



Women's schooling and fertility under low female labor force participation: Evidence from mobility restrictions in Israel[☆]

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ABSTRACT

This paper studies the effect of mothers' education on fertility in a mostly Muslim population with very low female labor force participation. We first show that a removal of travel restrictions on Israeli Arabs had raised female education and had almost no effect on male education. Next, we show that it lowered fertility rates among exposed women, which we interpret as an effect of female education on fertility. We rule out labor-force participation, age at marriage, marriage and divorce rates and spousal labor-force participation and earnings as confounding factors or as mechanisms but find that spousal education and children quality play a role in the fertility decline. We provide a variety of robustness tests that rule out other channels by which the removal of the travel restrictions could have affected fertility directly. These results are particularly interesting and important for the context of many Muslim countries with low rates of female labor force participation.

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1. Introduction

In the classic economic model of fertility (Becker, 1960; Mincer, 1963), education increases the opportunity cost of women's time, prompting them to have fewer children but also raising their permanent income through earnings and tilting their optimal fertility choices towards higher children's quality (Becker and Lewis, 1973; Willis, 1973). In these models, the link between education and fertility crucially depends on labor force participation.

This paper studies the role of female education in reducing fertility through mechanisms other than the labor market and its implied female value of time. In the past half-century, for example, the total fertility rate of Muslim women in Israel fell sharply, from over 9.8 children in the mid-1950s to 3.9 in 2008.¹ Concurrently, Israeli–Arab women's average years of schooling increased more than threefold, from three years in 1951 to over ten in 2008. This change, however, hardly affected their labor-force participation and employment behavior; the respective

rates were only 15% in 2000 and 18% in 2009.² Whether education plays a role in lowering fertility rates in the absence of the labor market mechanism is of great importance since in most of the Arab and Muslim world, it is common for women to be absent from the labor force.³ However, female education has increased to various degrees in Arab and Muslim countries and this change could have lowered fertility rates via other channels.⁴

An extensive literature documents associations between education and fertility (Strauss and Thomas, 1995). However, whether they represent causal relationships has been the subject of debate. Breierova and

² CBS (2002), State of Israel Prime Minister's Office, and Yashiv and Kasir (2009).

³ The most recent World Bank statistics show that in 2009 the labor force participation rate of women over 15 years old was 20–24% in Egypt, Jordan, Lebanon, and Yemen, and it was 14–17% in Iraq, Saudi Arabia, and the West Bank and Gaza. In Pakistan and Turkey, Muslim though not Arab countries, female labor force participation is also very low, 23–24% (<http://data.worldbank.org/indicator/SL.TLF.CACT.FE.ZS>).

⁴ The increase in education may impact women's fertility by improving an individual's knowledge of, and ability to process information regarding fertility options and healthy pregnancy behaviors (Grossman, 1972). Second, education may enhance females' ability to process information and contraceptive options (Strauss and Thomas, 1995). Education may also improve a wife's bargaining power inside her marriage (Thomas, 1990) and may also tilt the tradeoff from the number of children to their quality (Moav (2005). McCrary and Royer (2011) present an insightful summary of how education may affect fertility and children's outcomes and discuss the related empirical evidence. However, there is little evidence regarding the importance of these channels in the absence of meaningful increases in women's employment and the opportunity cost of their time.

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¹ Israel Central Bureau of Statistics (hereinafter: CBS) website, online tables and figures.

Duflo (2004) and Osili and Long (2008) use school expansion as a source of exogenous decrease in the cost of schooling and find a negative causal effect of education on early age fertility in Indonesia and Nigeria. Black et al. (2008) find that gains in education resulting from compulsory-schooling laws decreased teenage pregnancy in the U.S. and Norway. Also in Norway, Monstad et al. (2008) find that increases in education did not lead to decreased fertility rates, yet did lead women to give birth at older ages. In contrast, McCrary and Royer (2011), using exact cutoff dates for school entry, find that education does not affect fertility. Kirdar et al. (2009) use the extension of compulsory schooling in Turkey in 1997 and find that it increased the average age of marriage and reduced fertility at young ages. Duflo et al. (2010) provide experimental evidence that access to education for adolescent girls reduced early fertility among girls who were likely to drop out of school. This mixed evidence obviously suggests a lack of consensus regarding the causal effect of women's education on fertility. Furthermore, maternal education can affect fertility through various channels, and as such it is not evident that there should be one universal effect of maternal education on fertility. Therefore, it is important to separately identify the different channels through which the effect works, and in particular those channels which do not operate through the labor market; thus, the main contribution in the evidence we present is in studying a case in which the level of education had increased without changes in the labor market taking place. This evidence is not only important in abstracting from the labor market effects; it is also highly relevant for understanding the fertility transition in the Muslim and the Arab world, where women's education had increased significantly, yet their labor force participation remained low.

We base the evidence presented in this paper on the de facto revocation in October 1963 of military rule over Arabs in Israel, which immediately allowed some of the Arab population to regain access to schooling institutions. Military rule was in effect from 1948 to 1966 in several geographical areas of Israel that had large Arab populations. Since 1948, the Arab residents of these areas were subject to measures that placed tight controls on all aspects of their lives, including restrictions on mobility and the requirement of a permit from the Military Governor to travel outside of a person's registered domicile.⁵ The travel restrictions were revoked in October 1963 following unexpected political and government change.⁶

This historical episode sharply increased the education of affected cohorts of children. The Military Government restricted de facto access to schools for children in localities and villages that had no primary or secondary schools while not affecting access in localities in the relevant regions that already had such institutions. By so doing, it created two zones in the Arab-populated areas, one in which school attendance required travel that had become difficult if not impossible and one in which schooling access was not disrupted at all. In the latter group, we distinguish between Arab localities that were under military rule and the Arab population that lived in predominantly Jewish cities. The latter population group was also placed under military rule at first (1948) but was exempted de facto from some of the restrictions a short time later.

The change which took place in late 1963 reduced the cost of primary or secondary schooling for children in localities that lacked

⁵ A recent historical episode of similar restrictions on perceived "enemy" populations is the United States Government's internment and forced relocation of Japanese Americans and Japanese residing along the Pacific coast of the United States to War Relocation Camps in the wake of Japan's attack on Pearl Harbor. President Franklin Roosevelt authorized the internment by Executive Order on February 19, 1942. On January 2, 1945, the exclusion order was totally rescinded. Another example is the arrest in camps of Germans in England during World War II.

⁶ In June 1963 the Israeli Prime Minister, David Ben-Gurion, who together with his ruling Labor Party strongly supported the continuation of the Military Government, resigned unexpectedly. The change was also a response to the mounting pressure from the Israeli public and many political parties, including the right-wing party Herut, to annul military rule over Israeli Arabs. This effort led in 1966 to the complete revocation of military rule and the equalization of Arab citizens' rights with those of other citizens.

schools. Therefore, the exposure of an individual to this "treatment" was determined both by location and by her year of birth. After controlling for locality and year of birth fixed effects, we use the interaction between a dummy variable indicating the age of the individual in 1964 and whether or not the locality was part of the Military Government zone and had no schools as an exogenous variable and as an instrument for an individual's education. This is a similar identification strategy as that used to estimate the effect of school quality on returns to education (Card and Krueger, 1992), the effect of college education on earnings (Card and Lemieux, 1998) and the effect of school construction on education and earnings (Duflo, 2001). We allowed the affected cohorts to include children aged 4–13 in 1964, using older cohorts to perform placebo tests.

We used data from the 1983 and 1995 Israeli censuses which include information on labor force participation, education, fertility, and locality of residence of all family members. In the 1983 census, the affected cohorts were just over 23–33 years old, making it possible to study the effect of education on early-age fertility. In 1995, the affected cohorts were already aged 36–46, allowing estimation of the effect of education on completed fertility.

We first show evidence that the removal of travel restrictions imposed on part of the Arab population of Israel during the 1950s and early 1960s, raised female education sharply with almost no effect on men education. We then present evidence that this sharp increase in Arab women's education accounts for part of the fertility decline in the affected cohorts. We also present evidence that women's labor-force participation, as well as other potential mechanisms such as age at marriage, marriage rates, and divorce rates, did not play any role in this fertility decline. The estimated impact of women's education on fertility remains very large even after we account for spouse's employment. Furthermore, spouse's education increased immensely through assortative matching and, therefore, probably played a major role in the decline in demand for children. Other mechanisms that seem to be relevant for the role of education in reducing fertility of Arab women in Israel are changes in fertility preferences, knowledge and use of contraceptives, higher bargaining power within the household and role of women in family decisions, reduced religiosity, and positive attitude towards modern health care and modernism in general.

The evidence we present below suggests that the decline in the cost of attending primary and secondary schooling from 1964 onward increased females' years of schooling by 1.02 for women who were aged 4–8 in 1964, and by 0.58 for women aged 9–14 at that time. These educational gains are associated with a large increase in the probability of a woman's completing primary school and also of the completion of at least some years of secondary school. Much smaller effects are estimated for men, suggesting that the travel restrictions did not limit boys' access to schooling as badly.

These very large effects on girls' schooling levels are associated with a sharp decline in completed fertility, measured at 0.61 children in the younger affected cohorts and 0.47 children in the older cohorts. Under the assumption that the historical episode provides a valid instrumental variable for women's schooling, the implied 2SLS estimates show that a one-year increase in maternal schooling caused a 0.6-child decline in fertility. This evidence suggests that the increase in mothers' schooling had a large and negative effect on fertility even though the actual opportunity cost of their time did not change much. Using data from a fertility survey conducted in 1974/75 among a representative sample of some 3000 currently married Arab women under age 55 in Israel, we also find that maternal education was highly correlated with other potential mechanisms, in particular a change in fertility preferences, changes in contraceptive details, a shift in preferences towards quality children and reduced child and infant mortality, higher bargaining power of women as reflected in their larger role in family decisions, decline in religiosity, and positive attitude towards modernism.

The identification assumption in estimating the causal effect of mother's schooling on fertility is that the removal of the travel

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