to travel to white areas to obtain contraception (Kaufman 1997). Column 2 of table A1 measures the average distance from each respondent's district of birth to the nearest white area boundary. Because birthplace within a district is not known, the centroid of each district is used. Respondents in most homelands were born in districts located on average within 12 km of a white area. However, for Venda and Transkei, respondents were born on average 17.3 and 34.6 km from the nearest white area. As indicated in figure A5, white areas exhibited the most sustained drop in fertility when compared to these two homelands.

Additionally, as discussed in Section 3.1, labor migration of African men into white areas left African women concentrated in the homelands in the 1960s, and forced removals from white areas to homelands over the subsequent decades eased the imbalanced sex ratios in the homelands. The sex ratio can influence marriage rates in South Africa (Posel and Casale 2013), and the balancing of the sex ratio may have made family formation easier, slowing the fertility decline in homelands. Column 3 of table A1 reports the ratio of adult African men per 100 adult African women living in each homeland in 1970 (except KwaNdebele, which had not yet been established), as recorded by the census. Venda had the most imbalanced sex ratio in 1970, leaving the greatest possible balancing of the sex ratio and, perhaps, increase in family formation. Again, as depicted in figure A5, white areas exhibited a particularly sustained drop in fertility compared to Venda. Conversely, Bophuthatswana began with the most balanced sex ratio among the homelands, and was the only homeland to exhibit a fall in fertility relative to white areas by the late 1980s. Although not conclusive, these patterns suggest that proximity to white areas and a balancing over time of low ratios of men to women may have slowed the fertility decline in some homelands.

Appendix H: Aggregate reduction in fertility due to declining crude birth rate, 1970–1994

In 1969, the year before the apartheid government first provided free family planning services, 21,920,560 people lived in South Africa and the crude birth rate was 38.047 births per thousand people, indicating that 834,012 children were born in 1969 ($21,920,560 \times 0.038047$). The lower line in figure A6 depicts the actual numbers of births calculated similarly for each year from 1970 until apartheid ended in 1994. The slope of this line falls over time because the crude birth rate fell to 26.474 births per thousand people in 1994.

Figure A6. *Births in South Africa, 1969–1994*

Notes: The lower line plots the actual of births in each year, calculated as total population multiplied by the crude birth rate. The upper line plots the number of births there would have been had 1969's crude birth rate persisted unchanged through 1994.

Data sources: See appendix I.4 and I.5.

The upper line in figure A6 plots the number of births there would have been had 1969's crude birth rate persisted unchanged through 1994. The number of births in 1969 is unchanged. In 1970, 22,502,430 people lived in South Africa, the crude birth rate was 37.883 per thousand people, the crude death rate was 13.879 per thousand people, and the net migration rate was 2.6371 per thousand people. There were therefore 852,460 births, 312,311 deaths, and 59,342 net migrants in 1970. Applying 1969's higher crude birth rate to 1970 would have raised the number of births by 3,690, thereby raising the population in 1971 from 23,101,920 to 23,105,610. In 1971, the crude birth rate was 37.775, the crude death rate was 13.569, and the net migration rate was 2.9507. There were therefore 872,213 births in 1971 ($23,101,920 \times 0.037755$). Had 1969's crude birth rate persisted, there would have been 879,099 births in 1970 ($23,105,610 \times 0.038047$), an increase of 6,886 births. There would also have been more deaths and net migrants, and the population in 1972 would have been 23,739,366 instead of its actual value of 23,728,830. The number of births in each following year are calculated similarly.

The gray region in figure A6 represents the number of additional births there would have been had 1969's crude birth rate persisted unchanged through 1994. The decline in the crude birth rate reduced the total number of births between 1970 and 1994 by 5.134 million.

Appendix I: Data sources

I.1 Household surveys

1974 Fertility survey:

Human Sciences Research Council. (1974). *Fertility Survey*.

- 1987 Demographic and health survey:
 Human Sciences Research Council. (1999). *Demographic and Health Survey, 1987*. Available at <<http://sada.nrf.ac.za/ahdetails.asp?catalognumber=0115>>, accessed June 10, 2013.
- 1994 and 1995 October Household surveys:
 Central Statistical Service. (1994–1995). October Household Survey. Available at <<http://www.datafirst.uct.ac.za/>>, accessed August 6, 2013.
- 2008 National income dynamics study:
 Southern Africa Labour and Development Research Unit. (2008). National Income Dynamics Study. Available at <<http://www.datafirst.uct.ac.za/>>, accessed January 14, 2013.

I.2 Expenditure on family planning services

Estimates of Expenditure, published by national and homeland governments as follows:

- Republic of South Africa, 1950–1994
- Bophuthatswana, 1978–1994
- Ciskei, 1981–1994
- Gazankulu, 1980–1993
- Kangwane, 1990
- KwaNdebele, 1982–1988 and 1991–1994
- Kwazulu, 1979–1994
- Lebowa, 1977–1981
- Qwaqwa, 1978–1994
- Transkei, 1975–1989
- Venda, 1978–1985 and 1990

I.3 Political demarcations

Homelands:

Municipal Demarcation Board. (2015). TBVC Homelands.

Magisterial districts in 1991:

GIRAUT, F., AND VACCHIANI-MARCUZZO, C. (2009). *Territories and Urbanization in South Africa: Atlas and Geo-Historical Information System (DYSTURB)*. Marseille: IRD.

District councils in 2001:

Statistics South Africa. 2014. District Councils.

I.4 Population

South Africa, 1950–1989:

Organization for Economic Co-operation and Development. (2014). Stat Extracts. <<http://www.stats.oecd.org>>, accessed August 25, 2014.

All homelands in 1970 except KwaNdebele and Lebowa:

Bureau for Economic Research re Bantu Development (BENBO). (1976). *Economic Revue*. Pretoria: BENBO. [Individual publications for each homeland]

Lebowa in 1970:

Bureau for Economic Research re Bantu Development (BENBO). (1976). *Black Development in South Africa*. Pretoria: BENBO. [Table B.15.1]

Adult sex ratio in all homelands in 1970 except KwaNdebele:

Department of Statistics. (1970). *South African Census 1970*. <<http://www.datafirst.uct.ac.za/dataportal/index.php>>, accessed January 18, 2013.

All homelands in 1985:

MOSTERT, W. P., VAN TONDER, J. L. AND HOFMEYR, B. E. (1988). Demographic Trends in South Africa. Chapter 4 in *South Africa: Perspectives on the Future*, ed. H.C. Marais. Pinetown, South Africa: Owen Burgess. [Table 2]

I.5 Birth and death rates

Total fertility rate in South Africa:

MOSTERT, W. P., VAN TONDER, J. L., OOSTHUIZEN, J. S. AND VAN ZYL, J. A. (1998). *Demography: Textbook for the South African Student*. Pretoria: Human Sciences Research Council.

Crude birth rate and crude death rate in South Africa:

World Bank. (2016). World Data Bank. Downloaded from <<http://data.worldbank.org/>>, accessed March 18, 2016.

I.6 Prices

Price index for all retail items in South Africa, 1950–1957:

South African Reserve Bank. (1960). Quarterly Bulletin of Statistics, No. 58, December 1960. Pretoria, South Africa: Republic of South Africa.

Consumer price index in South Africa, 1957–2012:

Organization for Economic Co-operation and Development. (2014). Stat Extracts. <<http://www.stats.oecd.org>>, accessed August 25, 2014.

I.7 Exchange rates

Currency conversion from Pound to South African Rand at rate of 2 Rand per Pound:

Reserve Bank. (2001). The Reserve Bank and the Rand: Some Historic Reflections. <<https://www.resbank.co.za/Publications/Speeches/Detail-Item-View/Pages/default.aspx?sarbweb=3b6aa07d-92ab-441f-b7bf-bb7dfb1bedb4&sarblist=a01d874c-c3f6-4b93-a9dc-c984cf8652cf&sarbitem=200>>, accessed August 25, 2014.

Exchange rate of 8.0485 Rand per US Dollar on January 3, 2012:

OANDA. (2014). Rand/Dollar Exchange Rate. <<ws9.standardbank.co.za/research/data/DMIS93.xls>>, accessed August 31, 2014.